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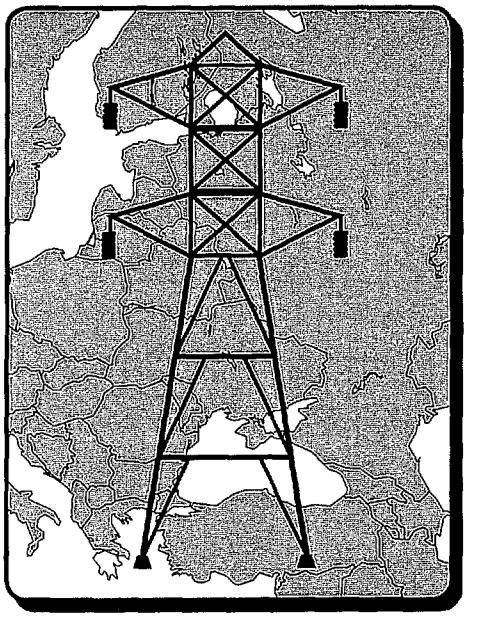
Central and Eastern Europe Regional Energy Efficiency Project EUR-0030-C-00-2053-00



Energy Pricing, Energy Efficiency, and Energy Sector Restructuring Component

Final Report
December 1996

Volume II

Prepared for:
U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy, and Urban Development
Energy and Infrastructure Division

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CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT
EUR-0030-C-00-2053-00

Energy Pricing, Energy Efficiency, and
Energy Sector Restructuring Component
Electric Power Contracting
and Pricing

Task Completion Memorandum

Prepared for:

U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy,
and Urban Development
Energy and Infrastructure Division

Prepared by:

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April 1994

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BALTICS TASK #1

ELECTRIC POWER CONTRACTING AND PRICING

1. Summary

Upon achieving independence from the Soviet Union, the Baltic countries (Estonia, Latvia, and Lithuania) faced immediate and urgent questions regarding the restructuring of the electric power sector. Day-to-day dispatch and operation of the high-voltage grid was subject to the control of a regional Soviet authority, and none of the Baltic countries possessed the mix of generating capacity needed to operate independently. Therefore the power sector was restructured to enable operation of the high voltage grid by a limited liability company (the Baltija Dispatch Center) owned by Eesti Energia, Latvenergo, and the Lithuanian State Power System (LSPS). Since independence, the Baltics have sharply reduced the amount of their electricity trade with Russia and Belarus. The Baltija Dispatch Center now has the ability to limit the area of synchronous operation to Estonia, Latvia, Lithuania, Pskov and Kaliningrad. However, the Baltics continue to maintain AC interconnections with Russia and Belarus and continue to wheel power to Kaliningrad and Pskov, and the Baltic grid is normally operated synchronously with the national power grids of Russia and Belarus.

To assist in power sector restructuring and to facilitate a transition toward a market economy, AID supported a series of seminars designed to help the Baltic countries negotiate international agreements regarding the operation and ownership of the high-voltage grid, the establishment of generating capacity obligations and reserve requirements, the sale of electric energy, and the wheeling of electric energy through the high voltage grid. These seminars provided the power companies and energy ministries with extensive information on U.S. and Canadian experience in power contracting and establishment of reliability standards, as well as comparisons with British (National Grid Company) and Scandinavian (Nordel) experience in these areas.

The need for the task was identified in the final regional Energy Pricing Conference under the Emergency Energy Project (1800015). On September 10, 1992 representatives of the Baltic Energy Council agreed to form a Working Group on electric power contracting and nominated the chief engineer of the Baltija Dispatch Center as the chairman of the Working Group. This Working Group was made up of representatives of the three power companies as well as the Baltija Dispatch Center. At a planning meeting held in October 1992 it was agreed that the three energy ministries would be invited to participate in all of the seminars. Five seminars

were held - in November 1992, December 1992, February 1993, May 1993, and November 1993.

These seminars, together with the meetings of the Working Group, resulted in two major accomplishments:

(1) the regional development and negotiation of bilateral power sales agreements - first an Estonia-Latvia agreement (January 1993) and then a Latvia-Lithuania agreement (April 1993)

(2) the negotiation of a multilateral agreement among all three power systems (April 1994).[1]

These agreements have increased the reliability of power supply in the Baltic region, and have helped to maintain the reliability of the electric power grid in which the Ignalina nuclear plant is operated. The bilateral agreements established a precedent for other bilateral international agreements - for example, the Lithuania-Belarus agreement and a draft Latvia-Russia agreement.

When the Working Group began in October 1992, power was sold under one-month bilateral agreements consisting of one or two pages of text. There were no power sales contracts except verbal agreements backed up by brief notes and letters. There was a rudimentary form of interconnection agreement (the 1992 agreement on "parallel operation") containing 4 or 5 pages of text. By April 1994 power was sold under bilateral sales contracts backed up by a detailed, three-country interconnection agreement reflecting most of the basic principles of North American interconnection agreements. These principles include a requirement that the interchange of electric energy will be governed by bilateral power sales contracts; shared responsibility for meeting a planning reserve margin; and guidelines for conducting power system planning on a regional basis.

This report describes the objectives of the AID program of technical cooperation, the work performed, the results, and the lessons learned.

[1] The multilateral agreement increases the likelihood that future interconnection agreements involving any one of the Baltic countries will involve all three countries. There is now a greater likelihood that a Poland-Lithuania interconnection will involve multilateral negotiations with the participation of the Baltija Dispatch Center rather than bilateral negotiations between Poland and Lithuania. Similarly, there is a greater likelihood that an Estonia-Finland interconnection will involve multilateral negotiations with the participation of the Baltija Dispatch Center rather than bilateral negotiations between Estonia and Finland.

2. Objectives

The objectives of this task were:

(1) To work with the Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries

(2) To promote the development of pricing principles that are consistent with the efficient operation of the regional electrical system and consistent with economic efficiency objectives

(3) To provide information to the Baltic countries regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structures

(4) To help the Baltic countries reach agreement on key issues involving power contracting and pricing.

These objectives were achieved. A Working Group was formed by the Baltic Energy Council to conduct and participate in seminars with AID support and U.S. experts' participation and conduct negotiating sessions without U.S. participation. The Working Group continues to provide a forum for technical-level discussions that support the policy-level meetings of the Baltic Energy Council. The objectives of the Working Group are:

(1) to negotiate the types of international agreements that are needed to maintain a reliable supply of power in the high-voltage electric grid shared by the three countries

(2) to arrange bulk power purchase and wheeling transactions in a market economy; to accomplish the transition from a centrally planned economy to a market economy.[2]

The Baltic participants in the Working Group were particularly concerned about reliability of the high-voltage network due to an excess of reactive power in the transmission grid during the off-peak hours of the day in the off-peak (summer) season, for 1992 and 1993. The adequacy of spinning reserves was also a serious concern due to potential forced outages at Ignalina, fuel shortages, and dependency on three large base load plants in the region.

[2] This statement of objectives is based on statements made by the Estonian, Latvian, and Lithuanian participants in the seminars, and not on a formal document.

3. Work Performed

3.1 Organization of Work and Counterparts

The work conducted under this task involved several organizations: the three Baltic governments (Estonia, Latvia, Lithuania), the three Baltic power companies (Eesti Energia, Latvenergo, and the Lithuanian State Power System), and two regional authorities (the Baltic Energy Council and the Baltija Dispatch Center). This task provided 5 training seminars, materials and technical assistance to all of these organizations.

In response to AID's offer to sponsor the seminars and in response to numerous communications among AID, the Baltija Dispatch Center, RCG/Hagler Bailly, the utilities and the Baltic Energy Council, the energy ministries of the Baltic countries signed an "Agreement to Participate in a Study of Pricing and Contracting for Electric Power" in August and September 1992 (see Appendix C.6). Through this agreement the ministries supported a proposal to establish a program of technical cooperation with USAID in a series of seminars. On September 10, 1992 representatives of the Baltic Energy Council agreed to form the Working Group on electric power contracting.

In October 1992 the Baltija Dispatch Center became the point of contact for the organization and scheduling of all seminars. A close working relationship then developed between the Baltija Dispatch Center and Hagler Bailly. One of the first issues to be resolved was the participation of the three energy ministries; it was agreed that the ministries would be invited to participate in the October 14-15 meeting and in all seminars.

The Working Group held its first meeting on October 14-15, 1992 and the Hagler Bailly task leader attended the October 15 session. The agenda and schedule for the November 1992 seminar was established; the approximate schedules for the December 1992 and February 1993 seminars were established; and a preliminary list of topics to be discussed in future seminars (after November 1992) was agreed upon.

The principal counterpart organization was the Baltija Dispatch Center, which hosted all of the seminars and distributed agendas and documents translated into Russian. An active in-country counterpart (the Baltija Dispatch Center) was needed to maintain communication among the various power companies and energy ministries.

The "secondary" counterpart organizations were the three power companies. The U.S. participants were careful to avoid taking sides in disputes, except to clarify technical issues and provide an accurate description of the way an issue would be resolved in North America. Within the power companies, however, the departments with the most active participation in the seminars were the dispatch departments. The economics departments were less active and apparently were not authorized to share accounting data. Eesti Energia sent its general

counsel to one of the seminars, but none of the other power companies was represented by an attorney.

The "tertiary" counterpart organizations were the energy ministries, which generally had less technical expertise than the power companies. During the October 1992 - April 1994 period, the ministries faced shortages of staff, political changes in the wake of key elections, and reorganizations. The Lithuanian Ministry of Energy was the most active in attendance at the seminars, and played a key role in organizing support for the seminars.

Seminar themes were the result of agreement of the Baltija Dispatch Center and USAID Project Manager. All of the U.S. participants were given topic guidance, instructions, and briefing materials by the task manager. The coordinating role of the task manager was important to the organization of the work and the continuity of the program. The Latvia USAID representative attended the February 1993 and November 1993 seminars. He was invited to all seminars and was debriefed on each.

3.2 Schedule, Activities and Personnel

The original work plan for this task envisioned three seminars plus a Working Group meeting, with the delivery of a final report in September 1993. The scope of work was expanded to five seminars, with a task completion memorandum in April 1994. The scope of work was also expanded to include the participation of NERC. Staffing was as follows:

Task leader:	Charles Zimmermann, Manager, RCG/Hagler Bailly, Inc.
Energy economist/pricing specialist:	Charles Zimmermann
Power systems engineer:	William Dunn, Principal Consultant, ECC, Inc.
Utility economic engineer:	Mark B. Lively, independent consultant
Power contracting specialist:	Robert Stein, Vice President, Energy Supply Planning and Engineering, Central Vermont Public Service Corporation
Reliability specialist:	Thomas Kennedy, Reliability Concepts Workshop Leader, North American Electric Reliability Council

Five seminars were conducted:

1. Seminar on Reactive Power, Reserve Capacity, and Alternative Methods of Determining Electricity Prices in Wholesale Markets
   Date: November 19-20, 1992
   Content: Three papers were discussed. The first paper described different ways to control reactive power and establish reactive power criteria. The second paper described two approaches to pooling of installed capacity and operating reserve obligations: the New England Power Pool and the NORDEL power pool. The third paper described twelve alternative approaches to setting electricity prices in wholesale markets.
   U.S. participants: William H. Dunn, Jr. and Charles Zimmermann

2. Seminar on Electric Transmission Pricing, Time of Use Rates, and Capacity Payments
   Date: December 9-10, 1992
   Content: Five papers were discussed. The first paper described alternative methods of calculating the cost of transmission service. The second paper described the potential benefits of time of use rates and alternative methods of calculating time of use rates. The third paper described the potential benefits of dynamic pricing, i.e., highly flexible time of use rates. The fourth paper described alternative types of capacity obligations and methods of computing capacity payments. The fifth paper was an initial draft of a multilateral Baltic agreement, based on the NEPOOL-Hydro Quebec interchange agreement and the Enerex power pool agreement.
   U.S. participants: Mark B. Lively and Charles Zimmermann

3. Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures
   Date: February 17-18, 1993
   Content: Two papers were discussed. The first paper described the benefits and disadvantages of alternative forms of capacity contracts and joint ventures to build and operate generating stations. The second paper identified problems that would have to be resolved if the Baltic power systems decided to share information on the cost of power generation.
   U.S. participants: Robert Stein and Charles Zimmermann

4. Seminar on Power Sales Agreements and Reliability Agreements **Date:** May 12-13, 1993
   Content: The primary focus of this seminar was on NEPOOL and NPCC reliability standards and the potential application of such standards to the Baltic countries. The other topic was the relationship between bilateral power sales agreements and multilateral agreements. There was a discussion of the question whether bilateral agreements should be replaced by a multilateral power sales agreement, or should merely be supplemented by a multilateral agreement on reserves and reliability.
   U.S. participants: Charles Zimmermann

5. Seminar on Liability Clauses and Direct Demand Side Management Programs
Date: November 15-16, 1993
Content: This seminar included a review of the progress to date in contract negotiations and a discussion of the results of the program. North American experience with interruptible demand programs was described.
U.S. participants: Thomas Kennedy and Charles Zimmermann, with assistance from Robert Archer, AID project officer

A variety of sample contracts were distributed, to illustrate different types of power transactions (see Appendix A.3). Alternative types of power sales and wheeling transactions were described in briefing packages for the first three seminars (see Appendix A.2). Hagler Bailly also collected information on existing electric power transactions among the Baltic countries, on installed capacity, and on costs associated with existing transactions.

4. Results

These seminars, together with the meetings of the Working Group, resulted in:

(1) transfer of power contracting and pricing information to a core group of utility and ministry officials

(2) development of a draft interconnection agreement

(3) the negotiation of bilateral power sales agreements - first an Estonia-Latvia agreement (January 1993; see Appendix C.5) and then a Latvia-Lithuania agreement (April 1993; see Appendix C.4).

(4) the negotiation of a multilateral agreement among all three power systems (April 1994; see Appendix C.2 for a description of the final draft and Appendix C.3 for the November 1993 draft).

These agreements have increased the reliability and security of electric power supply in the Baltic countries by increasing the level of cooperation among the power companies, establishing a shared obligation to maintain reserve margins, and establishing guidelines for emergency procedures (for example, disconnection from most of the Russian grid in the event of an accident in Russia).

The practical results of the program are summarized in an agreement signed on November 16, 1993 (see Appendix C.1).

5. Lessons Learned and Significance of the Work

5.1 Lessons Learned

This task was successful because:

- AID objectives were substantially the same as the objectives of the counterpart organizations.
- AID provided support and guidance to the July 1992 regional energy pricing workshop, which provided a forum for discussion of the concept of a working group on power contracting.
- AID maintained a dialogue with the three countries to identify their needs and to encourage regional cooperation.
- A considerable amount of work was done by the Baltic members of the Working Group as well as the American participants.

AID had four objectives:

(1) To work with the Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries

(2) To promote the development of pricing principles that are consistent with the efficient operation of the regional electrical system and consistent with economic efficiency objectives

(3) To provide information to the Baltic countries regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structures

(4) To help the Baltic countries reach agreement on key issues involving power contracting and pricing.

Among these objectives, (1), (3) and (4) were fully supported by the Baltic participants while objective (2) was partially supported. Although the goal of "efficient operation of the regional electric system" was supported in principle, its implementation would involve economic dispatch, which requires the sharing of information on the short-run cost of power generation. In most power transactions in the Baltics, the seller does not want to reveal his costs to the buyer. Pricing issues were discussed extensively in the seminars, but the pricing clauses actually implemented in contracts were very simple.

To implement objective (1) it was necessary to provide a considerable amount of information and training on reliability standards and agreements that require power companies to maintain reliability standards. The North American Electric Reliability Council (NERC) was represented at the fifth seminar.

When evaluated against AID objectives, the program of technical assistance was successful in meeting objectives (1), (3), and (4). The number of agreements signed (a measure of success regarding the fourth objective) perhaps exceeded AID's original expectations. Objective (2) was supported by the transfer of information and the facilitation of debate on pricing issues, but AID objectives regarding pricing were only partially reflected in signed contracts.

Because of the multi-country character of the task and the participation of multiple organizations, a significant portion of the task leader's work involved collecting information, distributing information, and coordinating the work of the various U.S. and Baltic organizations involved.

Following the fifth seminar, the three power companies and the Baltija Dispatch Center negotiated a multilateral agreement on interconnection and power pooling issues (see Appendix C.2). The negotiating process lasted about five months (November 1993 - April 1994).

5.2 Significance of the Work

When the Baltic countries became independent, AID responded quickly with in-country energy sector assistance programs in November 1991. Technical documents on electric power pricing and least-cost utility planning were delivered to Eesti Energia and Latvenergo in December 1991. Plans for a regional seminar on electric power contracting were developed in January 1992, in a meeting with Janis Pavuls, General Director of Latvenergo. The seminar was held on May 27-28, 1992.

At this time, power reliability was affected by payment problems, which were exacerbated by the rapid increase in fuel prices and inflation of the ruble. "Contracts" were limited to monthly agreements between utilities, based on telephone conversations. For some months, power would flow for the beginning of the month (a period of one or two weeks) without any agreement on power sales prices; in mid-month, a retroactive agreement would be reached.

In 1992-1993 there was a risk of power shortages in the Baltics. In October 1992 a cooling water accident at the Ignalina nuclear station forced Lithuania to shut down much of its industry and receive 300 MW of emergency power from Russia (on ten occasions). During the winter of 1992-93, Latvenergo ran out of heavy fuel oil to run its oil-fired power plants, and was fortunate to have an unexpected surplus of run-of-river hydroelectric energy.

In this context, the successful negotiation of agreements to improve electric power system reliability in the Baltic countries provides a valuable contribution to their energy security and therefore protects their economic security. The rapid response of AID in the 1991-92 period established technical support for negotiations among the countries, leading to the April 1994 multilateral agreement.

5.3 Relevance to Broader Regional Energy Issues

The multilateral agreement among the Baltic countries will help these countries to negotiate, collectively, interconnection agreements with NORDEL and CENTREL.

The Baltic contracts in place today are probably the most detailed electric power agreements in the region encompassed by the former Soviet Union. The program sets an example that other Regional Dispatch Centers may follow.

Representatives of Russia, Belarus, Estonia, Latvia, and Lithuania met in Minsk in February 1993 to discuss the need for a 5-country agreement on reliability standards. At this meeting the Baltija Dispatch Center was asked to draft a multilateral agreement on reliability issues. Under the April 1994 multilateral agreement among the Baltija Dispatch Center and the Baltic power companies, the Dispatch Center is authorized to negotiate an agreement on parallel (synchronous AC) operation with the power systems of Russia and Belarus.

PROCEEDINGS OF A SEMINAR ON REACTIVE POWER, RESERVE CAPACITY, AND ALTERNATIVE METHODS OF DETERMINING ELECTRICITY PRICES IN WHOLESALE MARKETS

Riga, Latvia
November 19-20, 1992

Prepared for:

Bureau for Europe
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

HBI Reference No. 92-4070-205

Prepared by:

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November 1992

16

CONTENTS

DESCRIPTION OF THE SEMINAR

AGENDA

LIST OF PARTICIPANTS

PAPERS PRESENTED:

- William H. Dunn, Jr. "Consumption of Excess Reactive Power."
- William H. Dunn, Jr. "Measurement of Reserve Capacity and Definition of Reserve Obligations."
- Charles F. Zimmermann. "Alternative Methods of Determining Electricity Prices in Wholesale Markets."

DESCRIPTION OF THE SEMINAR

On November 19 and 20, 1992, a seminar on electric power agreements and transactions was held at the Baltija Dispatch Center in Riga, Latvia. This seminar was organized by the Dispatch Center in cooperation with the U.S. Agency for International Development (AID) and with RCG/Hagler, Bailly, Inc., a U.S. consulting firm whose participation in the seminar was funded by AID's Bureau for Europe. Participants from Estonia, Latvia, and Lithuania attended the seminar and took part in the discussions. Presentations were given by two representatives of the Baltija Dispatch Center and by two U.S. consultants. The seminar focused on three topics:

- consumption of excess reactive power
- measurement of reserve capacity and definition of reserve obligations
- alternative methods of determining electricity prices in wholesale markets.

The key participants in the seminar are the members of a working group on electric power contracting and pricing. The members of this working group were selected on September 10, 1992 in accordance with a decision of the Baltic Energy Council, an organization containing representatives of the three power systems (Eesti Energia, Latvenergo, and the Lithuanian State Power System) and the three energy ministries (the Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy). The Baltija Dispatch Center is a limited liability company that is owned by all three countries, managed by the Baltic Energy Council, and funded by the three power systems. In this context the Baltic Energy Council has a management role that is comparable to the role of the board of directors of a private corporation. The responsibility of the working group is to assist the Baltic Energy Council in developing international agreements on electric power interconnections, sales, and wheeling.

The working group includes representatives of Eesti Energi, Latvenergo, the Lithuanian State Power System, and the Baltija Dispatch Center. The Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy were invited to send representatives to the seminar. The Latvian and Lithuanian ministries were represented but the Estonian ministry was unable to send a representative in the November 19-20 time frame.

The topics for the November seminar were selected by the working group at its first meeting, which was held at the Baltija Dispatch Center on October 14 and 15, 1992. The role of U.S. consultants in the seminar was to provide information to the working group on the types of

interconnection agreements and power sales agreements made by power systems in the United States, Canada, western Europe, and Australia.

The seminar had three objectives:

1. Discuss methods of coping with reactive power surpluses in the Baltic power systems and the way in which the cost associated with artificial consumption of reactive power should be shared among the Baltic power systems.

   This issue is related to the broader question of how the three countries should share the cost of maintaining and operating a transmission grid that was built as a unified system across Estonia, Latvia, Lithuania, and portions of Russia and Belarus. When the level of power flows is substantially below the level for which the transmission system was designed, a surplus of reactive power can develop. In 1992 the surplus of reactive power became a serious problem and the cost of compensating for this surplus became significant; selected hydro units were operated in synchronous condensor mode.

2. Discuss the methods of measuring the amount of reserve capacity that is actually available to meet load in the Baltic countries, the obligations of one power system to provide reserve capacity to another, and the method of payment for reserve capacity provided to another power system or systems.

   This issue is related to the question of how the three countries should share access to the generating capacity that was built as a part of the Northwest Interconnected Power System and sited without regard to the boundaries that have now become international borders. An agreement is needed to provide enough reserves to make up for an unscheduled shutdown of one of the 1300 MW Ignalina nuclear units. Without such a reserve, a nuclear unit shutdown would cause an immediate curtailment of power to customers.

3. Discuss alternative methods of determining electricity prices in wholesale markets.

   The Baltic countries are involved in international electric power sales transactions for which it is difficult to determine the appropriate prices to be charged. An agreement on the method of determining prices would facilitate the negotiation of prices.

All three topics were discussed, but specific or detailed agreements were not developed during the seminar.

This seminar is the first in a series of three seminars in an electric power contracting and pricing program funded by AID. The broader objectives of this program are:

(1) To work with the Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries

(2) To promote the development of pricing principles that are consistent with the efficient operation of the regional electric system and consistent with economic efficiency objectives.

(3) To provide information to the Baltic countries regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structures.

Before the working group on power contracting and pricing was formed by the Baltic Energy Council, two regional seminars were organized and implemented with AID funding. A seminar on international power pricing was held at the Baltija Dispatch Center on May 27-28, 1992, and a regional seminar on energy pricing was held at the Institute of Physical Energetics of the Latvian Academy of Sciences on July 16-17, 1992. These earlier seminars covered topics related to electricity pricing, including the terms of power pooling agreements and the development of tariffs based on marginal cost pricing principles.

Seminar on Reactive Power, Reserve Capacity, and Alternative Methods of Determining Electricity Prices in Wholesale Markets

Agenda

Location: Dispatch Center Baltija, 1 Shmerla str., Riga, Latvia

Date: Thursday, November 19 and Friday, November 20, 1992

Countries involved: Estonia, Latvia, Lithuania

Agenda for November 19. 1992

9:30	Registration of participants
10:00	Introductory remarks by Vilnis Kreslinsh, director of DC Baltija.
10:30	Presentation by Juri Pervushin (DC Baltija) on reactive power compensation in the Baltic power systems in 1992.
11:00	Presentation by William Dunn (RCG/Hagler, Bailly, Inc.) on consumption of excess reactive power.
11:30	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals regarding excess reactive power.
13:30	Lunch
15:00	Presentation by Metcheslav Vonsovich (DC Baltija) on the present situation with regard to availability of reserve capacity. Identification of issues to be resolved.
15:20	Presentation by William Dunn (RCG/Hagler, Bailly, Inc.) on measurement of reserve capacity and definition of reserve obligations in the New England Power Pool and in the Nordel system.
17:05	Break
17:20	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals for measurement of reserve capacity and definition of reserve capacity obligations.

Agenda for November 20. 1992

9:30	Meeting of the working group
10:00	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals for measurement of reserve capacity and definition of reserve capacity obligations. (continued)
11:00	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on alternative methods of determining electricity prices in wholesale markets.
13:30	Lunch
14:20	Discussion led by Metcheslav Vonsovich (DC Baltija) on alternative methods of determining electricity prices in wholesale markets.
16:00	Closing remarks by Vilnis Kreslinsh (DC Baltija), Charles Zimmermann (RCG/Hagler, Bailly, Inc.), William Dunn (ECC, Inc.)

Seminar on Reactive Power, Reserve Capacity, and Alternative Methods of Determining Electricity Prices in Wholesale Markets

Riga, Latvia
November 19-20, 1992

List of Participants

USA

Charles F. Zimmermann	RCG/Hagler, Bailly, Inc., Manager
William Dunn	ECC, Inc., Principal Consultant

DISPATCH CENTER BALTIJA

Vilnis Kreslinsh	Director of Dispatch Center Baltija
Metcheslav Vonsovich	Chief Engineer of Dispatch Center Baltija
Juri Pervushin	Deputy Chief of Grid Network Planning
Janis Ositiș	Chief of Dispatch Department
Karl Brinkis	Chief of Relay Protection and Grid Network Planning
Tatiana Ovsjukova	Chief Specialist

ESTONIA

Valerij Peterson	Chief of Dispatch Department of Eesti Energia
Joulo Mejbaum	Deputy Chief of Dispatch Department of Eesti Energia
Mikel Viese	Control Engineer of Dispatch Department of Eesti Energia

LATVIA

A. Berzinsh	Ministry of Industry and Energy
Leons Marcinkus	Chief of Economics Department of Latvenergo
Eduards Rozental	Chief of Dispatch Department of Latvenergo
Peteris Klavinsh	Chief of Planning Department of Energocontrol Division of Latvenergo

LITHUANIA

Ada Maceziskiene	Ministry of Energy
Janas Balinskis	Deputy Director of LSPS
Gedeminas Volskis	Chief of Economic Department of LSPS
Augustinas Kiselius	Deputy Chief of Dispatch Department of LSPS

CONSUMPTION OF EXCESS REACTIVE POWER

Prepared for:

Seminar on Electric Power Contracting and Pricing
in Estonia, Latvia, and Lithuania
19-20 November 1992

Control Center of the Baltic Power Systems Ltd.
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REACTIVE POWER CONTROL

- Reactive Power control means voltage control

- Why control voltage?
  - Prevent damage to power system equipment
  - Satisfactory voltage to customers/loads
  - Reduce system losses

SOURCES OF REACTIVE POWER

- Generators running over-excited
- Static Capacitors
- Static Var Compensators (SVC)
- Line Charging
- Synchronous Condensors

Also,

- Under-Load Tap Changing transformers can move Reactive Power between voltage levels

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CONSUMPTION OF REACTIVE POWER

- Generators running under-excited
- Load (without compensating distribution capacitors)
- Static Var Compensators (SVC)
- Reactors
- Synchronous Condensors
- Transformers
- Line Loading

WAYS TO CONTROL REACTIVE POWER

- Change generator excitation
- Switch capacitors/reactors/SVC
  - SCADA
  - Voltage Control
  - Time Clock
- Switch lines
- Adjust Under-Load Tap Changing transformers
- Start synchronous condensors, including:
  - Decoupled combustion turbines
  - Hydro units in synchronous condensor mode

BEFORE STARTING SYNCHRONOUS CONDENSORS TO LOWER VOLTAGE

- Make sure all capacitors in the area have been switched out
- Make sure all reactors in the area have been switched in
- Make sure all SVC's in the area are in the Reactive Power absorption mode
- Make sure all generators in the area are running under-excited to the extent technically permissible
- Make sure all Under-Load Tap Changing transformers in the area are drawing Reactive Power away from the problem area, to the extent feasible. Use tap stagger between adjacent transformers to increase Reactive Power consumption.

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BEFORE STARTING SYNCHRONOUS CONDENSORS

If that does not solve the problem:

- Switch out lines not needed for reliability

Then, if there is still a problem:

- Start synchronous condensors
- Start hydro units and/or decoupled combustion turbines in synchronous condensor mode

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ESTABLISH REACTIVE POWER CRITERIA

- For Generation:
  - Leading and lagging power factor capability
  - Voltage Schedules (vary by time of day and season)
- For Transmission/Distribution:
  - All capacitors and reactors switchable
  - SVC's, where appropriate
  - Under-Load Tap Changing transformers, where appropriate

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ESTABLISH REACTIVE POWER CRITERIA

- For Load:
  - Power factor, as seen from the transmission system, within defined power factor range. Such range should vary with load level and season
  - Compliance with the above requires many capacitors to be switchable
  - Retail tariffs with power factor requirements and/or billing

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RECOMMENDATIONS

- At this stage of development, the Baltics do <u>not</u> need a complex Reactive Power billing system

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RECOMMENDATIONS

- Therefore, if modified dispatch of Reactive Power sources and consumption does not resolve the problem, the following actions could be taken:

  - Treat Real Power consumption for Reactive Power control (in synchronous condensors and in decoupled combustion turbines and hydro units operating in a synchronous condensor mode), as:

    1. Increased transmission losses to be shared by all three countries

    2. An expense of the transmission system (priced at marginal energy cost) and allocated as part of transmission system costs

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RECOMMENDATIONS

- Develop penalty charges for non-compliance with criteria applicable to:

  1. Generators not producing or absorbing Reactive Power as required

  2. Load not within power factor criteria

  Pricing for these penalties could relate to the projected cost of compliance

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MEASUREMENT OF RESERVE CAPACITY
&
DEFINITION OF RESERVE OBLIGATIONS

Prepared for:

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MEASUREMENT OF RESERVE CAPACITY

TWO TYPES OF RESERVE

- Installed Reserve

  Probabilistically determined amount of total installed capacity needed to meet desired level of reliability while recognizing variability of load, generation availability and mutual assistance

- Operating Reserve

  Amount of spinning (synchronized) and fast start reserve capability needed to preserve the integrity of the system following a worst contingency and to restore the system to be able to handle the next contingency within a defined time period.

MEASUREMENT OF RESERVE CAPABILITY

- Installed Reserve

  The total audited capability of all generating resources of a utility including purchases from other utilities that are backed-up by audited capability

- Operating Reserve

  The difference between each operating unit's actual output and its audited capability, less any temporary limitations, plus the audited capability of any off-line fast start units, less any temporary limitations

DEMAND-SIDE MANAGEMENT (DSM)

- DSM can contribute to both Installed Reserve and Operating Reserve obligations
- Installed Reserve DSM can include techniques such as slow response:
  - Interruptible Loads
  - Customer Generation

Page 1 of 2

DEMAND-SIDE MANAGEMENT (DSM)

- Operating Reserve DSM can handle techniques such as fast response:
  - Interruptible Loads
  - Customer Generation
  - Remote control of uses such as water heating, space heating, etc.
  - Voltage reduction
  - Other operator controlled demand reducing actions

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HOW TO AUDIT CAPABILITY

Installed Reserve

- Seasonal testing of capability under defined conditions:
  - Number of hours
  - Ambient temperature, if applicable
  - River flow, if applicable
  - Station configuration
- Details of "proof" required must be elaborated
- Occasional unannounced "spot tests" (say, 1 per month) should be allowed to validate ratings during actual day-to-day operations
- Additional complexity for multiple ratings (i.e. normal, reserve and maximum)

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HOW TO AUDIT CAPABILITY

Operating Reserve

- On-Line testing of response rates:

  Periodic (say, 1 per month) testing of the MW/Minute response rate of units under both manual and automatic control, if applicable

- Off-Line testing of fast start units:

  Periodic (say, 1 per month) testing of the time it takes off-line fast start units to get on-line and fully loaded

- Details of "proof" required in both cases must be elaborated

- Additional complexity for multiple ratings (i.e. normal, reserve, maximum)

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HOW TO AUDIT CAPABILITY

Demand-Side Management (DSM)

- Seasonal testing of response and MW of load relief actual achievable from:
  - Interruptible Loads
  - Customer Generation
  - Operator initiated remote control
  - Voltage reduction
- Details of "proof" required must be elaborated
- If customer payments are associated with DSM capability, penalties must be included for non-performance

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DEFINITION OF

RESERVE OBLIGATIONS

INSTALLED CAPACITY OBLIGATIONS

Northeast Power Coordinating Council (NPCC)*

"Each Area's generating capability will be planned in such a manner that, after due allowance for scheduled maintenance, forced and partial outages, interconnections with neighboring Areas and regions, and available operating procedures, the probability of disconnecting non-interruptible customers due to generation deficiency, on the average, will be no more than once in ten years."

* NPCC is 1 of the 9 Regional Councils of the North American Electric Reliability Council (NERC). The New England Power Pool (NEPOOL) is one of the Areas of NPCC.

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OPERATING RESERVE OBLIGATIONS

Northeast Power Coordinating Council (NPCC)

"Each Area shall make every effort to schedule outages of generating capacity in such a manner that generating supply, with allowance for forced outages, will be adequate to meet the Area's forecasted load and reserve requirements, in accordance with the NPCC Operating Reserve Criteria."

The NPCC Operating Reserves Criteria cover:

- Ten-Minute Reserve (including synchronized or spinning component)
- Thirty-Minute Reserve
- Automatic Generating Control (AGC)
- Distribution (Pattern) of Reserve
- Sustainability of Reserve

MEETING OBLIGATIONS

Two Approaches

- Each utility does it on their own
- Groups of utilities do it by cooperating:
  - On a bilateral bases
  - Through a pooling arrangement

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FIRST EXAMPLE OF POOLING OF INSTALLED CAPACITY OBLIGATIONS & OPERATING RESERVE OBLIGATIONS

New England Power Pool (NEPOOL)

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NEPOOL

POOLWIDE INSTALLED CAPACITY REQUIREMENT
(Objective Capability)

LEADS TO PARTICIPANT CAPABILITY RESPONSIBILITIES

- 70% weighted by respective annual peaks
- 30% weighted by respective average monthly peaks
- influenced by:
  - Performance Incentive Program
  - New Units
  - Tie Line Adjustment
  - Adjustment and Deficiency Charges

NEPOOL

PERFORMANCE INCENTIVE PROGRAM (PIP)

- Compares actual availability to the target availability (by class of unit) used in setting Objective Capability
- Does it by unit entitlement (share)
- Adjusts each Participant's Capability Responsibility based on the weighted difference between actual and target availability for its units
- The adjustment is done at the rate corresponding to changes in NEPOOL's Objective Capability for incremental changes in all target availabilities
- "Safety Net" protects against impact of catastrophic failure (reason for pooling)

NEPOOL

NEW UNITS

A way of allocating the incremental reliability benefits/impacts from the design performance of a New Unit

- Calculate Objective Capability using the characteristics and target availabilities of all units including the New Units

- Calculate Objective Capability replacing the New Units with "Proxy" unit characteristics and target availabilities (400 MW, 10.85% forced outage rate, 9.62% planned outage rate, 2.3% summer derating)

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NEPOOL

NEW UNITS

- The Objective Capability calculated using the Proxy Units is used to determine initial Capability Responsibilities for the Participants
- The difference between the two Objective Capability calculations is charged or credited to the Participants holding the entitlements in the New Units
- The PIP also applies to the New Units

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NEPOOL

TIE LINE ADJUSTMENTS

- Objective Capability is calculated assuming certain transfer capabilities and emergency assistance available between NEPOOL and other adjoining pools/utilities
- Objective Capability is calculated assuming certain contractual usage of a portion of these transfer capabilities
- If actual contractual use for meeting Capability Responsibility requirements is different from that assumed in setting Objective Capability, an adjustment to required Objective Capability is performed

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NEPOOL

ADJUSTMENT & DEFICIENCY CHARGES

- Approximates the carrying charges of installing new combustion turbine peaking capacity, together with an allowance for associated wheeling costs

  Adjustment Charge: US $72/KW-Yr

  Deficiency Charge: US $33/KW-Yr

- Deficiency charges can be waived for circumstances beyond the control of the Participant

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NEPOOL

OPERATING RESERVE

Sufficient units are kept on Automatic Generation Control (AGC) to insure that tie lines to external pools/utilities are at scheduled values and the frequency is maintained at 60.00 Hz ± 0.02 Hz

Sufficient reserve is maintained to cover 1-½ times the largest contingency. Of this total reserve:

- 1/3 is available in 30 minutes
- 2/3 is available in 10 minutes (at least ⅔ of the 10 minute reserve has to be synchronized and at least ½ of that has to be on AGC)

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SECOND EXAMPLE OF POOLING OF INSTALLED CAPACITY OBLIGATIONS & OPERATING RESERVE OBLIGATIONS

Scandinavian Power Pool (NORDEL)

NORDEL

Each country is responsible for maintaining, at all times, its share of the regulation response and production reserves required in NORDEL. There is no Installed Capacity Obligation, as such.

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NORDEL

- Each country prepares its own "power and energy balance" for the next three years
- These are compiled by the NORDEL Operations Committee and distributed
- The plans for the next year allow identification of possible and suitable exchanges of power and/or energy to cover outages
- Bilateral meetings are held throughout the year between the owners of the interconnections
- These meetings serve to identify where outage plans can be modified to minimize total costs or maintain operational security

NORDEL

WEEKLY INFORMATION EXCHANGE

- Each week, the operations management personnel in each country exchange information on:
  - The largest loss of production which can occur
  - Planned line-outages
  - Transmission limitations on the tie lines and in the national networks
  - Operating reserves
  - Forecast marginal values
- Each country follows NORDEL guidelines to determine its marginal cost of energy

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NORDEL

ACTUAL DISPATCH

- Each country determines the optimum dispatch of its resources to meet the demands of its customers at the lowest cost
- This leads to determination of each country's marginal cost of energy, which are exchanged with the other countries
- Agreements are made on power exchanges:
  - shall be made with regard to valid notification time, usually 1 hour
  - shall specify the amount and duration, usually 1 to several hours
  - shall specify the price, usually the average of buyer's and seller's marginal values

NORDEL

PRODUCTION CONTROL

- Primary regulation is usually set at 6,000 MW/Hz
- Responsibility for primary regulation is allocated in proportion to annual consumption as follows:

Norway	1,940
Sweden	2,630
Finland	1,160
Denmark	270

- Primary regulation responsibility can be met by purchases from another country
- Deviations from scheduled interchange are priced in accordance to agreements which are specific to the interconnection involved

NORDEL

PRODUCTION RESERVES

- Operating reserve is broken down into two categories:
  - Normal operating reserve is available for frequency regulation and to cover deviations from forecasts
  - Disturbance reserve is for disturbances in the power balance or in the transmission system
- Activation time for both normal and disturbance reserves is subdivided into:
  - Instantaneous reserve maximum of 30 seconds
  - Fast reserve maximum of 15 minutes
  - Slow reserve maximum of 4 hours

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NORDEL

PRODUCTION RESERVES

- The instantaneous component of both normal and disturbance operating reserve is covered by the production control MW/Hz requirements

- The fast and slow components of both normal and disturbance operating reserves are dimensioned after local criteria and are not coordinated within NORDEL on a regular basis

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NORDEL

DAILY NORDIC POWER EXCHANGES

- Each country determines its marginal power value following NORDEL standards for calculation
- Most exchanges are transacted on a split the savings basis
- In cases where the purchasing country does not have self generation options or where the costs of their options are extreme, a cap is placed on the seller's price of 75 SEK/MWh above its marginal cost to supply
- These daily power exchanges are conducted to minimize total production costs and to:
  - utilize the combined hydro resources and avoid spilling
  - utilize the combined nuclear resources optimally
  - utilize fossil resources in cost order

NORDEL

OTHER CHARACTERISTICS

- Denmark and Finland are power dimensioned. This means that if the power stations have sufficient capacity to cover maximum demand, there is no problem with covering the energy requirements.

- Sweden and Norway are energy dimensioned. This means that if the annual energy demand can be satisfied, there is no problem covering the maximum demand.

- The large variations in annual hydro production are balanced by transfers between the power dimensioned and energy dimensioned systems

- Participation in power exchanges is voluntary

ALTERNATIVE METHODS OF DETERMINING ELECTRICITY PRICES IN WHOLESALE MARKETS

Prepared for:

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ALTERNATIVE METHODS OF DETERMINING ELECTRICITY PRICES IN WHOLESALE MARKETS

Objectives of this presentation:

- to provide information regarding the alternative methods that could be used to determine the prices of electricity purchased and sold by Baltic countries

- to identify pricing methods that are consistent with the efficient operation of the regional power system and consistent with economic efficiency objectives.

Funding for U.S. participation in this seminar is provided by the U.S. Agency for International Development (AID). AID's broader objective is to help the Baltic countries make a transition to a market economy.

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TRANSACTIONS WITHIN THE SCOPE OF THIS PRESENTATION

Sale of both capacity and energy

If power system A has a contract to provide baseload capacity for system B, it will be normal for B to purchase energy generated from this capacity. Most power sales transactions involve capacity and energy.

Sale of electric energy (without the sale of capacity)

(1) If power system A can generate electricity more cheaply than system B, it is possible for A to deliver energy to B on a short-term basis, without making a long-term commitment to provide capacity to B.
(2) If A and B cannot agree on the terms of a capacity contract, it is possible that A and B will be able to negotiate the sale of energy alone.

Sale of electric generating capacity (and energy, when needed)

It is possible for power system A to have a contract to maintain reserve capacity for system B, and receive payment for this reserve, even when the capacity is not used to deliver energy to B.

TRANSACTIONS OUTSIDE THE SCOPE OF THIS PRESENTATION

Energy exchange

(1) Power systems A and B may find that it is cheaper to exchange energy with each other at different locations than to generate and transmit energy without such exchanges.
(2) If power system A can deliver energy to system B and B can deliver an equivalent amount of energy to system C without transmitting energy received from A, it will be possible for A to provide energy to C by negotiating an exchange agreement with B. Under this agreement B delivers energy to C, in exchange for the energy received from A.

Sale of both transmission capacity and transmission service

If power system A has a contract to provide transmission capacity for the benefit of system B, it will be normal for B to use this capacity to transmit energy.

Sale of transmission service (without the sale of capacity)

It is possible for A to provide transmission service to B on a short-term basis, without making a long-term commitment to provide transmission capacity to B.

DEFINITIONS OF SELECTED TERMS

Power system

For this presentation, a power system is defined as an enterprise which owns generation, transmission, and distribution facilities. Examples are Eesti Energia, Latvenergo, and the Lithuanian State Power System. Power systems in the United States are owned by private companies and by the federal government, state governments, and city governments.

Customer

A customer is an individual, an industrial enterprise, a government institution, or a power system that purchases electricity or pays for transmission services. Any organization that is billed for electricity use is a customer. For example, Latvenergo is a customer of Eesti Energia.

Consumer

An electricity consumer is a customer who does not sell, generate, transmit, or distribute electricity.

Wholesale market

A power system can sell electricity in two markets: (1) a retail market, in which electricity is sold to consumers, and (2) a wholesale market, in which electricity is sold to other power systems (or to a grid company that does not sell to consumers).

Electricity prices

Electricity prices include all of the prices related to the sale of electricity, and may include energy charges, demand charges, customer charges, and charges for reactive power.

Methods of determining prices

A method of determining prices is a set of general concepts and principles used to calculate prices. The selection of a method reflects an economic philosophy as well as technical considerations.

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DEFINITIONS OF TERMS

Domestic market

For a power system, the domestic market includes all of the customers located within the country where the power system is located. For Eesti Energia, Latvenergo, and the Lithuanian State Power System (LSPS) the domestic market is only a retail consumer market. For many U.S. utilities the domestic market includes both a retail and a wholesale market.

Export market

Electricity is exported when it is sold by a power system in one country to a customer in another country. It is normal in market economies for the export market to be limited to a wholesale market. Therefore an export market is a particular kind of wholesale power market - one in which international trade is involved.

When both the exporting nation and the importing nation have hard currencies, power import and export agreements can be very similar to other types of wholesale power agreements. For example, agreements between U.S. and Canadian power systems are similar to agreements among U.S. power systems.

Power pool

A power pool is an association of two or more interconnected power systems having an agreement to coordinate operations and planning for improved reliability and efficiency. Because Eesti Energia, Latvenergo, and the Lithuanian State Power System have agreed to coordinate operations through the Baltija Dispatch Center, they are part of a power pool. The Northwest Interconnected Power System was a power pool.

Reliability council

In the United States and Canada, a reliability council is an association that is formed to promote the reliability and adequacy of power supply over a large region. The ten reliability councils cover all of the United States and Canada. Two of these reliability councils are power pools. The North American Electric Reliability Council (NERC) is a federation of the ten regional reliability councils.

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TERMS USED IN ELECTRIC RATE DESIGN

Customer class

A customer class is a category of customers that is distinguished for the purpose of calculating tariffs. In former socialist economies there may be only two customer classes, household and industrial. Customer classes in the United States include residential, commercial (or "small light and power"), industrial (or "large light and power"), public street and highway lighting, other public authorities, railroads, and wholesale customers.

Revenue requirement

It is possible to calculate tariffs so that for planning purposes, total annual revenue equals total annual cost (including an allowance for a return on capital investment). This total annual cost is called the revenue requirement.

Revenue requirement = Capital carrying charge + Fuel cost + Operating cost + Maintenance cost

Capital carrying charge

The capital carrying charge (or annual capital cost) is the amount of revenue needed to pay interest on debt, profit on shareholders' equity, depreciation, amortization, income taxes, and taxes on the value of land, buildings and equipment owned by the power system. (For more information see U.S. Department of Energy, Electric Plant Cost and Production Expenses 1990, pages 126-128.)

Allowed rate of return on equity

In the United States power sector the profits of shareholding companies are limited by price controls that are set by state governments and by the Federal Energy Regulatory Commission (FERC). To set acceptable price levels the regulatory authority must determine the annual percentage rate of return on shareholders' equity capital that should be allowed. This percentage is called the allowed rate of return on equity. This rate is usually determined by estimating the rate needed to attract equity capital.

A Method for Estimating Generation Expenses for Power Plants*

Generation expense =
Capital carrying charge + Fuel expenses +
Operation expenses + Maintenance expenses

Capital carrying charge =
(Net investment in plant x Rate of return) + Income taxes
+ Depreciation and amortization + Taxes other than income taxes

Net investment in plant =
Gross investment in power plant - Accumulated depreciation
- Deferred income taxes - Deferred income tax credit
+ Working capital

Accumulated depreciation =
(Age of power plant / Assumed economic life of power plant)
x Gross investment in power plant

Working capital =
Annual fuel and operation and maintenance expenses / 8

Rate of return =
(Common stockholders' share of capitalization
x Rate of return on common stock)
+ (Preferred stockholders' share
x Rate of return on preferred stock)
+ (Debt share of capitalization
x Average interest rate on debt)

Depreciation and amortization =
Gross investment in power plant / Economic life of plant

* This method was developed by the U.S. Department of Energy to compute generation expenses for individual power plants. To set tariffs it is usually not necessary for a power system to calculate capital carrying charges for individual stations.
Source: U.S. Department of Energy, Energy Information Administration, Electric Plant Cost and Power Production Expenses 1990, DOE/EIA-0455(90), pages 11, 126-128.

TERMS USED IN ELECTRIC RATE DESIGN

Fully distributed cost

When the revenue requirement is allocated among customer classes, the cost to a particular customer class is called a fully distributed cost. This approach to pricing is commonly used when a power system cannot earn profits from exports (for example, when it is a net importer).

Fuel and purchased power adjustment clause

A fuel and purchased power adjustment clause is a tariff provision designed to ensure that an increase (or decrease) in the cost of fuel and/or purchased power is matched by an increase (or decrease) in revenue. When actual revenue exceeds actual cost there is a "cost over-recovery." When actual cost exceeds actual revenue there is a "cost under-recovery." The adjustment clause may be designed to eliminate both conditions.

TERMS USED IN ELECTRIC RATE DESIGN

Short run marginal cost (SRMC) of energy

The SRMC of energy is the estimated cost per kWh of supplying an additional kWh of energy, at a particular hour of a particular day, using existing plant and equipment and using the available fuel supply. SRMC is often used to compute prices in short term economy transactions; for example, the price of economy energy may equal SRMC plus a profit allowance.

Short run marginal cost of capacity

If it is possible to sell additional capacity using existing plant and equipment, the SRMC of capacity is the estimated cost per kW of supplying an additional kW of capacity in a particular time frame (for example, the month of January) using existing plant and equipment and using the available fuel supply. The SRMC of capacity is a concept that is not commonly used in pricing.

Long run marginal cost (LRMC) of energy

The LRMC of energy is the projected cost per kWh of supplying an additional kWh of energy in a particular portion of the year (for example, the peak hours during the winter season) over a period of many years, using both new and existing plant and equipment and using fuel from the sources of supply that are planned for the future.

Long run marginal cost of capacity

The LRMC of capacity is the projected cost per kW of supplying an additional kW of capacity in a particular portion of the year (for example, the peak hours during the winter season) over a period of many years, using both new and existing plant and equipment and using fuel from the sources of supply that are planned for the future.

ALTERNATIVE APPROACHES TO PRICING

Approaches based on distributed cost

1) Seller's fully distributed cost

2) Premium above seller's fully distributed cost

3) Seller's cost at specific generating stations

4) Split savings

Approaches based on marginal cost

5) Seller's SRMC (for recovery of variable cost)

6) Regional SRMC (for recovery of variable cost)

7) Regional SRMC (for recovery of fixed and variable cost)

8) Regional SRMC plus capacity charges

Approaches based on competitive bidding

9) Competitive bidding for energy

10) Competitive bidding for capacity

Approaches based on prices in other countries

11) Published prices *

12) Calculations based on generation cost *

* These approaches are not recommended and and are very rarely used in market economies, but are included for comparison.

No single approach is recognized as the standard in market economies.

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APPROACHES BASED ON DISTRIBUTED COST

Seller's fully distributed cost

The tariff system is designed to ensure that the seller's total revenue matches the seller's revenue requirement - the total annual cost (including profit) of providing electricity to retail (domestic) customers and wholesale (foreign) customers. Tariffs are intended to allocate costs fairly among customer classes. The same pricing principles are applied to domestic and foreign customers. The buyer is assured that the profits of the seller will not be excessive, but the buyer pays a share of the seller's cost increases. Export prices are raised when the seller faces low capacity utilization or high fuel prices. Adjustment clauses (for example, a fuel and purchased power adjustment clause) may be used to ensure that actual revenues match actual costs, for certain cost categories.

Revenue requirement = Domestic revenue + Export revenue

In the United States, tariffs to retail customers are usually based upon fully distributed costs. The concept is easily applied to wholesale customers.

Structure of export tariffs

Option 1: The seller does not dedicate firm capacity to the buyer, and the buyer pays an energy charge only. The energy charge may be adjusted hourly or daily. The sale can be terminated by the seller without notice.

Option 2: The seller agrees to dedicate firm capacity to the buyer, but the buyer pays an energy charge only. The energy charge includes an allowance designed to compensate the seller for the annual capital cost associated with this capacity commitment. The energy charge may be adjusted hourly, daily, or monthly.

Option 3: The seller agrees to dedicate firm capacity to the buyer, who pays a capacity charge and an energy charge. The capacity charge is computed to compensate the seller for the annual capital cost associated with the seller's capacity commitment. The energy charge may be adjusted hourly or daily. The capacity charge may be adjusted monthly or annually.

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APPROACHES BASED ON DISTRIBUTED COST

Premium above seller's fully distributed cost

In a power pool agreement, each power system may take responsibility for constructing and maintaining a certain amount of reserve capacity. When a power system must purchase electricity from other systems because it has a deficiency of capacity, the price of this electricity may include the seller's fully distributed cost plus a premium. This pricing system tends to encourage the construction of reserve capacity, which can be sold at a premium.

For example, the New England Power Pool (NEPOOL) has three types of outage service. In each category the price of electricity contains a premium:

- a 5 percent premium for Scheduled Outage Service (SOS)

  The premium is applied to either (1) the full load average rate for the buyer's generating unit out on scheduled outage or (2) the estimated average annual cost of supply for SOS, whichever is greater.

- a 10 percent premium for Unscheduled Outage Service

  The premium is applied to either (1) the full load average rate for the buyer's generating unit out on unscheduled outage or (2) the estimated average annual cost of supply for SOS or (3) the sellers' average actual hourly cost of supply for Unscheduled Outage Service, whichever is greater.

- a 15 percent premium for Deficiency Service

  The premium is applied to either (1) the estimated average annual cost of supply for SOS or (2) the seller's average actual hourly cost of supply for Deficiency Service, whichever is greater.

<u>Structure of export tariffs</u>

A premium can be applied to any tariff structure. Any of the three options described on the previous page (for seller's fully distributed cost) may be used.

Premium above seller's fully distributed cost:

Issues involving the distribution of operating profits

The seller's fully distributed cost is supposed to be sufficient to provide the seller with a reasonable return on invested capital. If the seller is able to sell power at a premium above fully distributed cost, the seller will earn additional operating profits. Where do the operating profits go?

There are several possible outcomes.

> Option A: Operating profits from electricity exports are added to the net income of shareholders, who may decide to use these funds to provide capital for the power system or use these funds to pay dividends.
>
> Option B: Operating profits from electricity exports are used to reduce tariffs to domestic customers.
>
> Option C: Operating profits from electricity exports are retained by the power system, but the power system is required to use these funds as a source of capital for investment.
>
> Option D: Operating profits from electricity exports are used to reduce the level of transfers from the government to the power system, or to increase the level of transfers from the power system to the government.

The choice among these outcomes must be made by governments. In the United States, options A and B are most commonly used. When the net income of shareholders is increased, however, the corporate income tax leads to an increase in payments to the federal government and (usually) the state government.

APPROACHES BASED ON DISTRIBUTED COST

Seller's cost at specific generating stations

The seller identifies specific generating stations that can be used to export capacity and energy. For each of these stations the seller calculates a tariff on the basis of standard operating assumptions consistent with the design of the plant. The buyer does not pay a premium when the seller has excess capacity and experiences low capacity utilization. For example, the annual capacity utilization for a baseload station may be assumed to be high, for the purpose of computing a tariff, regardless of the station's actual capacity utilization. For each station the tariff is computed from the seller's costs under the stated assumptions. For example, the tariff could be a price per kWh equal to:

- the station's "full load average rate" (the average cost per kWh assuming full load) or

- the station's average cost per kWh based on planned capacity utilization.

This approach is applied to some wholesale power sales in the United States.

There are at least two alternative methods of adjusting tariffs for fuel prices:

Option A: The energy charge is revised on a monthly basis to adjust for (1) changes in projected fuel prices and (2) the difference between actual and planned fuel costs incurred during the last 12 months.

Option B: The energy charge is based upon projected fuel costs, and revised on a monthly basis, without an adjustment for the difference between actual and planned fuel costs.

<u>Structure of export tariffs</u>

The three options available for the seller's fully distributed cost approach are also available for this approach.

APPROACHES BASED ON DISTRIBUTED COST

Split savings

The seller has no contractual obligation to provide firm capacity to the buyer. The buyer does not need additional firm capacity. The purpose of the transaction is to minimize the operating cost of power generation in the region (by providing "economy power" to the buyer). The buyer is capable of generating the amount of energy involved in the power sales transaction, without buying the energy from the seller, but the buyer finds that it is cheaper to purchase energy than to generate it. The tariff is an energy charge equal to the seller's incremental cost of power generation, plus a premium. The energy charge is adjusted hourly, or is computed for each power sale transaction.

Before each power sale transaction, the buyer calculates his decremental cost per kWh and the seller calculates his incremental cost per kWh, and the information is shared. (In a power pool this information may be reported hourly to the dispatch center.) The price is equal to the average of the buyer's decremental cost and the seller's incremental cost.

Under this approach the seller receives half of the total savings that would have been realized by the buyer if the energy had been sold at the seller's incremental cost. The seller therefore can obtain extra operating profits from power exports.

DEFINITIONS

Buyer's decremental cost

For a specific amount of energy sold in a specific time period, the decremental cost is the difference between the buyer's actual generation cost during the period and the level of generation cost that the buyer would have incurred if the power sale transaction had not occurred.

Seller's incremental cost

For a specific amount of energy sold in a specific time period, the seller's incremental cost is the difference between the seller's actual generation cost during the period and the level of generation cost that the seller would have incurred if the power sale transaction had not occurred.

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Split savings between NEPOOL and Hydro-Quebec: Phase I agreement

The following text is found in the Phase I agreement between the New England Power Pool and Hydro-Quebec.

"Economy energy" is defined as energy derived from non-renewable resources and delivered in order to effect a saving in the cost of generation when the receiving party has adequate generating capability to carry its own load. Either party may terminate or suspend the supply of Economy Energy at any time on reasonable notice to the other. Unless otherwise agreed to by the Operating Committee for a specific delivery, the price to be paid for Economy Energy shall be the incremental cost to the supplying party plus one-half of the savings gained by the interchange. The savings gained by the interchange shall be determined by deducting the incremental cost to the supplying party from the decremental cost to the receiving party of such energy transfer.

(*Supplement III, part 1*)

The words "incremental cost" where used in the Agreement shall mean any cost incurred by one party hereto supplying energy to or making operating reserve available to the other, which would not otherwise be incurred if the transaction did not take place. The elements of incremental cost when energy is supplied from sources on the seller's system which are normally in operation for operating reserve or for other purposes shall include, but not be limited to, the following:

Any incremental fuel cost and/or water rental charge.
Any cost for energy purchased to replace stored hydraulic energy.
Any incremental maintenance cost.
Any incremental labour cost.
Any incremental cost of a miscellaneous nature such as, for example, coal handling, water spillage.
Any incremental transmission cost or savings.
Any applicable incremental taxes or grants in lieu of taxes.

(*Supplement II, part 1*)

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Split savings between NEPOOL and Hydro-Quebec:
Phase I agreement (continued)

When energy is supplied from sources on the seller's system placed in operation for the specific and sole purpose of supplying energy or making operating reserve available to the other party, then the incremental cost shall include all costs referred to above and in addition, where applicable:

Any boiler firing-up cost.
Any boiler banking cost.
Any boiler incremental maintenance cost.
Any boiler incremental labour cost.
Any turbine starting cost.
Any turbine speed-no-load cost.
Any turbine incremental labour cost.

When energy is supplied from sources on the seller's system, then the incremental costs may include an allowance, computed by probability methods, for estimated present-day value of future costs which are expected to be incurred as a result of the transaction. The methods of computing and applying such allowances shall be agreed upon in writing by the Operating Committee.

(*Supplement II, part 1*)

Split savings

An example from the New York Power Pool

The New York Power Pool includes all of the large electric power systems in the state of New York. Among these power systems there are a variety of agreements to sell capacity and energy, but the daily dispatch of economy energy by the power pool is based upon a relatively simple pricing principle. Generating units are dispatched on the basis of the variable cost of power generation; the units with the lowest variable cost are dispatched first. The cost of generation in the region is minimized by the dispatch procedure, according to the power pool agreement.

In the New York Power Pool, economy energy is sold under a form of split-savings agreement that covers many transactions among the power systems within the pool.

Buyers purchase economy energy from the pool, and sellers sell to the pool. Each seller is paid an amount equal to the seller's incremental cost and then receives one half of the difference between the seller's incremental cost and the weighted average decremental cost (the weighted average buying cost) of all buyers.

Each buyer pays an amount equal to the buyer's decremental cost and then is refunded half of the difference between the buyer's decremental cost and the weighted average incremental cost (the weighted average selling cost) of all sellers.

APPROACHES BASED ON MARGINAL COST

Seller's SRMC (for recovery of variable cost)

The seller has no contractual obligation to provide firm capacity to the buyer. The tariff is an energy charge equal to the seller's short-run marginal cost (SRMC) of energy. The energy charge may be adjusted hourly, or if hourly adjustment is not practical the energy charge may be adjusted daily, for peak and off-peak periods.

For each hour or each peak/off-peak period, each power system calculates its SRMC, and the information is shared. The power systems engage in bilateral transactions to reduce generating cost through power sales. In each hour or each peak/off-peak period, the seller charges a single price (his SRMC) to all buyers. A power system with a high SRMC will want to purchase energy from power systems with a low SRMC.

Definition of SRMC

The term SRMC is used to refer to the SRMC of energy. In the United States the concept of SRMC of capacity is used very rarely, if ever, because capacity is not sold on a short-run basis (hourly or daily). The amount of generating capacity available from existing stations is projected annually for winter peak and summer peak periods, and capacity is sold in advance of the winter peak or summer peak. The amount of capacity specified in the contract may be adjusted to reflect seasonal variations in the capability of a generating unit (caused by changes in cooling water temperature or other factors) but is not adjusted daily.

The SRMC of energy is the estimated cost per kWh of supplying an additional kWh of energy, at a particular hour of a particular day, using existing plant and equipment and using the available fuel supply. In this context the generating resource that is used to supply an additional kWh is called the "marginal" resource. If generating resources are dispatched according to their variable cost per kWh, the marginal resource in a particular hour will be the one with the highest variable cost per kWh (among the resources used in that hour) and the SRMC will be the cost of an additional kWh from the marginal resource. In a transaction involving a modest increase in capacity utilization at a single generating station, the seller's SRMC could equal the seller's average incremental cost per kWh (the seller's incremental cost divided by the number of kWh sold).

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Seller's SRMC (for recovery of variable cost)

The components of SRMC depend on the type of power sale transaction for which a price must be determined.

- If the seller is a generating company and the buyer arranges for transmission, the seller's SRMC is simply the variable cost of generation (the additional fuel cost, operating cost, and maintenance cost) needed to supply an additional kWh of energy, at a particular hour of a particular day, using existing plant and equipment and using the fuel available. In the United States the marginal cost of generation is called the "system lambda" and this indicator is commonly used to dispatch generating stations.

- If the seller is a power system that provides transmission service as well as generation, the seller's SRMC should include an allowance for transmission losses, in addition to the variable cost of generation.

- If a group of power systems have formed a power pool, in which there are many transactions and it is impossible to predict who will be the sellers and who will be the buyers on a particular day, the power systems could decide that the seller's SRMC is the variable cost of generation. To develop a payment scheme it may not be necessary to estimate transmission losses for each transaction.

In a power pool or national grid, the buyer may pay a premium above the seller's SRMC, depending on the power pool's approach to reliability issues. A power system typically becomes less reliable during peak periods, as generating capacity reaches its maximum utilization and transmission capacity reaches its maximum utilization. If the price paid by the buyer is intended to reflect changes in the reliability of power supply, SRMC must include an allowance for the effect of an additional kWh of load on the reliability of power generation and transmission. This allowance is called a "congestion cost." In England and Wales it is computed as the Value of Lost Load (the average "price" per kWh assigned to energy that the customer is able to purchase but the power system cannot deliver) multiplied by the Loss of Load Probability (the probability that the power system will not be able to deliver the energy that the customer wants to purchase). The congestion cost is not a cost incurred by the seller; it is not part of the seller's SRMC.

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Seller's SRMC (for recovery of variable cost)

Advantages

1. The seller is assured that no portion of his energy exports will be sold below the cost of providing the energy. No portion is "subsidized."

2. If the buyer is considering a marginal increase or decrease in the quantity of power purchased, the buyer's decision will be based upon a "correct" price signal - the cost associated with a marginal increase or decrease.

3. The seller's price does not depend upon information received from the buyer (for example, information regarding the buyer's decremental cost) or information received from other sellers (unlike "split savings.")

4. If consumer tariffs are based upon marginal cost pricing, it may be desirable to apply the same principles to export tariffs. Many economists (including World Bank economists) have supported the use of marginal cost pricing in consumer tariffs. When the consumer faces a decision whether to buy an additional kWh of electricity, it is desirable for the price of that additional kWh to reflect the true cost of supplying that kWh. If the consumer tariff contains demand charges and customer charges as well as energy charges, it may be argued that the energy charge should equal the power system's SRMC.

5. If the power systems want to establish a competitive market for wholesale power, this approach provides a transition to a competitive market.

Disadvantages

1. When there is a shortage of capacity or a shortage of fuel, this approach may be considered unfair. The seller's profits can become very high when SRMC rises above the seller's average cost of power generation.

2. This approach is suitable when there are no capacity commitments.

3. SRMC is constantly changing and therefore results in unstable prices.

4. This approach does not offer a way to distribute the potential savings from power interchange fairly.

5. This approach is somewhat theoretical and experimental.

APPROACHES BASED ON MARGINAL COST

A regional SRMC can be implemented in three ways:

Regional SRMC (for recovery of variable cost)

In a region where the power systems do not need to negotiate contracts for the sale of capacity, or the power systems have not been able to agree on the terms of capacity contracts, the regional SRMC may be used to set prices that are intended to recover only the variable costs of generation and transmission.

Regional SRMC (for recovery of fixed and variable cost)

In a region where there is a need for sellers to recover the cost of capacity through export prices, the regional SRMC may be used to set prices that are intended to recover capacity costs and other fixed costs in addition to the variable costs of power generation and transmission.

This situation exists in England and Wales, where the National Grid Company establishes a Pool Purchase Price equal to the System Marginal Price plus an allowance for the effect of additional generation on reliability. This allowance equals the Value of Lost Load multiplied by the Loss of Load Probability.

Regional SRMC plus capacity charges

In a region where there is a need for sellers to recover the cost of capacity through export prices, the regional SRMC may be used to set an energy charge that is supplemented by capacity charges. The capacity charges are intended to recover capacity costs and other fixed costs, while the energy charges are intended to recover only the variable costs.

An example of a U.S. power pool with a regional energy rate based on SRMC is the Pennsylvania-New Jersey-Maryland (PJM) Interconnection. In contracts with independent power producers, a demand charge is used to pay for fixed costs and an energy charge (the PJM running rate) is used to pay for variable costs.

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APPROACHES BASED ON MARGINAL COST

Regional SRMC (for recovery of variable cost)

This approach is similar to the approach based upon the seller's SRMC, except that a single SRMC is computed for all of the sellers in a region. A group of power systems agree to sell power at a price that varies from hour to hour, or at peak and off-peak prices that vary daily. This price is the SRMC of energy from the integrated system, and it is the price charged by all sellers. Those with low variable cost earn high profits while those at the margin earn little profit.

It may be argued that generation costs will be minimized when there is a single regional market in which all prices in the region are based on the regional SRMC. If the marginal resource is made available to all of the potential buyers, the regional SRMC approach should yield more efficient operation than the approach based upon the seller's SRMC. However, power transactions based on a regional SRMC may not be achievable in the Baltic countries because:

- The market for wholesale power in the Baltics is strongly affected by Russia and Belarus, and it would be difficult to negotiate and enforce a regional pricing agreement with these countries.

- The Russian government may artificially reduce its power systems' SRMC by subsidizing the price of fuel used in power generation, and may prohibit power exports based on fuel cost subsidies.

- The potential to minimize generation cost may be only one of the considerations involved in the buyer's selection among sources of supply or the seller's selection among customers; political factors may also be important.

- It may not be possible to collect SRMC data on an hourly basis from all of the power systems, because the communication system is inadequate.

Moreover, the regional SRMC approach has all of the disadvantages listed above for the seller's SRMC approach.

APPROACHES BASED ON MARGINAL COST

Regional SRMC (for recovery of fixed and variable cost)

It is possible for a power pool or national grid to establish a method of computing energy charges that is based on the regional SRMC and is intended to provide the seller with enough revenue to recover both fixed and variable costs. This arrangement may be called a "spot pricing pool." There are no capacity charges, but sellers are expected to recover the cost of capacity through revenues based on energy charges (prices per kWh).

In the spot pricing pool in England and Wales, the sellers of power are generating companies. The seller receives two sets of payments:

- the Pool Purchase Price, including
  - the System Marginal Price, which is the regional SRMC of power generation, and
  - an allowance for congestion cost, which equals the Loss of Load Probability multiplied by Value of Lost Load

- the "Uplift," which includes payments for reactive power, out of merit dispatch, lost profits, reserves, and unscheduled available generation

The total of these payments, in theory, can provide generators with an incentive to build new power stations when there is a need to build new power stations. However, generating companies have found it necessary to use hedging contracts to ensure the recovery of their fixed costs. The absence of a guarantee of a "fair" rate of return on invested capital makes the spot pricing pool something innovative and unfamiliar to U.S. utilities. This approach to pricing may be considered experimental. A spot pricing pool does not exist in the United States.

The idea of recovering capital costs through a competitively determined price per kWh may be illustrated by comparing power generation with petroleum refining. A petroleum refinery recovers its capital cost by selling products in spot markets at prices that have no demand charge (or capacity charge). When there is a shortage of refining capacity, refining margins are high enough to attract additional investment; when there is a surplus of refining capacity, refining margins are low enough to discourage additional investment. A company that invests in petroleum refineries must accept this risk.

APPROACHES BASED ON MARGINAL COST

Regional SRMC plus capacity charges

In this approach the regional SRMC is used to set an energy charge that is supplemented by capacity charges. The capacity charges are intended to recover capacity costs and other fixed costs, while the energy charges are intended to recover variable costs. The energy charge may vary hourly or daily and the capacity charges may vary monthly or annually.

In the Baltics it may be necessary for a power system to dispatch units for which the cost of generation exceeds the level in neighboring countries such as Russia or Belarus. Thus the average cost of generation (including fixed and variable costs) in a Baltic country may be higher than the regional SRMC for a region including portions of Russia and Belarus. In this situation the regional SRMC may not be high enough cover a portion of capital costs in Estonia, Latvia, or Lithuania. In western countries, however, the average cost of generation is usually lower than the regional SRMC, and a portion of capital cost may be recovered through energy charges based upon the regional SRMC.

In market economies the selection of a methodology to compute capacity charges will depend, in part, on an assessment by regulatory authorities of the effect of these charges on the ability of generating companies or power systems to finance new capacity additions. The usual criterion is that the sum of capacity charge revenue and energy charge revenue should be no higher than the revenue level that is sufficient to finance the capacity additions needed in the region. Capacity additions may be provided by industrial establishments such as cogeneration facilities, as well as new generation companies and power systems.

Alternative definitions of capacity costs

In most power systems there is a mix of generating units designed for base load, cycling, and peaking, and there is a range of investment alternatives including construction of new generating units, "life extension" of older units, and investment in demand-side management measures (to enable customers to reduce load or shift load from peak to off-peak periods). Capacity may also be purchased from other power systems. Different power systems, regulatory agencies, and experts involved in ratemaking may use different definitions of capacity cost. For example, the following alternatives exist:

A: There are different categories of capacity (at least three categories: baseload, cycling, peaking), and capacity cost can only be defined for a specific category. In a power contract the capacity charge cannot be determined until the load profile is specified or the units needed to provide the power are identified. The capital cost of peaking capacity (in $/kW/year) is usually lower than the price of baseload capacity, because it is cheaper to install a kW of combustion turbine capacity than a kW of baseload power plant capacity. The energy cost of peaking capacity (other than hydro) is usually higher than the baseload energy cost.

B: The cost of a generating unit may be divided into two components: a capacity cost and an investment designed to reduce operating costs. The capacity cost is the cost of the cheapest method of ensuring that the annual peak load can be met - either a new combustion turbine designed for peaking, an increase in hydroelectric peaking capacity, a life extension of an older thermal unit, or a voluntary demand management program. The rest of the capital cost of the generating unit is an investment designed to reduce operating costs.

An investment in generating capacity other than peaking capacity may be justified by projected savings in fuel costs per kWh. For example, it is possible to add a heat recovery steam generator to a combustion turbine to lower fuel costs.

C: The cost of a generating unit may be divided into a capacity cost and an investment designed to reduce operating costs. To simplify the calculation of capacity cost, the capacity cost may be defined as the cost per kW per year of a combustion turbine designed for peaking.

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Alternative methods of computing capacity charges

There are many different ways to compute capacity charges. The following methods are described below:

1) LRMC (based on the cost of peaking capacity)

2) LRMC (based on the cost of the next unit)

3) Seller's distributed cost of capacity, based upon LRMC

4) Seller's incremental capacity cost

5) Buyer's avoided capacity cost

6) Seller's cost at specific generating stations

None of these methods is related to the buyer's ability to pay. In a market economy, electric tariffs are rarely raised to a level at which the customer's ability to pay is an important criterion in selecting a method of computing capacity charges.

In the United States, the buyer's avoided capacity cost is often the basis for capacity charges paid to independent generation companies.

Alternative methods of computing capacity charges

The LRMC of capacity is the projected cost per kW per year of supplying an additional kW of capacity in a particular portion of the year (for example, the peak hours during the winter season) over a period of many years, using both new and existing plant and equipment and using fuel from the sources of supply that are planned for the future.

This definition may be interpreted in different ways, depending on the approach used to measure capacity cost. The LRMC of capacity may be calculated on the basis of the cost of peaking capacity or the cost of the next generating unit to be built.

LRMC (based on the cost of peaking capacity)

Under Approach C (described above), capacity cost may be defined as the cost per kW per year of a combustion turbine designed for peaking. If this definition of capacity cost is accepted, LRMC must be calculated on the basis of the cost of peaking capacity. This is called the "peaker method" and it is the method that is most commonly used for LRMC analysis. The LRMC (in dollars per kW per year) can be estimated as the projected annual capital cost of a new combustion turbine designed for peaking operation, divided by the capacity of the unit.

Many combustion turbines in the United States are designed to use natural gas during peak periods. The cost of natural gas is typically classified as a "variable cost" although natural gas exploration, production, and transmission are capital-intensive activities with a high proportion of fixed cost. There are two possible approaches to the peaker method:

A: The annual capacity cost associated with a new peaking unit may be defined as the annual cost of the generating unit alone.

B: The annual capacity cost associated with a new peaking unit may be defined as the annual cost of the total capital investment that is (a) necessary to build and operate the unit, and (b) recovered through demand charges or other types of fixed monthly or annual payments. This total capital investment may include investment in gas pipelines, gas storage fields, petroleum product pipelines, and storage tanks for light fuel oil.

Alternative methods of computing capacity charges

LRMC (based on the cost of the next unit)

One way to implement Approach A - the viewpoint that a particular kind of capacity must be identified before a capacity cost can be measured - is to estimate LRMC based on the cost of the next unit. Under this approach (the "next unit" approach) a least-cost plan is developed for either (a) the power pool or region in which the buyer and seller are located, or (b) the seller's power system alone. To achieve economic efficiency the regional approach is preferred. The capacity cost associated with the next generating unit to be constructed is used to compute the capacity charges in a wholesale power contract.

One reason for considering the "next unit" approach is that the "peaker" approach does not guarantee the seller enough revenue from capacity charges to assure repayment of the cost of a generating unit that has a higher cost per kW than the peaking unit. The "peaker" approach tends to encourage construction of combustion turbines that are expensive to operate and use fuel inefficiently. The "next unit" approach may provide the seller with enough revenue from capacity charges to assure repayment of the capital investment in the next unit or in a comparable type of unit. The "next unit" approach should make it easier for the seller to raise capital.

In a region where none of the power systems are able to build a new generating unit, or the drop in electricity demand has eliminated the need for a new generating unit, the "next unit" approach may not be practical. If the power systems are planning major investments in life extension or demand-side management, the annual capacity cost per kW associated with these investments may be used in place of the annual capacity cost per kW of a generating unit.

Other approaches to LRMC

There are other approaches to LRMC that are more difficult to implement, and are not included in the list of alternatives in this presentation. For example, the "differential revenue requirements" method involves a comparison between two long-term development plans involving two different projections of electricity demand. It is not always clear how much of the difference in revenue requirements should be allocated to capacity cost; one option is to use the cost of peaking capacity.

Alternative methods of computing capacity charges

Seller's distributed cost of capacity, based upon LRMC

Another method of computing capacity charges is to consider wholesale customers to be a class of customers for which prices should be based on the seller's distributed cost. Under this approach the wholesale customer's rates are calculated on the same principles as the household and industrial rates. The capacity charge for wholesale customers is computed on the same principle as the demand charge for large industrial customers.

Among the various methods of allocating capacity costs to customer classes, one alternative is to allocate capacity costs in proportion to the revenue that would be required if capacity were priced at LRMC. This approach involves four steps:

1. The seller computes a total capital carrying charge based on seller's historical cost of plant and equipment. The capital carrying charge includes costs for generation and transmission investment.

2. The seller estimates incremental capacity required to serve each customer class. Incremental capacity is the capacity that would not be needed if the customer class did not have a firm capacity requirement.

3. For each customer class, the cost of incremental capacity is computed on the basis of the LRMC of the incremental capacity required to serve that customer class. An LRMC-based revenue requirement is computed by adding up these costs.

4. The capital carrying charge in step 1 is allocated among customer classes in proportion to their shares of the LRMC-based revenue requirement computed in step 3.

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Alternative methods of computing capacity charges

Seller's incremental capacity cost

The annual capital cost used to compute capacity charges may be defined as the incremental cost associated with the seller's obligation to provide firm capacity to the buyer. The concept of incremental and decremental cost is routinely applied to variable costs and may also be applied to fixed costs. It is more difficult to apply the concept to fixed costs, however, because it is less clear what the buyer and seller would have done in the absence of the capacity transaction.

The generating capacity that now exists in the Baltic countries was not built for the purpose of implementing contracts to sell capacity. The cost of existing capacity may be considered a "sunk cost" - a capital expenditure that has already been made. The obligation of an importer to pay for this capacity is unclear.

There are two ways to define the seller's incremental capacity cost:

1) The seller's incremental capacity cost is the annual cost per kW that the seller would have avoided if the seller had not had the obligation to provide capacity to the buyer. The seller's obligation may be to provide firm baseload, cycling, or peaking capacity, or some combination of these.

2) The seller's incremental capacity cost is the annual cost that the seller will incur as a result of signing a new contract and making a new commitment to the buyer.

Alternative methods of computing capacity charges

Buyer's avoided capacity cost

In the United States the term "avoided cost" is commonly used in negotiations of the price of capacity and energy sold by independent power producers and cogeneration facilities. The concept of avoided cost is very similar to the concept of decremental cost. Avoided costs are projected over the economic life of a new power plant or cogeneration facility.

There are two ways to define the buyer's avoided capacity cost:

1) The buyer's avoided capacity cost is the annual cost per kW that the buyer would have incurred if the buyer had not had the obligation to purchase capacity from the seller.

2) The buyer's avoided capacity cost is the annual cost that the buyer will avoid as a result of signing a new contract and making a new commitment to purchase capacity from the seller.

The buyer's potential savings associated with a contract to purchase capacity and energy involve energy costs as well as capacity costs. However, it would be normal to expect the buyer's avoided capacity cost to be equal to or higher than the seller's incremental capacity cost. If new capacity is involved, the buyer may prefer to determine capacity and energy payments through competitive bidding, rather than basing these payments on the buyer's avoided costs.

Seller's cost at specific generating stations

It is possible for both capacity and energy charges to be calculated on the basis of the seller's cost at specific generating stations, as described above. Another alternative is to set energy charges on the basis of the regional SRMC and set capacity charges on the basis of the seller's cost at specific generating stations.

Under this approach the seller identifies specific generating stations that can be used to provide firm capacity to the buyer. For each of these stations the seller calculates annual capacity costs per kW on the basis of standard operating assumptions consistent with the design of the plant. For example, the capacity charge could be based upon:

- the stations' annual capital cost per kW, assuming full load

- the station's annual capital cost per kW, based on planned capacity utilization.

This method of computing capacity charges may be preferred to the LRMC-based approaches because it is based upon historical costs incurred by the seller rather than a projection of costs that might be incurred to build generating units in the future. This method is simpler than the distributed cost method because it does not depend on information about the seller's entire power system and projected sales. If a capacity contract does not exist, this method may also be preferred to the seller's incremental cost and buyer's avoided cost approaches, which require a clear definition of the seller's obligation to provide firm capacity to the buyer.

Competitive bidding for energy

Competitive bidding is possible in a situation in which there are only two sellers, but it is preferable to have many sellers - at least five - to discourage collusion and price distortions. Competitive bidding is possible with only one buyer but it works best when there are many buyers and many sellers.

If non-firm energy is being sold, or if there are no capacity contracts among buyers and sellers, it is possible to establish competitive bidding for energy. There are at least two ways to implement competitive bidding for energy:

1. A type of commodity exchange may be set up by a national grid company, power pool, or dispatch center. Prices may be quoted daily for peak and off-peak energy, or may be quoted hourly or even on a half-hour basis. For each time period, buyers and sellers submit bids to the exchange, and transactions can occur as long as the price in a seller's offer is equal to or below the price in a buyer's offer. One alternative is to buy power from the lowest-priced seller first, and buy additional power on the basis of the sellers' offers (taking the lowest-price offer first).

2. A buyer may solicit bids to sell energy on a non-firm basis. If there are no other buyers soliciting bids at the same time, or if the sellers' ability to offer energy to the buyer is totally independent of the sellers' transactions with other buyers, there is no need for a commodity exchange. The buyer can rank the bids according to price and buy the least expensive supplies, until the total amount of energy purchased equals the amount the buyer needs to purchase.

The commodity exchange approach may also be used in situations in which the price per kWh of energy is intended to provide the supplier with enough revenue to cover both fixed costs and variable costs. In England and Wales the generating companies use hedging contracts to stabilize revenues associated with a spot pricing pool.

APPROACHES BASED ON COMPETITIVE BIDDING

Competitive bidding for capacity

When new generating units must be constructed, it is possible to determine the level of capacity payments through competitive bidding. This approach is commonly used in the United States by power systems that solicit bids from independent power producers and cogeneration facilities. There are many forms of competitive bidding, but two fundamental types may be distinguished:

1. The buyer may specify not only the amount of capacity needed but also the type of generating unit, the location, and other information needed to develop an accurate engineering cost estimate. The buyer may develop his own cost estimate to determine whether it is better to build and operate the new generating unit or purchase the capacity and energy from an independent generating company.

2. The buyer may specify a certain number of total megawatts of capacity needed, without specifying the type of generating units required. The buyer may specify a set of criteria or a rating system to be used to identify the winning bidder or bidders.

Competitive bidding for capacity is rarely, if ever, used to establish prices for existing capacity.

Published prices

The International Energy Agency publishes data on the average price per kWh of electricity sold to households and electricity sold to industry. These prices can be used to establish the level of average revenue per kWh for households and for industry in a formerly socialist economy in which the value of capital assets and the appropriate rate of return on capital are very difficult to measure.

This approach was used in Yugoslavia before the country was divided by civil war. In 1990 Jugel used the average price of electricity sold to industrial customers and to household customers in five countries - Italy, Switzerland, Germany, Austria, and Greece - to set electricity price ceilings in Yugoslavia. The quarterly IEA publication on Energy Prices and Taxes was used as the source of information on price levels.

Calculations based on generation cost

There are many published reports containing projections of the cost per kWh of power generated from natural gas, heavy fuel oil, coal, and nuclear power. These figures could be used to assign prices to the output of particular generating facilities, or to compute a weighted average price on the basis of the mix of fuels and unit types found in a particular power system.

A recent example of such a report is the International Energy Agency report on Electricity Supply in the OECD (1992).

PROCEEDINGS OF A SEMINAR ON ELECTRIC TRANSMISSION PRICING, TIME OF USE RATES, AND CAPACITY PAYMENTS

Riga, Latvia
December 9-10, 1992

Prepared for:

Bureau for Europe
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

HBI Reference No. 92-4070-205

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December 1992

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DESCRIPTION OF THE SEMINAR

AGENDA

LIST OF PARTICIPANTS

PAPERS PRESENTED:

- Mark B. Lively, "Determining the Appropriate Charge for Transmission Services in the Baltic Countries"
- Mark B. Lively, "Potential Benefits and Methods for Implementing Time of Use Rates for Wholesale Power Transactions in the Baltic Countries"
- Mark B. Lively, "Dynamic Pricing for Wholesale Power Transactions in the Baltic Countries"
- Charles F. Zimmermann, "Alternative Types of Capacity Obligations and Methods of Computing Capacity Payments"
- Charles F. Zimmermann, "Initial Draft of An Interconnection Agreement"

DESCRIPTION OF THE SEMINAR

On December 9 and 10, 1992, a seminar on electric power agreements and transactions was held at the Baltija Dispatch Center in Riga, Latvia. This seminar was organized by the Dispatch Center in cooperation with the U.S. Agency for International Development (AID) and with RCG/Hagler, Bailly, Inc., a U.S. consulting firm whose participation in the seminar was funded by AID's Bureau for Europe. Participants from Estonia, Latvia, and Lithuania attended the seminar and took part in the discussions. Presentations were given by two representatives of the Baltija Dispatch Center and by two U.S. consultants. The seminar focused on four topics:

- electric transmission pricing
- time of use rates
- alternative types of capacity obligations and methods of computing capacity payments
- a preliminary draft of an interconnection agreement.

The key participants in the seminar are the members of a working group on electric power contracting and pricing. The members of this working group were selected on September 10, 1992 in accordance with a decision of the Baltic Energy Council, an organization containing representatives of the three power systems (Eesti Energia, Latvenergo, and the Lithuanian State Power System) and the three energy ministries (the Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy). The Baltija Dispatch Center is a limited liability company that is owned by all three countries, managed by the Baltic Energy Council, and funded by the three power systems. In this context the Baltic Energy Council has a management role that is comparable to the role of the board of directors of a private corporation. The responsibility of the working group is to assist the Baltic Energy Council in developing international agreements on electric power interconnections, sales, and wheeling.

The working group includes representatives of Eesti Energi, Latvenergo, the Lithuanian State Power System, and the Baltija Dispatch Center. The Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy were invited to send representatives to the seminar. The Latvian and Lithuanian ministries were represented but the Estonian ministry was unable to send a representative in the December 9-10 time frame.

The topics for the December seminar were selected by the working group at its first meeting, which was held at the Baltija Dispatch Center on October 14 and 15, 1992. The role of U.S. consultants in the seminar was to provide information to the working group on the types of interconnection agreements and power sales agreements made by power systems in the United States, Canada, western Europe, and Australia.

The seminar had four objectives:

1. Discuss wheeling service, methods of payment for wheeling service in western countries, and possible utilization of these methods in the Baltic power systems.

   The primary focus of this discussion was the method of establishing wheeling charges for power received from St. Petersburg and delivered to Kaliningrad and to Pskov.

2. Discuss the potential benefits of implementing time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transactions.

   In early December 1992 Estonia and Lithuania continued to sell power at a single flat rate per kWh in each month, without a demand charge or time of use variation.

3. Discuss alternative types of capacity obligations and methods of computing capacity methods.

   In early December 1992 the Baltic power systems did not have any contracts for the commitment of firm capaicty on a long-term basis.

4. Discuss the structure of international power sales contracts and the type of contract that might be negotiated among the Baltic power systems.

   This topic was addressed by reviewing a preliminary draft of an interconnection agreement for the Baltic power systems.

All of these topics were discussed.

This seminar is the second in a series of three seminars in an electric power contracting and pricing program funded by AID. The broader objectives of this program are:

(1) To work with the Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries

(2) To promote the development of pricing principles that are consistent with the efficient operation of the regional electric system and consistent with economic efficiency objectives.

(3) To provide information to the Baltic countries regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structures.

Before the working group on power contracting and pricing was formed by the Baltic Energy Council, two regional seminars were organized and implemented with AID funding. A seminar on international power pricing was held at the Baltija Dispatch Center on May 27-28, 1992, and a regional seminar on energy pricing was held at the Institute of Physical Energetics of the Latvian Academy of Sciences on July 16-17, 1992. These earlier seminars covered topics related to electricity pricing, including the terms of power pooling agreements and the development of tariffs based on marginal cost pricing principles.

Seminar on Electric Transmission Pricing, Time of Use Rates, and Capacity Payments

Agenda

Location: Dispatch Center Baltija, 1 Shmerla str., Riga, Latvia

Date: Wednesday, December 9, and Thursday, December 10, 1992

Countries involved: Estonia, Latvia, Lithuania

Agenda for December 9, 1992

10:00	Introductory remarks by Vilnis Kreslinsh, director of DC Baltija.
10:15	Presentation by Metcheslav Vonsovich (DC Baltija) on existing agreements to provide wheeling service and existing methods of payment for wheeling service.
10:45	Presentation by Mark Lively (RCG/Hagler, Bailly, Inc.) on determination of the appropriate percentage charge to be used to pay for transmission service.
12:15	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals regarding the percentage charge to be used to pay for transmission service.
13:30	Lunch
14:30	Presentation by Metcheslav Vonsovich (DC Baltija) on existing proposals to establish time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transactions among the Baltic countries.
15:00	Presentation by Mark Lively (RCG/Hagler, Bailly, Inc.) on the potential benefits and methods of implementing time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transaction.
17:00	Discussion led by Metcheslav Vonsovich (DC Baltija) on proposals to establish time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transactions.

Agenda for December 10, 1992

10:00	Presentation by Metcheslav Vonsovich (DC Baltija) on the present situation with regard to capacity agreements and capacity payments.
10:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on alternative types of capacity obligations and alternative methods of computing the level of capacity payments.
12:30	Discussion led by Metcheslav Vonsovich (DC Baltija) on capacity obligations and methods of computing capacity payments.
13:30	Lunch
14:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on legislative aspects in contracting in power companies experience.
15:30	Discussion led by Metcheslav Vonsovich (DC Baltija) contracting on legislative uses in power.
16:30	Closing remarks by Vilnis Kreslinsh (DC Baltija).

Seminar on Electric Transmission Pricing,
Time of Use Rates, and Capacity Payments

Riga, Latvia
November 19-20, 1992

List of Participants

USA

Charles F. Zimmermann	RCG/Hagler, Bailly, Inc., Manager
Mark Lively	

DISPATCH CENTER BALTIJA

Vilnis Kreslinsh	Director of Dispatch Center Baltija
Metcheslav Vonsovich	Chief Engineer of Dispatch Center Baltija
Joury Pervoushin	Deputy Chief of Grid Network Planning
Janis Ositis	Chief of Dispatch Department
Tatiana Ovsjukova	Chief Specialist

ESTONIA

Joulo Mejbaum	Deputy Chief of Dispatch Department of Eesti Energia
Mikel Viese	Control Engineer of Dispatch Department of Eesti Energia
Teeju Kaare	Principal Solicitor Eesti Energia

LATVIA

A. Berzinsh	Ministry of Industry and Energy
Leons Marcinkus	Chief of Economics Department of Latvenergo
Eduards Rozental	Chief of Dispatch Department of Latvenergo
Maris Elksnis	Control Engineer of Latvenergo
Valdis Gintars	Chief Engineer of Energocontrol
Peteris Klavinsh	Chief of Planning Department of Energocontrol Division of Latvenergo

LITHUANIA

Rimas Shukis	Ministry of Energy
Mindaugas Krakauskas	Kaunas Energy Institute (for Ministry of Energy)
Janis Mirauskis	Economic Department of LSPS
Augustinas Kiselius	Deputy Chief of Dispatch Department of LSPS

ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

DETERMINING THE APPROPRIATE CHARGE FOR TRANSMISSION SERVICES IN THE BALTIC COUNTRIES

by

MARK B. LIVELY

UTILITY ECONOMIC ENGINEER
19012 High Point Drive
Gaithersburg, Maryland 20879
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9/10 December 1992
Riga, Latvia

Funded by USAID
Under contract with RCG/Hagler, Bailly, Inc.

ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

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by

MARK B. LIVELY

As parts of the former Northwest Integrated Power System of the former Soviet Union, Latvia, Lithuania, and Estonia find that their electrical networks are the result of the central planning characteristic of the former Soviet Union.

> One result of that central planning is Latvia, Lithuania, and Estonia being in the middle of the network and separating different parts of Russia. Accordingly, the three republics wheel electricity from one part of Russia to other parts of Russia, notably from St. Petersburg to Pskov and Kaliningrad, also from Byelorussia.
>
> Further, the different currencies used by the various countries and other financial issues has led to a decision for the wheeling charge to be expressed as a fraction of the electricity delivered for wheeling by the intermediate party.

Under current conditions, 8.3% of the electricity delivered by St. Petersburg is retained by Estonia as its payment for delivering the remaining 91.7% on to Pskov or to Latvia. Similarly, Latvia retains 8.3% of the electricity delivered to it as payment for delivering the remaining 91.7% to Lithuania. Finally, Lithuania retains 8.3% of the electricity delivered to it by Byelorussia or Latvia as payment for delivering the remaining 91.7% to Kaliningrad. The Baltic republics are interested in methods for justifying the retention rates they charge for wheeling electricity.

In most of the world, the conventional wisdom is that the cost of providing electric service is constantly changing, including the cost of providing wheeling services. At night, additional wheeling services can be accomplished with little additional electrical losses, and it even improves the reactive power situation. During the day, additional wheeling services may cause line overloads forcing the interruption of service to sales customers.

Just as the cost providing wheeling services change throughout the day, the value to the wheeling customer changes throughout the day. At some times, Pskov may have enough generation to meet its own load, and the value Russia of transmission is slight. During the day, Pskov must rely on power from St. Petersburg

or Byelorussia, and the value of transmission is high. Prices can change dynamically throughout the day and the year to reflect these variations in cost and value.

Two dynamic pricing models for wheeling have been advocated in leading journals and symposiums, and are the subjects of another paper at this program. Though methods exist to determine a dynamic, time-varying retention rate for wheeling services, most people are more comfortable with having a static, unvarying rate for electric services. Fortunately, static rates can be applied under contract to one portion of an electric service while dynamic rates are charged for other portions of an electric service. Thus, static and dynamic rates can co-exist when appropriate decision rules are in place to differentiate between which services are priced at which rates.

The two most common methods for determining utility prices in the U.S. are accounting costs and economic costs. Accounting cost pricing has been known under several variants including average cost pricing and rate base pricing. It is the traditional method used for most utility pricing cases in the U.S. Economic cost pricing is also know as marginal cost pricing, and is sometimes used an a adjunct to average cost pricing.

An embedded cost allocation example is provided. The example begins with the development of the power requirements of the various services offered by the utility, including sales to traditional customers and a wheeling service. The requirements at the customer meter are increased by the electrical losses that the utility is expected to experience at the various voltage levels. The wheeling service uses only the transmission system and only is charged for losses on the transmission system. An energy requirement is similarly developed. The power and energy requirements are then transformed into allocation factors, which represent the fraction of the utility's equipment used by each service. The normalizing factors will be discussed later.

The wheeling service uses identified fractions of the utility's production and transmission plant. The allocation of costs to the Wheeling Service is a simple multiplication of component cost and the allocation factors. Under conventional monetary arrangements, the wheeling customer would pay $17,844,000. But since the rate is to be a retention rates, the payment must be normalized relative to the value of the delivered electricity. The normalized costs are calculated by the simple multiplication of component cost and the normalizing allocation factors. If the utility had delivered electricity that it had produced, the cost of the electricity would be $204,646,000. Thus the retention rate should be 8.72%.

A marginal cost assignment example is also provided. Marginal cost studies look different from embedded cost studies. Where embedded cost studies allocate a portion of each cost category to a service, marginal cost studies use the unit cost of

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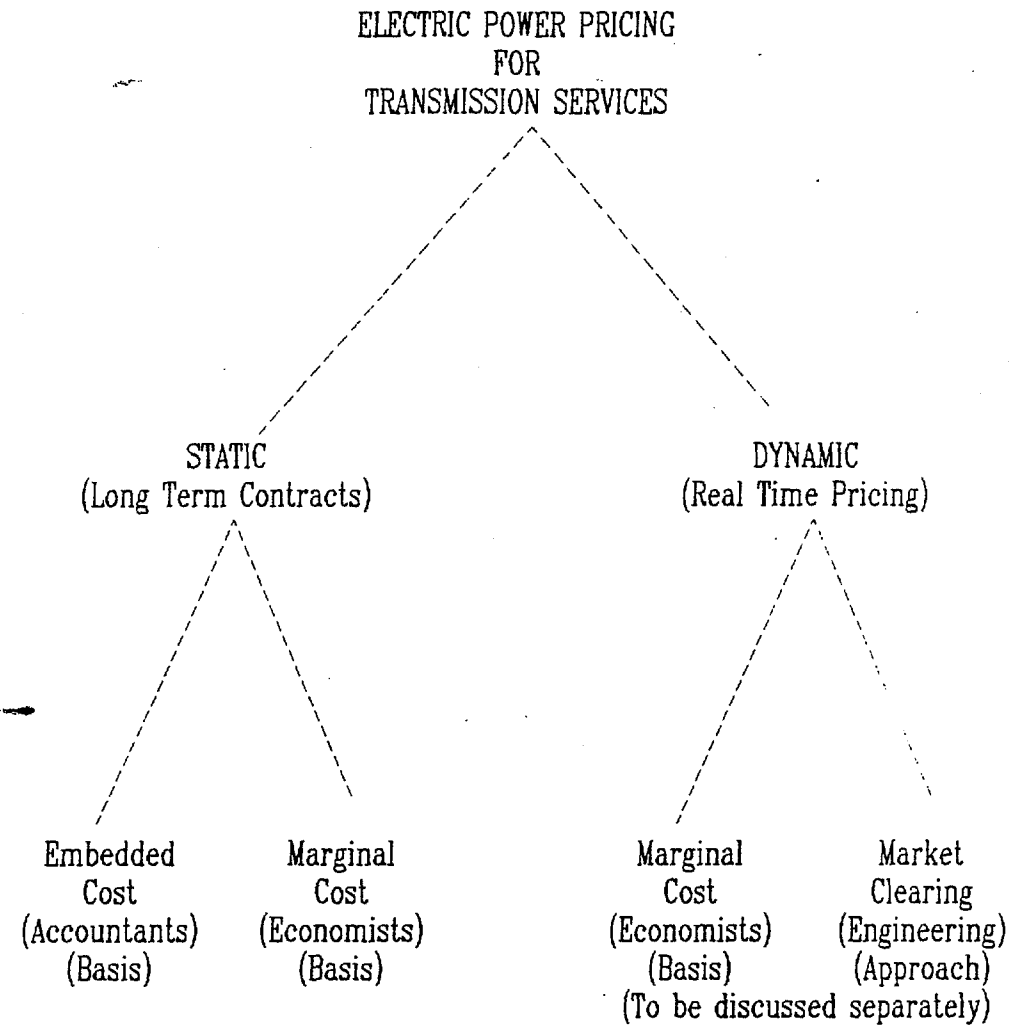
each cost category to price the amount of the related determinant used by the service. Marginal cost studies should use similar or identical assumptions for transmission losses and load factors.

The similarity in assumptions for transmission losses and load factors should keep the marginal cost retention rate close to the embedded cost retention rate. However, the great variation among the various component ratios of marginal cost to embedded cost results in marginal cost based retention rate being higher than the embedded cost retention rate.


ELECTRIC POWER PRICING
FOR
TRANSMISSION SERVICES
STATIC
(Long Term Contracts)
DYNAMIC
(Real Time Pricing)
Embedded
Cost
(Accountants)
(Basis)
Marginal
Cost
(Economists)
(Basis)
Marginal
Cost
(Economists)
(Basis)
Market
Clearing
(Engineering)
(Approach)
(To be discussed separately)

ELECTRIC POWER PRICING FOR TRANSMISSION SERVICES

FIXED PRICE/EMBEDDED COST BASIS

POWER REQUIREMENTS
(MW)

	TOTAL	RESIDENTIAL SALES	COMMERCIAL SALES	INDUSTRIAL SALES	WHEELING SERVICE
DELIVERIES	4000	1000	1000	1000	1000
DELIVERIES AT SECONDARY DISTRIBUTION VOLTAGE					
	1500	1000	500	0	0
SECONDARY DISTRIBUTION VOLTAGE LOSSES - 3%					
	45	30	15	0	0
DELIVERIES AT PRIMARY DISTRIBUTION VOLTAGE					
TO SECONDARY	1545	1030	515	0	0
TO CUSTOMERS	500	0	500	0	0
TOTAL	2045	1030	1015	0	0
PRIMARY DISTRIBUTION VOLTAGE LOSSES - 2%					
	41	21	20	0	0
DELIVERIES AT SUBTRANSMISSION VOLTAGE					
TO DISTRIBUTION	2086	1051	1035	0	0
TO CUSTOMERS	500	0	0	500	0
TOTAL	2586	1051	1035	500	0
SUBTRANSMISSION VOLTAGE LOSSES - 3%					
	78	32	31	15	0
DELIVERIES AT TRANSMISSION VOLTAGE					
TO SUBTRANSMISSION	2664	1083	1066	515	0
TO CUSTOMERS	1500	0	0	500	1000
TOTAL	4164	1083	1066	1015	1000
TRANSMISSION VOLTAGE LOSSES - 4%					
	167	43	43	41	40
INPUT TO POWER SUPPLY					
	4331	1126	1109	1056	1040

ELECTRIC POWER PRICING FOR TRANSMISSION SERVICES

FIXED PRICE/EMBEDDED COST BASIS

ENERGY REQUIREMENTS
(GWH)

	TOTAL	RESIDENTIAL SALES	COMMERCIAL SALES	INDUSTRIAL SALES	WHEELING SERVICE
DELIVERIES	21.500	4.000	4.500	7.000	6.000
DELIVERIES AT SECONDARY DISTRIBUTION VOLTAGE					
	6.250	4.000	2.250	0	0
SECONDARY DISTRIBUTION VOLTAGE LOSSES - 2%					
	125	80	45	0	0
DELIVERIES AT PRIMARY DISTRIBUTION VOLTAGE					
TO SECONDARY	6.375	4.080	2.295	0	0
TO CUSTOMERS	2.250	0	2.250	0	0
TOTAL	8.625	4.080	4.545	0	0
PRIMARY DISTRIBUTION VOLTAGE LOSSES - 1.6%					
	138	65	73	0	0
DELIVERIES AT SUBTRANSMISSION VOLTAGE					
TO DISTRIBUTION	8.763	4.145	4.618	0	0
TO CUSTOMERS	3.500	0	0	3.500	0
TOTAL	12.263	4.145	4.618	3.500	0
SUBTRANSMISSION VOLTAGE LOSSES - 2.1%					
	258	87	97	74	0
DELIVERIES AT TRANSMISSION VOLTAGE					
TO SUBTRANSMISSION	12.521	4.232	4.715	3.574	0
TO CUSTOMERS	9.500	0	0	3.500	6.000
TOTAL	22.021	4.232	4.715	7.074	6.000
TRANSMISSION VOLTAGE LOSSES - 2.4%					
	529	102	113	170	144
INPUT TO POWER SUPPLY					
	22.550	4.334	4.828	7.244	6.144

ELECTRIC POWER PRICING FOR TRANSMISSION SERVICES

FIXED PRICE/EMBEDDED COST BASIS

ALLOCATION FACTORS

	TOTAL	RESIDENTIAL SALES	COMMERCIAL SALES	INDUSTRIAL SALES	WHEELING SERVICE
SALES DELIVERIES PLUS LOSSES (MW)					
DETERMINANT	3,331	1,126	1,109	1,056	40
FACTOR	100.00%	33.81%	33.29%	31.70%	1.20%
SALES DELIVERIES PLUS LOSSES (GWH)					
DETERMINANT	16,550	4,334	4,828	7,244	144
FACTOR	100.00%	26.19%	29.17%	43.77%	0.87%
TOTAL DELIVERIES AT TRANSMISSION VOLTAGE (MW)					
DETERMINANT	4,331	1,126	1,109	1,056	1040
FACTOR	100.00%	26.00%	25.61%	24.38%	24.01%
TOTAL DELIVERIES AT TRANSMISSION VOLTAGE (GWH)					
DETERMINANT	22,550	4,334	4,828	7,244	6,144
FACTOR	100.00%	19.22%	21.41%	32.12%	27.25%
NORMALIZING SALES DELIVERIES PLUS LOSSES (MW)					
DETERMINANT	3,331				1,040
FACTOR	100.00%				31.22%
NORMALIZING SALES DELIVERIES PLUS LOSSES (GWH)					
DETERMINANT	16,550				6,144
FACTOR	100.00%				37.12%

ELECTRIC POWER PRICING FOR TRANSMISSION SERVICES

FIXED PRICE/EMBEDDED COST BASIS

COST ALLOCATION

Description	Annual Cost	Wheeling Service Allocation Factor	Wheeling Service Allocated Cost
Production			
Energy	$300,000,000	0.87%	$ 2,610,000
Demand	260,000,000	1.20%	3,120,000
Transmission			
Energy	400,000	27.25%	109,000
Demand	50,000,000	24.01%	12,005,000
Total	$610,400,000		$17,844,000

NORMALIZATION ALLOCATION

Description	Annual Cost	Normalized Wheeling Service Allocation Factor	Normalized Wheeling Service Allocated Cost
Production			
Energy	$300,000,000	37.12%	$111,360,000
Demand	260,000,000	31.22%	81,172,000
Transmission			
Energy	400,000	27.25%	109,000
Demand	50,000,000	24.01%	12,005,000
Total	$610,400,000		$204,646,000

Transmission Cost Normalized 8.72%

ELECTRIC POWER PRICING FOR TRANSMISSION SERVICES

FIXED PRICE/MARGINAL COST BASIS

COST ACCUMULATION

Description	Marginal Cost	Wheeling Service: Wheeling Usage	Wheeling Service: Allocated Cost
Production			
Energy	$25.00/MWH	144 GWH	$ 3,600,000
Demand	$35.00/KW-YR	40 MW	1,400,000
Transmission			
Energy	$ 0.01/MWH	6,144 GWH	61,440
Demand	$18.00/KW-YR	1,040 MW	18,720,000
Total			$23,781,440

COST NORMALIZATION

Description	Marginal Cost	Wheeling Service: Wheeling Usage	Wheeling Service: Allocated Cost
Production			
Energy	$25.00/MWH	6,144 GWH	$153,600,000
Demand	$35.00/KW-YR	1,040 MW	36,400,000
Transmission			
Energy	$ 0.01/MWH	6,144 GWH	61,440
Demand	$18.00/KW-YR	1,040 MW	18,720,000
Total			$208,781,440

Transmission Cost Normalized 11.39%

ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

POTENTIAL BENEFITS/ METHODS FOR IMPLEMENTING TIME OF USE RATES FOR WHOLESALE POWER TRANSACTIONS IN THE BALTIC COUNTRIES

by

MARK B. LIVELY

UTILITY ECONOMIC ENGINEER
19012 High Point Drive
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9/10 December 1992
Riga, Latvia

Funded by USAID
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ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

POTENTIAL BENEFITS/ METHODS FOR IMPLEMENTING TIME OF USE RATES FOR WHOLESALE POWER TRANSACTIONS IN THE BALTIC COUNTRIES

by

MARK B. LIVELY

In most parts of the world, the conventional wisdom is that the cost of providing electric service is constantly changing. Most electric utilities reflect this time variation in cost in the prices that they charge other utilities for short term transactions. Indeed, many transactions in the U.S. have prices that change every hour. In England, and in some other parts of the world, the accounting for bulk transactions is done every 30 minutes.

Changing the price of bulk electricity throughout the day produces many benefits, the most important of which is the increased economic efficiency with which all participants in the bulk market are able to operate their generators. A utility with excess coal capacity can increase generation and sell the excess at a profit during some period, or can reduce generation and buy excess nuclear generation or hydro energy that would otherwise be dumped. Further, it lessens the ability of a utility to impose additional costs on its neighbors by riding the interties, of being a tie-riding freeloader. I generally define a tie-riding freeloader as a utility that takes advantage of interchange practices in ways that decrease the freeloader's cost while increasing the costs of other utilities in the network.

I present an example of how a utility can decide to optimize its own economics by taking advantage of a single interchange price. Though my example uses a price of $20/MWH, any price used for all time periods will allow a utility to freeload. I then show the effect of this freeloading on the neighboring utilities, showing how the cost for the rest of the system increases because of the freeloader.. Various pricing options are available to encourage a joint optimization, including what I call a high option and a low option. These options give all of the dispatching benefit to only one party, either the buyer or the seller. Many bulk power pricing provisions results in these benefits being shared.

The methods for time-of-use pricing can be broadly grouped as static and dynamic. Static prices for a time period are set prior to the beginning of the time period. Some people include situational pricing within the concept of static prices. Situational pricing would have different price schedules with each price schedule being

applicable to specific events, such as the outage of a major power plant. There are two basic approaches to determining static prices: embedded cost and marginal cost. Dynamic pricing could be considered the ultimate in situational pricing. Under the various forms of dynamic pricing, generation loading, line loading, and reactive power flows all influence the price to be charged for bulk electricity. Dynamic pricing is discussed in a separate paper.

For static pricing, I have constructed an example with two types of generating plants with different cost structures. For simplicity purposes, I have assumed that the relevant decision period is one 24 hour day. The low operating costs of Type 1 generation makes it optimal for loads lasting at least 15 hours, otherwise Type 2 generation is cheaper, as shown in the screening curve. The two types of generation are dispatched to meet a daily load curve in the cheapest possible manner.

For this optimal dispatch, I present four embedded cost allocation methods, resulting in a range of allocations of costs to the five groups of hours.

METHOD A - Each hour shares equally in the fixed costs of generation that operates during that hour, independent of the amount of generation during each hour.

METHOD B - Each generation type is subdivided prior to allocation to time period. Each hour share equally in the fixed cost of each subdivision operated during that hour.

METHOD C - Each hour shares equally in the fixed costs of generation that is fully loaded during that hour. As a result, hours with partially loaded generation are charged only variable cost.

METHOD D - Each hour shares equally in the fixed costs of generation that is fully loaded if lower merit generation is also operating.

The total average cost would be appropriate for determining time-of-use rates for bulk power transactions, or for retail sales. The summary presents the total costs allocated to each time period, as well as the average price that would be charged during the time period based on the allocation methods.

I then present four marginal cost allocation methods based on two assumptions of the calculation of marginal cost and two assumptions on adjusting the rates to achieve the total revenue requirement of the system.

LOW ASYMPTOTE - Marginal cost is the cost of the most expensive unit that is currently operating.

HIGH ASYMPTOTE - Marginal cost is the cost of the least expensive unit that would be available to meet additional load. For Period 5, additional load would require more fixed costs in addition to more variable cost.

ADJUST ALL - Change all rates proportionately to achieve the revenue requirement of the system.

ADJUST CONSTRAINT - Change the rate of the constrained time period (Period 5) as necessary to achieve the revenue requirement of the system-Ramsey pricing.

Each of the 8 cost allocation methods have advantages and disadvantages, with different people supporting each of the concepts.

BENEFITS OF
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

1. Producers receive revenue commensurate with cost (i.e., reduce or eliminate losses on sales transactions)

2. Buyers pay less for purchased power than the cost they can avoid (i.e., reduce or eliminate uneconomic purchases)

3. Prevent competitors from reducing their costs at your expense (i.e., stop tie-riding freeloaders)

4. Provide better basis for prices to large industrial consumers

5. Provide cost incentive for load management programs

BENEFITS OF
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

TIE-RIDING FREELOADER EXAMPLE

AVAILABLE RESOURCES

Description	Size	Cost
Self Generation Type 1	500 MW	$10/MWH
Self Generation Type 2	50 MW	$50/MWH
Interconnection Ties	200 MW	$20/MWH

TYPICAL OPERATING PATTERNS

Self Sufficiency

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	400	400	0	0	4,000	0	0	4,000
2	550	500	50	0	5,000	2,500	0	7,500
Total	950-	900	50	0	9,000	2,500	0	11,500

Tie-Riding

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	400	450	0	-50	4,500	0	-1,000	3,500
2	550	500	0	50	5,000	0	1,000	6,000
Total	950-	900	0	0	9,500	0	0	9,500

Profit from tie-riding 2,000

Double Tie-Riding

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	400	500	0	-100	5,000	0	-2,000	3,000
2	550	500	0	50	5,000	0	1,000	6,000
Total	950-	1,000	0	-50	10,000	0	-1,000	9,000

Profit from tie-riding 2,500

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BENEFITS OF
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

TIE-RIDING FREELOADER EXAMPLE

RESOURCES of REMAINDER OF NET

Description	Size	Cost
Self Generation Type 1	2500 MW	$11/MWH
Self Generation Type 2	350 MW	$60/MWH
Interconnection Ties	200 MW	$20/MWH

TYPICAL OPERATING PATTERNS

Self Sufficiency

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	2,000	2,000	0	0	22,000	0	0	22,000
2	2,600	2,500	100	0	27,500	6,000	0	33,500
Total	4,600-	4,500	100	0	49,500	6,000	0	55,500

Tie-Riding

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	2,000	1,950	0	50	21,450	0	1,000	22,450
2	2,600	2,500	150	-50	27,500	9,000	-1,000	35,500
Total	4,600-	4,450	150	0	48,950	9,000	0	57,950

Loss due to allowing tie-riding 2,450

Double Tie-Riding

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	2,000	1,900	0	100	20,900	0	2,000	22,900
2	2,600	2,500	150	-50	27,500	9,000	-1,000	35,500
Total	4,600-	4,400	150	50	48,400	9,000	1,000	58,400

Loss due to allowing tie-riding 2,900

BENEFITS OF
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

TIE-RIDING FREELOADER EXAMPLE

JOINT ECONOMIC DISPATCH -- LOW PRICE OPTION

Former Tie-Riding Freeloader

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	400	500	0	-100	5,000	0	-1,000	4,000
2	550	500	50	0	5,000	2,500	0	7,500
Total	950-	1,000	50	-100	10,000	2,500	-1,000	11,500
Gain Due to Joint Economic Dispatch								0

Remainder of Net

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	2,000	1,900	0	100	20,900	0	1,000	21,900
2	2,600	2,500	100	0	27,500	6,000	0	33,500
Total	4,600-	4,400	100	100	48,400	6,000	1,000	55,400
Gain Due to Joint Economic Dispatch								100

JOINT ECONOMIC DISPATCH -- HIGH PRICE OPTION

Former Tie-Riding Freeloader

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	400	500	0	-100	5,000	0	-1,100	3,900
2	550	500	50	0	5,000	2,500	0	7,500
Total	950-	1,000	50	-100	10,000	2,500	-1,100	11,400
Gain Due to Joint Economic Dispatch								100

Remainder of Net

		Resources Used			Resource Cost			
Hour	Load	Type 1	Type 2	Ties	Type 1	Type 2	Ties	Total
1	2,000	1,900	0	100	20,900	0	1,100	22,000
2	2,600	2,500	100	0	27,500	6,000	0	33,500
Total	4,600-	4,400	100	100	48,400	6,000	1,100	55,500
Gain Due to Joint Economic Dispatch								0

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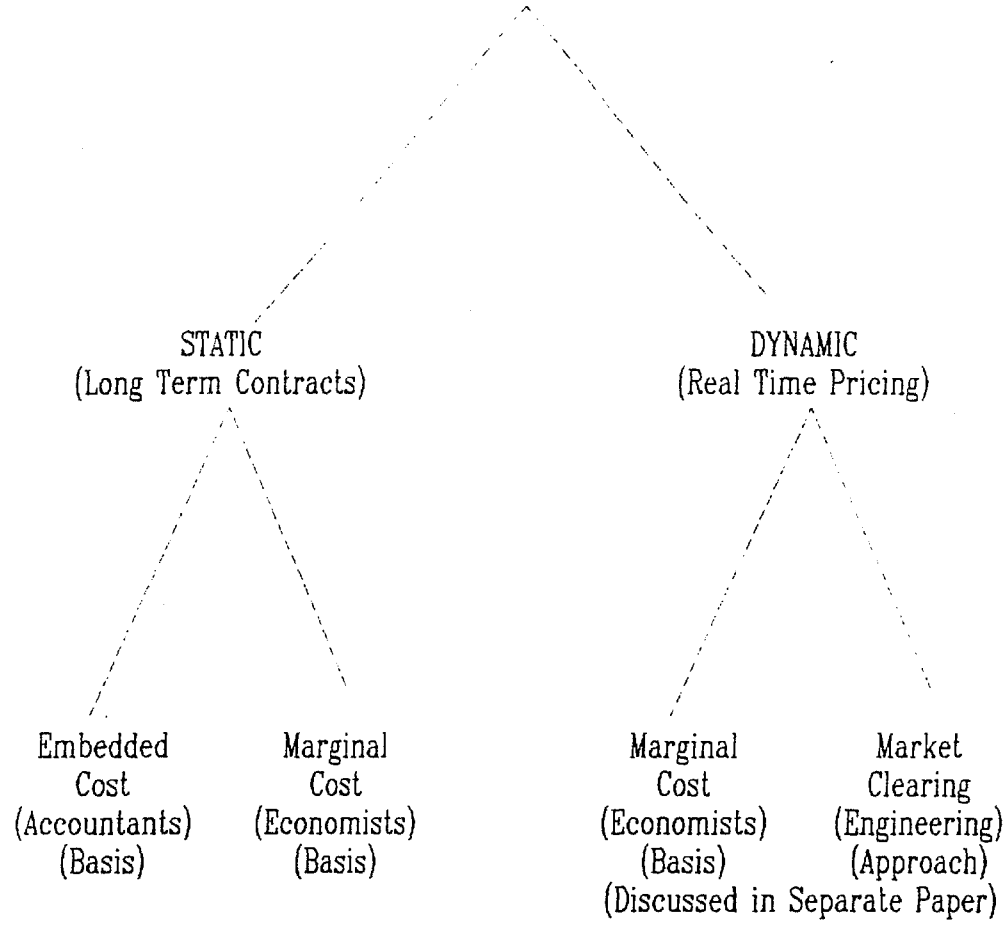
METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

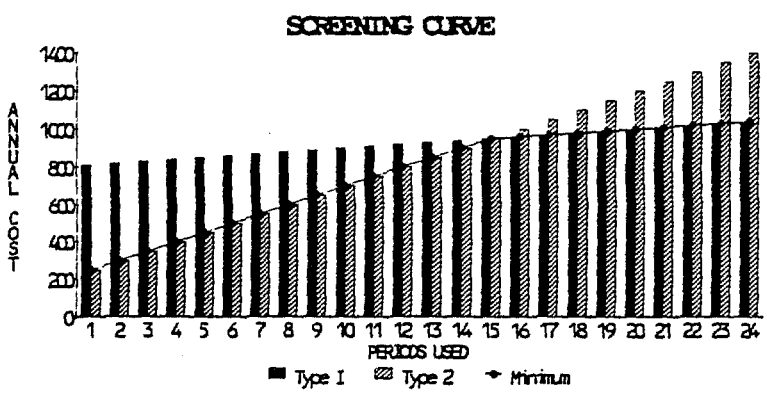


TECHNOLOGICAL COST ASSUMPTIONS

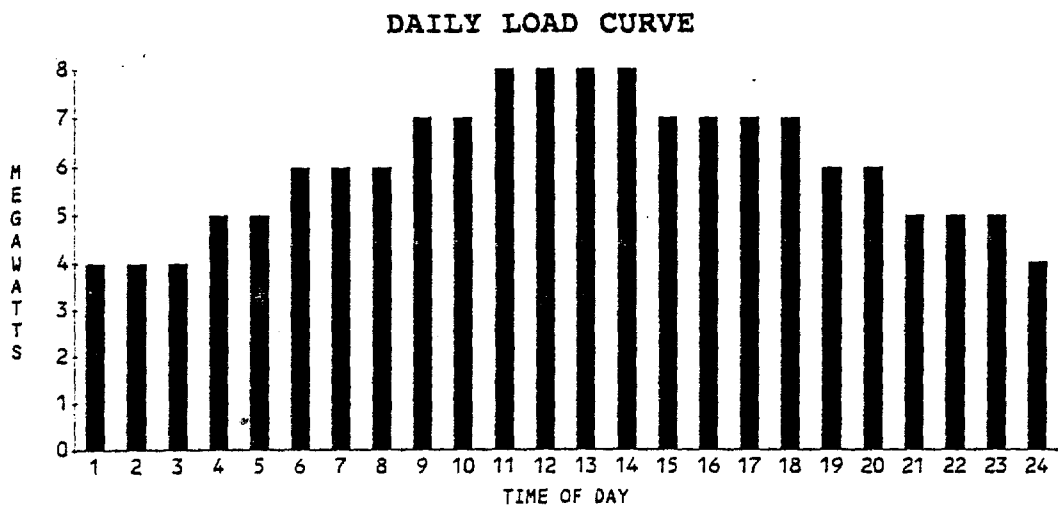
GENERATING OPTIONS	I	II
FIXED COST ($/MW-DAY)	800	200
VARIABLE COST ($/MWH)	10	50

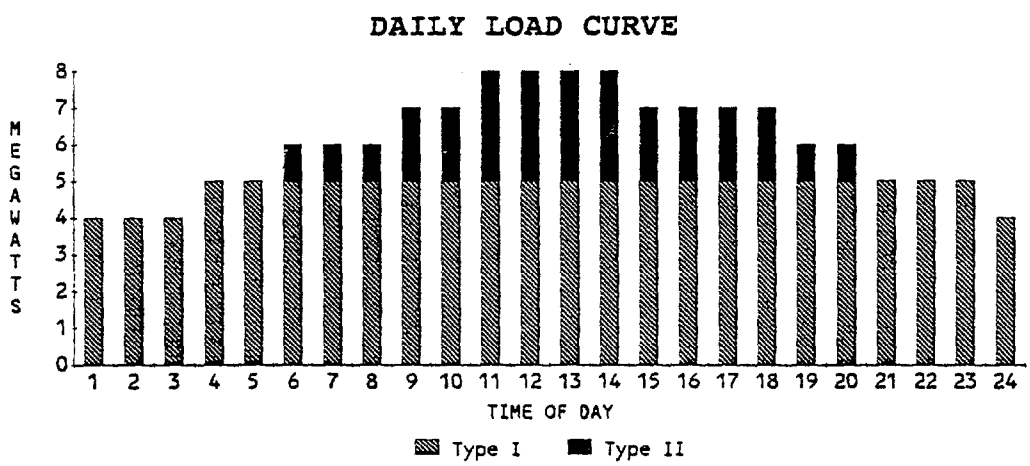
SCREENING CURVE

Hours Operated	Type 1 Cost	Type 2 Cost	Minimum Cost
1	810	250	250
2	820	300	300
3	830	350	350
4	840	400	400
5	850	450	450
6	860	500	500
7	870	550	550
8	880	600	600
9	890	650	650
10	900	700	700
11	910	750	750
12	920	800	800
13	930	850	850
14	940	900	900
15	950	950	950
16	960	1000	960
17	970	1050	970
18	980	1100	980
19	990	1150	990
20	1000	1200	1000
21	1010	1250	1010
22	1020	1300	1020
23	1030	1350	1030
24	1040	1400	1040



EMBEDDED COST ALLOCATION





METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

EMBEDDED COST ALLOCATION

Type I Generation

		Generation		Method A Hours	Method B Blocked Hours Approach			Method C Fully	Method D Constrained
Period	MW	MWH	Cost	Run	Load 4	Load 5	Total	Loaded	Shadow
1	4	16	160	666.67	533.33	0.00	533.33	0.00	0.00
2	5	25	250	833.33	666.67	200.00	866.67	1000.00	0.00
3	5	25	250	833.33	666.67	200.00	866.67	1000.00	689.66
4	5	30	300	1000.00	800.00	240.00	1040.00	1200.00	1655.17
5	5	20	200	666.67	533.33	160.00	693.33	800.00	1655.17
		116	1160	4000.00	3200.00	800.00	4000.00	4000.00	4000.00

Type II Generation

		Generation		Method A Hours	Method B Blocked Hours Approach				Method C Fully	Method D Constrained
Period	MW	MWH	Cost	Run	Load 6	Load 7	Load 8	Total	Loaded	Shadow
1	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	1	5	250	50.00	16.67	0.00	0.00	16.67	0.00	0.00
4	2	12	600	60.00	20.00	30.00	0.00	50.00	0.00	0.00
5	3	12	600	40.00	13.33	20.00	50.00	83.33	150.00	150.00
		29	1450	150.00	50.00	50.00	50.00	150.00	150.00	150.00

Summary

				TOTAL ALLOCATED COSTS				AVERAGE ALLOCATED COSTS			
Period	MW	Hours	MWH	Method A	Method B	Method C	Method D	Method A	Method B	Method C	Method D
1	4	4	16	826.67	693.33	160.00	160.00	51.667	43.333	10.000	10.000
2	5	5	25	1083.33	1116.67	1250.00	250.00	43.333	44.667	50.000	10.000
3	6	5	30	1383.33	1383.33	1500.00	1189.66	46.111	46.111	50.000	39.655
4	7	6	42	1960.00	1990.00	2100.00	2555.17	46.667	47.381	50.000	60.837
5	8	4	32	1506.67	1576.67	1750.00	2605.17	47.083	49.271	54.688	81.412
		24	145	6760.00	6760.00	6760.00	6760.00	46.621	46.621	46.621	46.621

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METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

MARGINAL COST ALLOCATION

Low Asymptote

	Load Data			SRMC		Adjust All		Adjust Constraint	
Period	MW	Hours	MWH	Rate	Total	Rate	Total	Rate	Total
1	4	4	16	10	160.00	12.050	192.80	10.000	160.00
2	5	5	25	10	250.00	12.050	301.25	10.000	250.00
3	6	5	30	50	1500.00	60.250	1807.49	50.000	1500.00
4	7	6	42	50	2100.00	60.250	2530.48	50.000	2100.00
5	8	4	32	50	1600.00	60.250	1927.99	85.938	2750.00
					5610.00		6760.00		6760.00

High Asymptote

	Load Data			SRMC		Adjust All		Adjust Constraint	
Period	MW	Hours	MWH	Rate	Total	Rate	Total	Rate	Total
1	4	4	16	10	160.00	8.930	142.88	10.000	160.00
2	5	5	25	50	1250.00	44.650	1116.25	50.000	1250.00
3	6	5	30	50	1500.00	44.650	1339.50	50.000	1500.00
4	7	6	42	50	2100.00	44.650	1875.30	50.000	2100.00
5	8	4	32	80	2560.00	71.440	2286.08	54.688	1750.00
					7570.00		6760.00		6760.00

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ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

DYNAMIC PRICING FOR WHOLESALE POWER TRANSACTIONS IN THE BALTIC COUNTRIES

by

MARK B. LIVELY

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U.S.A.

9/10 December 1992
Riga, Latvia

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ELECTRIC POWER CONTRACTING AND PRICING PROGRAM

DYNAMIC PRICING FOR WHOLESALE POWER TRANSACTIONS IN THE BALTIC COUNTRIES

by

MARK B. LIVELY

In most parts of the world the conventional wisdom is that the cost of electricity is constantly changing. Utilities have long reacted to this varying cost of electricity in the way each utility dispatches its generators, continually adjusting the output of one versus another to improve the utility's economics. Further improvements in economics can be achieved by dispatching one utility's generators against the generators of another utility, reducing high cost generation and increasing low cost generation. But for a utility to agree to this joint dispatch, the utility must be able to receive a benefit, either compensation for operating its units or a price less than the cost of its alternative generation. All of the possible combinations of could be combined to produce a time schedule of prices for various combinations of load and generation availability. But that is an exhausting task. A better approach is dynamic pricing.

The best known of the dynamic pricing methods is "Schweppe" pricing. Schweppe pricing involves the short run marginal cost of the optimal method of meeting each load period, nominally each hour. After the fact, the output of each generation is re-optimized based on known conditions. Short run marginal cost is then calculated based on these re-optimized generator loadings. When appropriate, additional charges, in the form of shadow prices, are assigned to those periods when generation is constrained. Finally, in some situations, all prices during the analysis period are increased or decreased to meet the revenue target for the system.

I have been advocating another dynamic pricing method known as WOLF pricing. I claim that system conditions reveal the extent of the imbalance between supply and demand. High frequency and early time clocks both reveal that supply exceeds demand. Economic theory suggests lower prices to encourage more demand and to discourage generation. The opposite occurs when frequency is low and time clocks are late. The concept can be applied instantaneously using sample prices shown in the example.

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Both pricing models use the incremental fraction of delivered power for the geographic dispersion of prices. For a given reference price anywhere on an unconstrained electric network, the price at any other place on the electric network can be calculated by the incremental fraction of delivered power. Given a reference price on the St. Petersburg border with Estonia of ABC and marginal losses of 2%, the price at the Estonia border with Latvia would be 102% of ABC, and the transmission retention rate would be 2%. Since transmission losses increase quadratically with line loading, Estonia would be paid 2% when its losses were only 1%. This retention rate would change throughout the day, all year long. Further since the incremental fraction of delivered power can be calculated as a complex value, the concept also determines a time-varying charge for reactive power.

Both dynamic pricing models recognize that transmissions lines are sometimes constrained, requiring load shedding or the "uneconomic" dispatch of some generators. Each pricing model provides a method to disconnect the prices in the disjoint regions, providing additional benefits to the owners of the transmission lines connecting the disjointed regions.

METHODS FOR
DYNAMIC PRICING
FOR WHOLESALE POWER TRANSACTIONS

1. Determine Dynamic Price

   A. Short Run Marginal Cost - "Schweppe" Pricing
      (See Caramanis, M.C. R.E. Bohn, and F.C. Schweppe, "Optimal Spot Pricing: Practice and Theory,", IEEE Transactions on Power Apparatus and Systems, Vol. PAS-101, No. 9, (1982), pp3234-3245; and, Caramanis, M.C. R.E. Bohn, and F.C. Schweppe, "The Costs of Wheeling and Optimal Wheeling Rates", IEEE Transactions on Power Systems, Vol. PWRS-1, No. 1, February 1986, pp63-73.)

   or

   B. Market Clearing Pricing - WOLF
      (See Lively, M.B., "Tie Riding Freeloaders--The True Impediment to Transmission Access", Public Utilities Fortnightly, December 21, 1989; and, Lively, M.B., "Inadvertent Interchanges -- A New Way to Price Unscheduled Electricity", Electrical World, December 1991.

2. Determine Geographic Price Dispersion
   Use incremental fraction of delivered power (See Cohn, N., "Control of Generation and Power Flow", Standard Handbook for Electrical Engineers, Eleventh Edition, pp16-2 through 16-47, McGraw-Hill Book Company, New York; and Keith, D.A., "Marginal Cost of Electricity Supply As a Basis for Price Negotiations in Power Contracting", Proceedings of a Seminar on International Power Pricing, June 1992)

3. Dynamic Transmission Price is Differential in Geographic Prices

4. Normalized Transmission Price is Ratio of Geographic Prices

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METHODS FOR
DYNAMIC PRICING
FOR WHOLESALE POWER TRANSACTIONS

SCHWEPPE PRICING

1. Utilities minimize their costs using equalized lambdas, creating global optimums.

2. Optimal re-dispatch lessens price manipulation by major players.

3. True-up to system revenue requirement keeps network whole.

METHODS FOR
DYNAMIC PRICING
FOR WHOLESALE POWER TRANSACTIONS

MARKET CLEARING PRICING

1. ENGINEERING CONTROL THEORY

2. ECONOMIC SUPPLY AND DEMAND THEORY

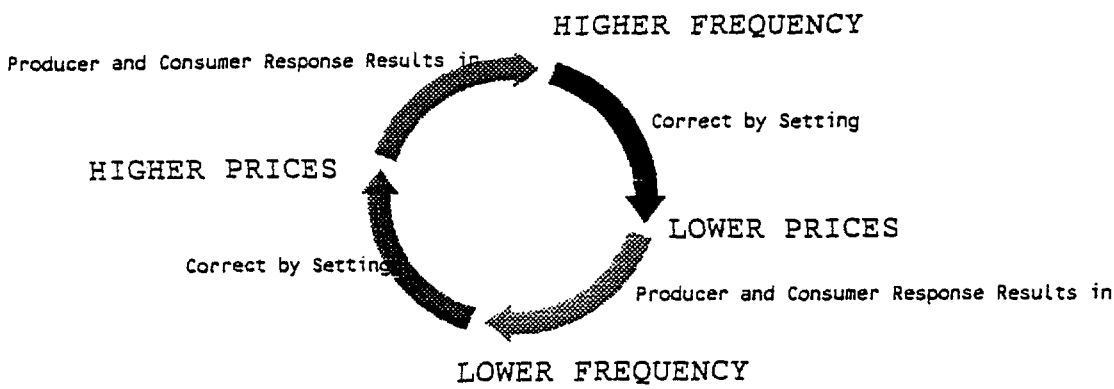
3. PRICE INCREASE - ECONOMIC THEORY PREDICTS
   A. GENERATORS INCREASE PRODUCTION
   B. USERS DECREASE DEMAND

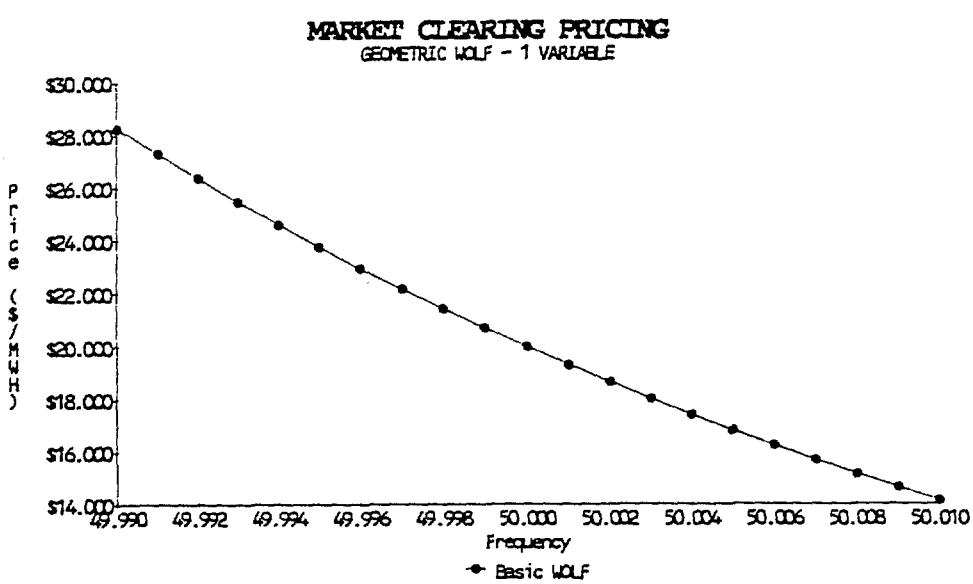
4. ELECTRICAL SYSTEM RESPONSE - MECHANICAL ENGINEERING
   FREQUENCY INCREASES

5. INTEGRATE ENGINEERING WITH ECONOMICS
   A. LOW FREQUENCY - INCREASE PRICES TO ENCOURAGE MORE PRODUCTION, LESS DEMAND
   B. HIGH FREQUENCY - DECREASE PRICES TO ENCOURAGE MORE DEMAND, LESS PRODUCTION
   C. LATE CLOCK - INCREASE PRICES A LITTLE TO ENCOURAGE MORE PRODUCTION AND LESS DEMAND
   D. EARLY CLOCK - DECREASE PRICES A LITTLE TO ENCOURAGE MORE DEMAND AND LESS PRODUCTION

METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

MARKET CLEARING PRICING





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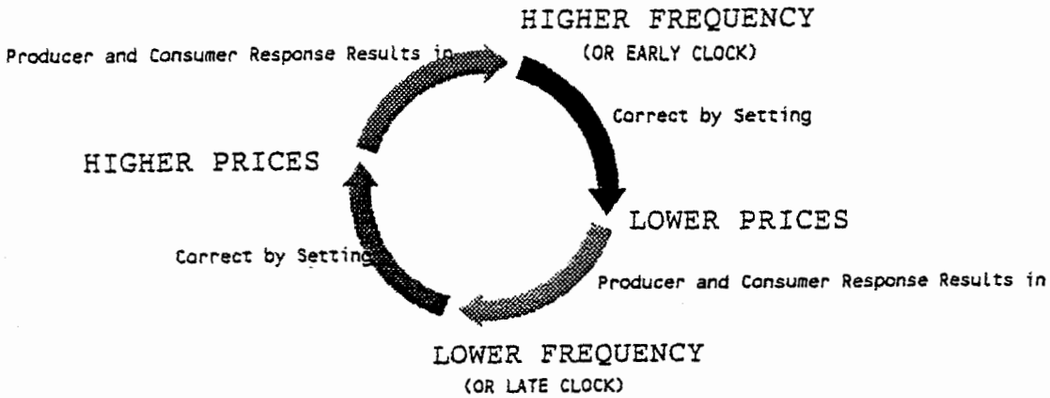
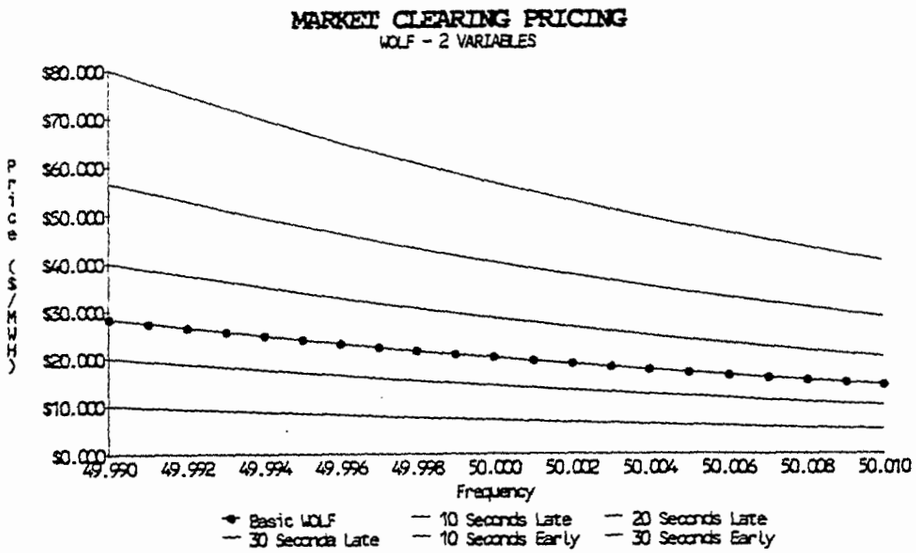
METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

MARKET CLEARING PRICING





METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

MARKET CLEARING PRICING

SAMPLE WOLF PRICES FOR FREQUENCY AND CUMULATIVE TIME DELAY

Cumulative Time Delay in Seconds, i.e., How Late (or Early if Negative) A Synchronous Clock Is

Frequency	0	10	20	30	40	-10	-20	-30	-40
49.990	$28.284	$40.000	$56.569	$80.000	$113.137	$20.000	$14.142	$10.000	$7.071
49.991	$27.321	$38.637	$54.642	$77.275	$109.283	$19.319	$13.660	$9.659	$6.830
49.992	$26.390	$37.321	$52.780	$74.643	$105.561	$18.661	$13.195	$9.330	$6.598
49.993	$25.491	$36.050	$50.982	$72.100	$101.965	$18.025	$12.746	$9.013	$6.373
49.994	$24.623	$34.822	$49.246	$69.644	$98.492	$17.411	$12.311	$8.706	$6.156
49.995	$23.784	$33.636	$47.568	$67.272	$95.137	$16.818	$11.892	$8.409	$5.946
49.996	$22.974	$32.490	$45.948	$64.980	$91.896	$16.245	$11.487	$8.123	$5.743
49.997	$22.191	$31.383	$44.383	$62.767	$88.766	$15.692	$11.096	$7.846	$5.548
49.998	$21.435	$30.314	$42.871	$60.629	$85.742	$15.157	$10.718	$7.579	$5.359
49.999	$20.705	$29.282	$41.411	$58.563	$82.821	$14.641	$10.353	$7.320	$5.176
50.000	$20.000	$28.284	$40.000	$56.569	$80.000	$14.142	$10.000	$7.071	$5.000
50.001	$19.319	$27.321	$38.637	$54.642	$77.275	$13.660	$9.659	$6.830	$4.830
50.002	$18.661	$26.390	$37.321	$52.780	$74.643	$13.195	$9.330	$6.598	$4.665
50.003	$18.025	$25.491	$36.050	$50.982	$72.100	$12.746	$9.013	$6.373	$4.506
50.004	$17.411	$24.623	$34.822	$49.246	$69.644	$12.311	$8.706	$6.156	$4.353
50.005	$16.818	$23.784	$33.636	$47.568	$67.272	$11.892	$8.409	$5.946	$4.204
50.006	$16.245	$22.974	$32.490	$45.948	$64.980	$11.487	$8.123	$5.743	$4.061
50.007	$15.692	$22.191	$31.383	$44.383	$62.767	$11.096	$7.846	$5.548	$3.923
50.008	$15.157	$21.435	$30.314	$42.871	$60.629	$10.718	$7.579	$5.359	$3.789
50.009	$14.641	$20.705	$29.282	$41.411	$58.563	$10.353	$7.320	$5.176	$3.660
50.010	$14.142	$20.000	$28.284	$40.000	$56.569	$10.000	$7.071	$5.000	$3.536

WOLF Half Lifes

Frequency	0.02 Hertz
Clock Error	20 Seconds

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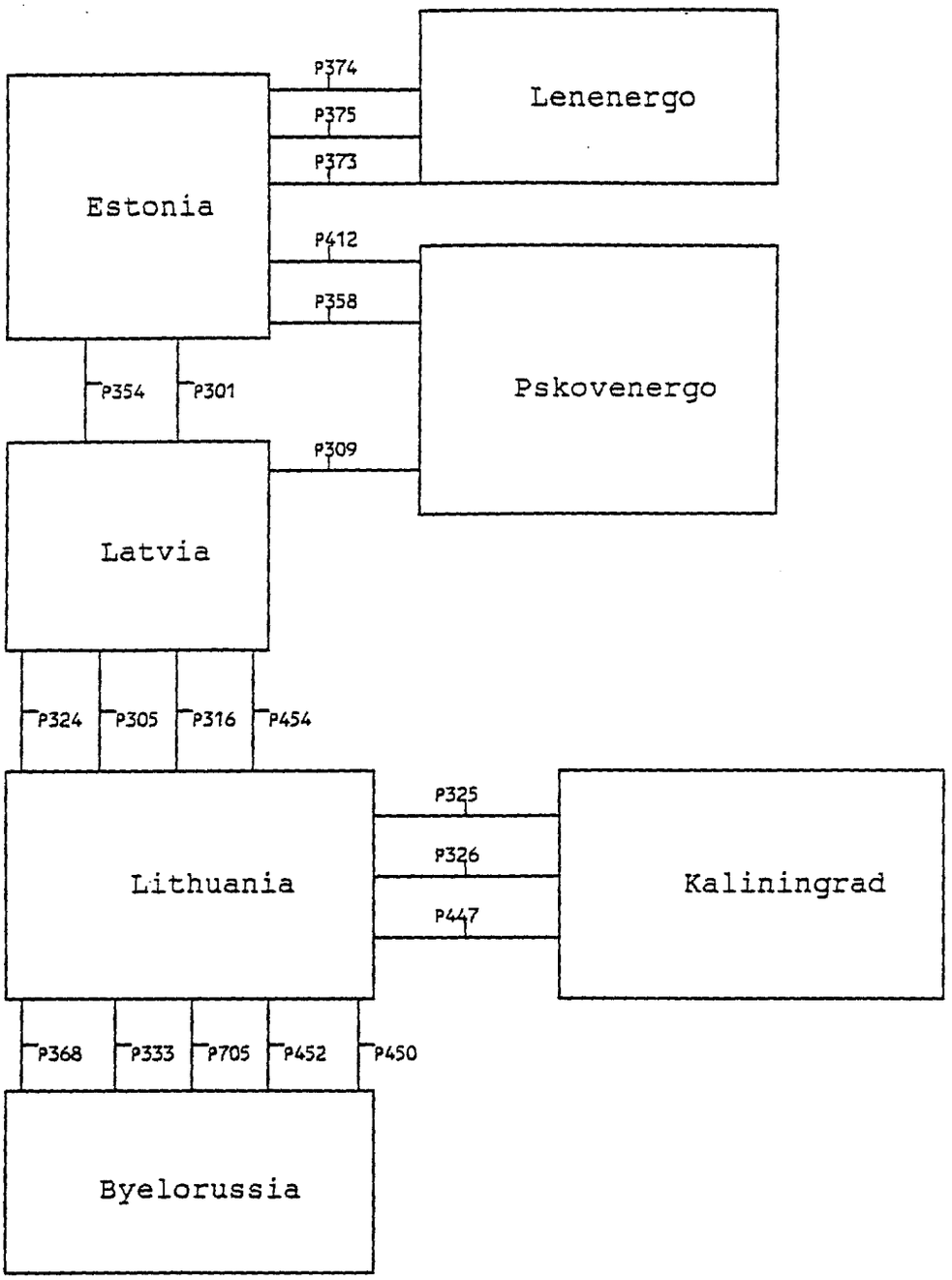
METHODS FOR
TIME-OF-USE ELECTRIC POWER PRICING
FOR WHOLESALE POWER TRANSACTIONS

Different Price for Each Time Period (5 minutes: 10 minutes: or 1 hour)
Different Price for Each Interconnection Point (p374,p375,p373, ...)



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ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AND METHODS OF COMPUTING CAPACITY CHARGES

Prepared for:

Seminar on Electric Transmission Pricing,
Time of Use Rates, and Capacity Payments
December 9-10, 1992

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Washington, D.C. 20523

December 1992

OUTLINE

1. The relationship between electricity prices and development planning

2. Alternative types of capacity obligations among power systems in the United States

3. Alternative types of capacity obligations that could be developed in the Baltics

4. Alternative methods of computing capacity charges

DEVELOPMENT PLANNING FOR U.S. POWER SYSTEMS

In the United States, development planning in the electric power sector is usually subject to the following objectives:

- The future development of the generation, transmission, and distribution system must provide the level of capacity needed to meet projected peak loads and energy requirements while achieving and maintaining standards of reliability.

- Investments designed to reduce the customers' peak load or energy requirement must be compared with investments designed to increase the capacity of the generation, transmission, and distribution system. An optimal mix of demand-side and supply-side investments should be identified.

- The expected cost of providing electric power to the consumer must be minimized, while maintaining standards of reliability.

Alternative development plans are compared, to select the best plan:

- The "least cost" plan is the one that minimizes the expected net present value of revenue requirements over the time period encompassed by the planning process (for example, over a 20-year period), while maintaining standards of reliability.

- The "best" plan may be the one that achieves a reasonably low cost (measured by the expected net present value of revenue requirements) under a variety of scenarios - for example, scenarios reflecting a variety of assumptions about oil prices and economic growth rates. The best plan may be the one under which the power system is prepared to cope with a variety of future conditions, including unfavorable conditions.

- The selection of the "best" plan may also involve a consideration of the environmental effects of power generation, transmission, distribution, and use.

THE RELATIONSHIP BETWEEN ELECTRICITY PRICES AND DEVELOPMENT PLANNING IN THE UNITED STATES

In any development plan for a U.S. power system, the projection of electricity demand must be consistent with the projection of the present value of revenue requirements. Electricity prices provide a link between these two projections.

- Electricity demand will be influenced by the level of prices (for example, the average tariff) and by the form of consumer tariffs (for example, the use of day/night tariffs or declining block rates).

- The tariffs and the demand projection may be used to project the level of customer revenue in each future year.

- Projected revenue must be equal to, or reasonably close to, projected revenue requirements in each future year. These revenue requirements will be influenced by the amount of new investment needed to meet the peak load and energy requirements specified in the electricity demand projection.

Prices achieve a balance between supply and demand.

- If the electricity price projection is too low, projected revenue will not be large enough to meet projected revenue requirements. There will not be enough money to pay for the capital investments in the development plan, so the development plan will be impossible to achieve. The reliability targets will not be met and shortages of electricity may be projected for peak periods.

- If the electricity price projection is too high, the present value of revenue requirements will not be minimized. The high level of prices will reduce electricity demand, and there will be excess generation and transmission capacity. When excess capacity exists, the average cost per kWh increases. Therefore there is a danger that high prices will lead to higher costs.

CAPACITY CHARGES AND DEVELOPMENT PLANNING

In the United States, a development plan is feasible only if the power system can obtain the necessary capital from lenders and from shareholders. To accomplish this, the power system must be able to persuade potential investors that tariffs will be high enough to pay operating expenses, interest and principal on long-term debt, and dividends to shareholders. The power system must show that it can provide a level of profit sufficient to attract capital from shareholders - that is, a level of profit sufficient to make the average shareholder want to buy more shares of stock in the company, rather than selling his stock in the company.

Regulatory approval for proposed tariffs will depend, in part, on an assessment by regulatory authorities of the effect of these tariffs on the ability of the power system to finance new capacity additions.

Capacity charges are used to recover the fixed costs of power generation and transmission, including the annual capital cost. An allowance for profit (that is, a return on equity) is part of the annual capital cost. If capacity charges are too low, there is a likelihood that profits will be too low, and therefore there is a danger that the development plan will not be feasible.

Perhaps the simplest example of the relationship between capacity charges and development planning is a project developer's attempt to obtain financing for an independent power plant. Under "project financing," the individual project - the generating unit - must have enough projected revenues to cover all expenses including a reasonable return on capital. If the developer cannot show that the capacity and energy charges will be sufficient to cover the cost of building and operating the proposed generating unit, the developer will not be able to obtain the necessary capital and the generating unit will not be built. In many instances the developer will try to negotiate capacity payments that ensure the recovery of fixed costs.

For a large power system it is desirable to negotiate capacity payments when a new capital project is developed to provide generating capacity or transmission capacity to another power system.

THE RELATIONSHIP BETWEEN ELECTRICITY PRICES AND DEVELOPMENT PLANNING IN THE BALTICS

Under the former Soviet system of planning there was almost no relationship between electricity prices and development planning.

- It was not necessary to project electricity prices before projecting peak loads and energy requirements.

- It was not necessary to calculate the level of prices needed to obtain financing for the capital projects contained in the development plan.

In the future there must be a linkage between electricity prices and development planning, but the precise form of this linkage is unclear.

- At present there is very little capital available to invest in generating stations and transmission system improvements.

- There is no regional authority coordinating the development plans of Eesti Energia, Latvenergo, and the Lithuanian State Power System.

- Equipment suppliers in Russia and other countries to the east may be less reliable than western suppliers, and may not be able to meet western standards. Western capital may be needed to finance the use of western equipment for maintenance and refurbishment.

- Foreign capital is expected but the sources of foreign capital have not all been identified. It is difficult to project the proportion of total capital from different sources (for example, private sector debt versus EBRD and IBRD loans) and therefore the overall cost of capital for power systems is not known.

ARE CAPACITY CHARGES NEEDED IN THE BALTICS TO RECOVER THE COST OF HISTORICAL INVESTMENT?

In the development of a method for calculating capacity charges for international power transactions, there are at least three alternative approaches to the issue of historical investment:

1) Exclude historical investment from the fixed costs used to compute capacity charges. Assume that the "return" on past investments in the power sector has no relationship to the ability of power systems to obtain financing for future investment. Assume that it would be fruitless to try to allocate the costs of historical investment among the three power systems.

2) Include historical investment in capital costs used to compute capacity charges, but use a methodology that ensures that the charges associated with historical investment are much lower than the charges associated with new investment. For example, include only a charge for depreciation and amortization on the basis of historical cost, without adjustment for inflation.

3) Develop a methodology to compute capacity charges on the basis of the costs that would have been incurred if the generating stations and transmission lines in the Baltics had been built in a western market economy.

Because there was almost no relationship between electricity prices and development planning in the Northwest Interconnected Power System, the first approach appears to be the most reasonable.

ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AMONG POWER SYSTEMS IN THE UNITED STATES

Although a wide variety of capacity obligations exists, there are four basic types of obligations among power systems:

1. Sale of capacity and energy from generating units that were built to provide wholesale power to companies other than the owner(s) of the units

2. Participation in a joint venture, in which a generating unit is built to provide capacity and energy to two or more owners

3. Sale of capacity and energy from power systems with unplanned excess capacity or ability to displace higher-cost generation

4. Participation in a power pool, in which each member must meet its own capacity needs and reserve requirements

For simplicity these four categories may be called "planned sales," "joint ventures," "unplanned sales," and "power pools."

ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AMONG POWER SYSTEMS IN THE UNITED STATES

Planned sales

Sale of capacity and energy from a generating unit or units that were built to provide wholesale power to companies other than the owner(s) of the units

- Capacity charges must cover either the seller's actual annual capital costs per kW, or the level of annual capital costs per kW that was projected by the seller before the generating unit was built.

Alternative ownership arrangements:

1. The generating unit may be owned by an independent power producer (IPP) - a generation company that is in the business of building and operating power plants for the sale of wholesale power in competitive markets. The profits of IPPs are not regulated by government authorities.

2. The generating unit may be owned by a power system which routinely constructs, or plans to construct, more generating capacity than the amount required to meet the needs of retail customers. This additional capacity is planned to provide power to wholesale customers.

3. The generating unit may be owned by a government-owned power system that was created to provide hydroelectric power to other power systems. The purchasers typically include municipal systems that own distribution lines but have no generation or transmission investment. There are two large hydroelectric authorities owned by the U.S. government - Bonneville Power Authority and the Tennessee Valley Authority - and several hydroelectric authorities owned by state governments.

4. The generating unit may be owned by an industrial or commercial company which uses a portion of the steam for purposes other than power generation. This type of generating unit is called a cogeneration plant, and is roughly comparable to a combined heat and power (CHP) plant. Most cogeneration facilities in the United States are not owned by power systems and do not provide district heating.

ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AMONG POWER SYSTEMS IN THE UNITED STATES

Joint ventures

Participation in a joint venture, in which a generating unit is built to provide capacity and energy to two or more owners

- In most cases there are no capacity charges for capacity used to serve the retail customers of the joint venture partners. Each owner pays a share of capital expenditures and fixed costs.

- If a portion of the capacity is used to sell power in wholesale markets, capacity charges will be used to recover the capital costs and other fixed costs associated with wholesale power sales.

Alternative ownership arrangements:

1. The joint venture may be created by two or more power systems, each of which will use the new generating capacity to serve retail customers. The partners choose to share the cost of a large power plant, rather than building smaller power plants independently, so that the partners can reduce generation costs per kW and costs per kWh. For example, the partners may share the cost of a nuclear power station with two or more nuclear reactors at a single site.

2. The joint venture may include power systems with a variety of needs for generating capacity. A partner may use some of all of its share of joint venture capacity to sell wholesale power to other power systems, rather than serve retail customers.

- If the joint venture includes only partners who use their joint venture capacity to sell wholesale power, the joint venture falls in the "planned sales" category. In this situation the generating unit is built to provide wholesale power to customers other than the owner of the unit, and capacity charges are used to recover capital costs.

ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AMONG POWER SYSTEMS IN THE UNITED STATES

Unplanned sales

Sale of capacity and energy from power systems with unplanned excess capacity or ability to displace higher-cost generation

- Capacity charges should equal or exceed the seller's incremental cost of providing capacity. If the seller has excess capacity, this incremental cost will be very low.

- If the seller has excess capacity, the capacity charges may be large enough to make a contribution to the seller's fixed costs, but are unlikely to cover the seller's fixed costs on a fully distributed cost basis.

- If the energy is used to displace higher-cost generation, capacity charges will be negotiated between buyer and seller. The buyer may be willing to pay a capacity charge that is higher than the seller's fully distributed cost.

Ownership arrangements

- The seller is a power system, in most cases. Independent power producers and cogenerators typically do not build capacity in excess of the amount they are contractually obligated to provide.

Situations in which unplanned sales are made:

1. If the seller's long-term projection of retail customer demand was an overestimate, the seller typically will have constructed more generating capacity than the amount required to meet the needs of its retail customers.
2. If the price of heavy fuel oil increases sharply, and the buyer has power plants designed to rely on heavy fuel oil for baseload generation, the buyer may purchase capacity and energy from power systems that have coal-fired or nuclear capacity available for additional wholesale power sales. In theory a gas price increase could have the same effect.
3. The most favorable condition for unplanned sales is one in which the seller has excess capacity, the buyer has oil-fired capacity, and the price of oil has increased sharply.

ALTERNATIVE TYPES OF CAPACITY OBLIGATIONS AMONG POWER SYSTEMS IN THE UNITED STATES

Power pools

Participation in a power pool, in which each member must meet its own capacity needs and reserve obligations

- There are no capacity charges associated with membership in the power pool, because a member is not required to use long-term contracts to meet its own capacity needs and reserve obligations. If a member chooses to purchase capacity or to participate in a joint venture to build capacity, the decision is not attributable to membership in the power pool.

- The power pool agreement should specify the prices to be paid for energy purchased to cover scheduled outages, unscheduled outages, and capacity deficiencies. These types of power purchases will involve only energy charges, because the seller does not assume a long-term obligation to provide capacity.

- In the simplest case, a power pool is formed by power systems which have the ability to operate independently but choose to join the pool to reduce their costs or increase the reliability of service to their customers.

- In a spot pricing pool there are no capacity payments, but hedging contracts may be used by sellers to stabilize their revenues.

INNOVATIVE TYPES OF CAPACITY OBLIGATIONS THAT COULD BE CREATED IN THE BALTICS

For Estonia, Latvia, and Lithuania it is possible to create new types of capacity obligations that are suited to the transition to a market economy. In international transactions among the Baltic countries the treatment of historical costs may be very different from the way historical costs are treated in the United States and other western countries.

Innovative types of capacity obligations may involve either jont ventures or power sales contracts.

Joint ventures to maintain and refurbish generating units. For a particular generating unit, the three power systems may become equity owners of a joint venture in which the generating unit is maintained and refurbished to provide capacity and energy to the owners.

- There are no capacity charges. Each owner agrees to pay a share of future capital expenditures, but historical capital expenditures are not allocated among owners.

- Each owner should agree to pay energy charges based upon variable costs, which should be easy to measure. Fuel costs will be the largest component of variable cost. To make the agreement simple it would be possible to compute the monthly energy charge as the average monthly cost of fuel per kWh, multiplied by a factor (for example, 1.04) reflecting an allowance for transmission losses.

- The owners must reach agreement on the method of dispatch of the unit and the decision-making structure for day-to-day operation. For example, day-to-day operation may be the responsibility of (1) the power system in the country where the unit is located, (2) the Baltija Dispatch Center, or (3) a committee with one representative from each equity owner.

- Historical capital expenditures may be reflected in tariffs for domestic (retail) customers of the power system in the country where the unit is located. The joint venture would not be responsible for recovering these costs.

INNOVATIVE TYPES OF CAPACITY OBLIGATIONS THAT COULD BE CREATED IN THE BALTICS

Power sales contracts without recovery of historical costs. Power systems may continue the present pattern of ownership while using contracts to establish pricing principles for power sales. In a bilateral agreement, the buyer and seller may negotiate an agreement for the sale of capacity and energy, in which historical capital expenditures are excluded from capacity payments.

- Capacity charges must cover future capital expenditures and future fixed costs, but not historical capital expenditures. Historical capital expenditures may be defined as expenditures that precede the effect date of the contract.

- Alternative ownership arrangements:

  1) Each power system continues to own 100 percent of each generating unit within its territory. Costs and revenues may be measured for the power system as a whole. The power system may raise capital by issuing long-term debt or by receiving government funds obtained by government borrowing from the IBRD or EBRD.

  2) A generating unit may be reorganized as an operating company with its own accounting records. The operating company may raise capital by issuing long-term debt or by receiving funds obtained by government borrowing. There may be an agreement that the purchasers of wholesale power have the right to audit the accounting records of the operating company.

  3) A generating unit may be reorganized as a joint venture involving the power system and one or more foreign companies providing foreign equity capital to maintain and refurbish the generating unit. (This approach is being implemented in Poland.)

  4) An entire power system may be privatized or reorganized as a joint venture with foreign equity owners. Some of the foreign capital obtained through restructuring may be used to maintain and refurbish the generating units(s) used to export power. (This approach is being implemented in the eastern provinces of Germany.)

ISSUES INVOLVED IN INNOVATIVE CAPACITY OBLIGATIONS

To create innovative capacity obligations for the Baltics, it will be necessary for the power systems to resolve issues that are not addressed in market economies. Some of these issues are listed below.

Should maintenance costs be capitalized, if maintenance has been deferred?

> In market economies, maintenance is normally treated as a set of fixed and variable operating costs that are recovered through energy charges and are not capitalized. This approach is reasonable when generating units and transmission lines are kept in good condition through normal maintenance. In the Baltics, however, it may be necessary to make up for the lack of adequate maintenance in the past.

If maintenance costs are capitalized, over how many years should deferred maintenance be amortized?

> For any category of capital assets (equipment, buildings, transmission lines, etc.) the number of years of depreciation or amortization must not exceed the useful operating life of the capital assets. The true cost of generation and transmission should not be disguised by using 3-year or 40-year amortization periods for equipment with a shorter lifetime.

What date or guideline should be used to distinguish "historical" capital expenditures from "new" capital expenditures?

> It should not be difficult to argue that capital expenditures made prior to a country's independence should be considered "historical." If a new joint venture or a new sales contract is negotiated, some agreement must be reached regarding capital expenditures made after independence and before the effective date of the agreement. The simplest solution is to consider such expenditures "historical."

ALTERNATIVE METHODS OF COMPUTING CAPACITY CHARGES

Because a capacity charge is a payment to cover the cost of providing capacity, it is necessary for the buyer and the seller to agree upon a definition of capacity costs. The following discussion consists of two parts:

Alternative definitions of capacity costs

A: the cost of a particular type of generating capacity

B: the cost of the cheapest method of ensuring that the annual peak load can be met

C: the cost of a combustion turbine designed for peaking

Alternative methods of computing capacity charges

1) Seller's cost at specific generating stations

2) Seller's distributed cost of capacity, based upon LRMC

3) Seller's incremental capacity cost

4) LRMC (based on the cost of peaking capacity)

5) LRMC (based on the cost of the next unit)

6) Buyer's avoided capacity cost

ALTERNATIVE DEFINITIONS OF CAPACITY COSTS

In most power systems there is a mix of generating units designed for base load, cycling, and peaking, and there is a range of investment alternatives including construction of new generating units, "life extension" of older units, and investment in demand-side management measures (to enable customers to reduce load or shift load from peak to off-peak periods). Capacity may also be purchased from other power systems. Different power systems, regulatory agencies, and experts involved in ratemaking may use different definitions of capacity cost. For example, the following alternatives exist:

A: There are different categories of capacity (at least three categories: baseload, cycling, peaking), and capacity cost can only be defined for a specific category. In a power contract the capacity charge cannot be determined until the load profile is specified or the units needed to provide the power are identified. The capital cost of peaking capacity (in $/kW/year) is usually lower than the price of baseload capacity, because it is cheaper to install a kW of combustion turbine capacity than a kW of baseload power plant capacity. The energy cost of peaking capacity (other than hydro) is usually higher than the baseload energy cost.

B: The cost of a generating unit may be divided into two components: a capacity cost and an investment designed to reduce operating costs. The capacity cost is the cost of the cheapest method of ensuring that the annual peak load can be met - either a new combustion turbine designed for peaking, an increase in hydroelectric peaking capacity, a life extension of an older thermal unit, or a voluntary demand management program. The rest of the capital cost of the generating unit is an investment designed to reduce operating costs.

An investment in generating capacity other than peaking capacity may be justified by projected savings in fuel costs per kWh. For example, it is possible to add a heat recovery steam generator to a combustion turbine to lower fuel costs.

C: The cost of a generating unit may be divided into a capacity cost and an investment designed to reduce operating costs. To simplify the calculation of capacity cost, the capacity cost may be defined as the cost per kW per year of a combustion turbine designed for peaking.

ALTERNATIVE METHODS OF COMPUTING CAPACITY CHARGES

There are many different ways to compute capacity charges. The following methods are described below:

1) Seller's cost at specific generating stations

2) Seller's distributed cost of capacity, based upon LRMC

3) Seller's incremental capacity cost

4) LRMC (based on the cost of peaking capacity)

5) LRMC (based on the cost of the next unit)

6) Buyer's avoided capacity cost

None of these methods is related to the buyer's ability to pay. In a market economy, electric tariffs are rarely raised to a level at which the customer's ability to pay is an important criterion in selecting a method of computing capacity charges.

In the United States, the buyer's avoided capacity cost is often the basis for capacity charges paid to independent generation companies.

Seller's cost at specific generating stations

It is possible for both capacity and energy charges to be calculated on the basis of the seller's cost at specific generating stations.

Under this approach the seller identifies specific generating stations that can be used to provide firm capacity to the buyer. For each of these stations the seller calculates annual capacity costs per kW on the basis of standard operating assumptions consistent with the design of the plant. For example, the capacity charge could be based upon:

- the stations' annual capital cost per kW, assuming full load
- the station's annual capital cost per kW, based on planned capacity utilization.

If this approach is used in the Baltics, the buyer and seller may agree to exclude historical capital expenditures from the calculation of capacity charges.

This method of computing capacity charges may be preferred to the LRMC-based approaches because it is based upon actual costs incurred by the seller rather than a projection of costs that might be incurred to build generating units in the future. This method is simpler than the distributed cost method because it does not depend on information about the seller's entire power system and projected sales. If a capacity contract does not exist, this method may also be preferred to the seller's incremental cost and buyer's avoided cost approaches, which require a clear definition of the seller's obligation to provide firm capacity to the buyer.

Seller's distributed cost of capacity, based upon LRMC

Another method of computing capacity charges is to consider wholesale customers to be a class of customers for which prices should be based on the seller's distributed cost. Under this approach the wholesale customer's rates are calculated on the same principles as the household and industrial rates. The capacity charge for wholesale customers is computed on the same principle as the demand charge for large industrial customers.

Among the various methods of allocating capacity costs to customer classes, one alternative is to allocate capacity costs in proportion to the revenue that would be required if capacity were priced at LRMC. This approach involves four steps:

1. The seller computes a total capital carrying charge based on seller's actual cost of plant and equipment. The capital carrying charge includes costs for generation and transmission investment.

2. The seller estimates incremental capacity required to serve each customer class. Incremental capacity is the capacity that would not be needed if the customer class did not have a firm capacity requirement.

3. For each customer class, the cost of incremental capacity is computed on the basis of the LRMC of the incremental capacity required to serve that customer class. An LRMC-based revenue requirement is computed by adding up these costs.

4. The capital carrying charge in step 1 is allocated among customer classes in proportion to their shares of the LRMC-based revenue requirement computed in step 3.

Seller's incremental capacity cost

The annual capital cost used to compute capacity charges may be defined as the incremental cost associated with the seller's obligation to provide firm capacity to the buyer. The concept of incremental and decremental cost is routinely applied to variable costs and may also be applied to fixed costs. It is more difficult to apply the concept to fixed costs, however, because it is less clear what the buyer and seller would have done in the absence of the capacity transaction.

The generating capacity that now exists in the Baltic countries was not built for the purpose of implementing contracts to sell capacity. The cost of existing capacity may be considered a "sunk cost" - a capital expenditure that has already been made. The obligation of an importer to pay for this capacity is unclear.

There are two ways to define the seller's incremental capacity cost:

1) The seller's incremental capacity cost is the annual cost per kW that the seller would have avoided if the seller had not had the obligation to provide capacity to the buyer. The seller's obligation may be to provide firm baseload, cycling, or peaking capacity, or some combination of these.

2) The seller's incremental capacity cost is the annual cost that the seller will incur as a result of signing a new contract and making a new commitment to the buyer.

ALTERNATIVE METHODS OF COMPUTING CAPACITY CHARGES

The LRMC of capacity is the projected cost per kW per year of supplying an additional kW of capacity in a particular portion of the year (for example, the peak hours during the winter season) over a period of many years, using both new and existing plant and equipment and using fuel from the sources of supply that are planned for the future.

This definition may be interpreted in different ways, depending on the approach used to measure capacity cost. The LRMC of capacity may be calculated on the basis of the cost of peaking capacity or the cost of the next generating unit to be built.

LRMC (based on the cost of peaking capacity)

Under Approach C (described above), capacity cost may be defined as the cost per kW per year of a combustion turbine designed for peaking. If this definition of capacity cost is accepted, LRMC must be calculated on the basis of the cost of peaking capacity. This is called the "peaker method" and it is the method that is most commonly used for LRMC analysis. The LRMC (in dollars per kW per year) can be estimated as the projected annual capital cost of a new combustion turbine designed for peaking operation, divided by the capacity of the unit.

Many combustion turbines in the United States are designed to use natural gas during peak periods. The cost of natural gas is typically classified as a "variable cost" although natural gas exploration, production, and transmission are capital-intensive activities with a high proportion of fixed cost. There are two possible approaches to the peaker method:

A: The annual capacity cost associated with a new peaking unit may be defined as the annual cost of the generating unit alone.

B: The annual capacity cost associated with a new peaking unit may be defined as the annual cost of the total capital investment that is (a) necessary to build and operate the unit, and (b) recovered through demand charges or other types of fixed monthly or annual payments. This total capital investment may include investment in gas pipelines, gas storage fields, petroleum product pipelines, and storage tanks for light fuel oil.

ALTERNATIVE METHODS OF COMPUTING CAPACITY CHARGES

LRMC (based on the cost of the next unit)

One way to implement Approach A - the viewpoint that a particular kind of capacity must be identified before a capacity cost can be measured - is to estimate LRMC based on the cost of the next unit. Under this approach (the "next unit" approach) a least-cost plan is developed for either (a) the power pool or region in which the buyer and seller are located, or (b) the seller's power system alone. To achieve economic efficiency the regional approach is preferred. The capacity cost associated with the next generating unit to be constructed is used to compute the capacity charges in a wholesale power contract.

One reason for considering the "next unit" approach is that the "peaker" approach does not guarantee the seller enough revenue from capacity charges to assure repayment of the cost of a generating unit that has a higher cost per kW than the peaking unit. The "peaker" approach tends to encourage construction of combustion turbines that are expensive to operate and use fuel inefficiently. The "next unit" approach may provide the seller with enough revenue from capacity charges to assure repayment of the capital investment in the next unit or in a comparable type of unit. The "next unit" approach should make it easier for the seller to raise capital.

In a region where none of the power systems are able to build a new generating unit, or the drop in electricity demand has eliminated the need for a new generating unit, the "next unit" approach may not be practical. If the power systems are planning major investments in life extension or demand-side management, the annual capacity cost per kW associated with these investments may be used in place of the annual capacity cost per kW of a generating unit.

Other approaches to LRMC

There are other approaches to LRMC that are more difficult to implement, and are not included in the list of alternatives in this presentation. For example, the "differential revenue requirements" method involves a comparison between two long-term development plans involving two different projections of electricity demand. It is not always clear how much of the difference in revenue requirements should be allocated to capacity cost; one option is to use the cost of peaking capacity.

Buyer's avoided capacity cost

In the United States the term "avoided cost" is commonly used in negotiations of the price of capacity and energy sold by independent power producers and cogeneration facilities. The concept of avoided cost is very similar to the concept of decremental cost. Avoided costs are projected over the economic life of a new power plant or cogeneration facility.

There are two ways to define the buyer's avoided capacity cost:

1) The buyer's avoided capacity cost is the annual cost per kW that the buyer would have incurred if the buyer had not had the obligation to purchase capacity from the seller.

2) The buyer's avoided capacity cost is the annual cost that the buyer will avoid as a result of signing a new contract and making a new commitment to purchase capacity from the seller.

The buyer's potential savings associated with a contract to purchase capacity and energy involve energy costs as well as capacity costs. However, it would be normal to expect the buyer's avoided capacity cost to be equal to or higher than the seller's incremental capacity cost. If new capacity is involved, the buyer may prefer to determine capacity and energy payments through competitive bidding, rather than basing these payments on the buyer's avoided costs.

INITIAL DRAFT OF AN INTERCONNECTION AGREEMENT

Prepared for:

Seminar on Electric Transmission Pricing,
Time of Use Rates, and Capacity Payments
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1.3 "Interruptible load" is the total amount of load that a power system is not obligated to supply at all times, as a consequence of agreements with wholesale or retail customers that power will be supplied on an interruptible basis at prices below the prices in effect for power supplied on a firm basis.

1.4 In any hour, "firm load" is the amount of load that is not interruptible load.

1.5 "Firm peak load" is the amount of load that is not interruptible load and is measured at the winter peak.

1.6 "Total firm resources" shall mean the sum of the generating capability (in MW) of a power system's generating stations plus the amount of firm capacity (in MW) purchased from other power systems or generation enterprises according to the terms of power purchase agreements. Total firm resources are measured by the amount of power that can be supplied to the transmission grid of a power system.

1.7 The "peak power requirement" of a power system is the power level (in MW) that must be supplied to the transmission grid of the power system to meet the coincident firm peak load of the retail and wholesale customers of the power system. The peak power requirement equals the firm peak load plus an allowance for transmission losses.

1.8 The "installed reserves" of a power system equal the difference between the total firm resources available to a power system during a particular winter season and the peak power requirement projected for the same season.

1.9 The "operating reserves" of a power system equal the difference between the total firm resources that can be made available within one hour and the firm load in the current hour.

1.10 The "spinning reserves" of a power system equal the amount of unloaded generating capability that can be made available within ten minutes. Spinning reserves are one category of operating reserves.

Interconnection Agreement

entered into as of the first day of January, 1993

between Eesti Energia, Latvenergo, and the Lithuanian State Power System, hereinafter called the "power system participants."

WHEREAS the power system participants were formerly part of the Northwest Interconnected Power System of the USSR, a system which was designed and operated as a unified system for the benefit of all of the electric power consumers in the northwest region of the USSR, and

WHEREAS the power system participants continue to share an interconnected transmission system, continue to have their generating units dispatched by a dispatch center located in Riga, Latvia, and recognize the need to coordinate planning and operations to maintain a reliable and adequate supply of power, and

WHEREAS Eesti Energia desires to export power from baseload units and import power from peaking and cycling units, Latvenergo desires to import power from baseload units, and the Lithuanian State Power System desires to export power from baseload and cycling units,

NOW THEREFORE the power system participants mutually agree as follows:

Article 1
Definitions

1.1 A "power system" is an enterprise which owns and operates electric transmission and distribution facilities. A power system may also own and operate generating facilities.

1.2 "Firm capacity" is the amount of capacity that a power system purchases from other power systems under agreements in which the seller is obligated to supply this capacity under all conditions except force majeure conditions.

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1.11 The "transmission grid" of a power system participant consists of all power lines operated at voltages equal to or greater than 110 kV and located within the service territory of the power system participant.

1.12 For a particular power sales transaction, the "seller" is the power system participant who delivers power and the "buyer" is the power system participant who receives power.

1.13 For a particular power sales transaction, the "seller's incremental cost is the sum of the following costs:

(a) the incremental cost of the fuel, operating labor, and maintenance required to generate the energy necessary to supply (1) the delivery to the buyer, plus (2) the incremental transmission losses incurred on the seller's system, plus (3) the energy supplied to any intervening power system as compensation for transmission losses.

(b) the incremental cost of starting and operating any generating units which must be started by the seller as a result of supplying such energy, and

(c) the seller's cost of energy purchased from other power systems, if the purchase is made as a result of the seller's obligation or decision to supply energy to the buyer.

1.14 For a particular power sales transaction, the "buyer's decremental cost" is the sum of the following:

(a) the estimated cost of the fuel, operating labor, and maintenance which the buyer avoided as a result of the obligation or decision to purchase energy from the seller, and

(b) the estimated cost of generating unit startup which the buyer avoided as a result of the obligation or decision to purchase energy from the seller.

Article 2
Governmental Authorizations

This agreement, including its supplements, is subject to the authorizations of the Baltic Energy Council, the Ministry of Energy of Estonia, the Ministry of Industry and Energy of Latvia, the Ministry of Energy of Lithuania, and other ministries of the governments of Estonia, Latvia, and Lithuania. To implement this agreement, the participant power systems will attempt to obtain governmental authorization from the Baltic Energy Council and from their respective ministries of energy.

If a power system participant requests governmental authorization to implement this agreement and does not receive approval within a reasonable period of time, not to exceed 90 days, the power system must notify the other power system participants that the request has not been approved. Each power system participant will attempt to keep the other power system participants informed of government decisions or policies that will create serious obstacles to the implementation of this agreement.

Article 3
General Obligations and Practices

Type of power. All electric power and energy interchanged or sold under this agreement shall be in the form of alternating current.

Voltage. The voltage at which power is transmitted across an international border shall be the voltage which the transmission was designed to provide, unless the power systems on both sides of the border agree to permit transmission at a different voltage. The operating voltage at each interconnection between two power system participants shall be controlled in accordance with operating practices and limitations set by the Baltija Dispatch Center.

Frequency. On the transmission grid of each power system participant, the frequency shall be controlled in accordance with operating practices and limitations set by the Baltija Dispatch Center.

Effects of interconnection with Russia and Belarus. If the flow of power across an interconnection with Russia or Belarus prevents a power system participant from maintaining voltage and frequency within the guidelines set by the Baltija Dispatch Center, the power system participant shall follow the instructions given by the Baltija Dispatch Center regarding actions that may be taken to limit the flow of power to another power system participant at unacceptable voltage and frequency levels.

Spinning reserve. Each of the power system participants will maintain the level of spinning reserve requested by the Baltija Dispatch Center and the level of operating reserve requested by the Baltija Dispatch Center.

Maintenance schedules. The power system participants shall coordinate maintenance schedules for generating equipment and transmission lines so as to increase the reliability of their power systems. Scheduled outages will be planned at least 90 days in advance, in cooperation with the Baltija Dispatch Center.

Coordinated development. The power system participants will share information with each other and with the Baltija Dispatch Center regarding the future development of generation and transmission facilities. The power system participants will coordinate development of generation and transmission facilities so as to increase the reliability of their power systems and maintain installed reserves in accordance with Article 4 below.

Continuity of service. The power system participants shall try to maintain continuity of service in the delivery and receipt of electric power and energy as provided under this agreement. If the service is interrupted or diminished for any reason, the cause of such interruption or reduction shall be removed and normal operating conditions shall be restored as soon as practicable.

Article 4
Installed Reserves

Target level of installed reserves. Each power system participant shall attempt to maintain installed reserves equal to at least 15 percent of the peak power requirement projected for each winter season over a ten-year forecasting period.

To achieve its target level of installed reserves, each power system participant shall rebuild existing generating capacity, construct new generating capacity, or purchase firm capacity under long-term contracts.

Development Planning Committee. The power system participants shall form a Development Planning Committee for the purpose of coordinating the future development of their systems. This committee will have seven members, including one representative of the Baltija Dispatch Center and two representatives of each power system participant.

Each power system participant shall provide information to the Development Planning Committee regarding projections of total firm resources, peak power requirements, and interchange of power with other power systems over a ten-year forecasting period. The methodology for projecting peak power requirements shall be described in detail.

If a power system does not expect to have installed reserves equal to at least 15 percent of the peak power requirement projected for each winter season over a ten-year forecasting period, the power system shall provide a report to the Development Planning Committee explaining the reasons why the installed reserves are below the target level. The Development Planning Committee will identify actions that can be taken to achieve the target level of installed reserves.

Article 5
Ownership, Operation, and Maintenance of the Transmission Grid

Eesti Energia shall own, maintain, and operate the portion of the transmission grid located within the borders of Estonia. Latvenergo shall own, maintain, and operate the portion of the transmission grid located within Latvia. The Lithuanian State Power System shall own, maintain, and operate the portion of the transmission grid located within Lithuania.

If the power system participants agree that a capital investment in the transmission grid is needed in any portion of the area of the Baltic countries, the power system participants shall submit to the Baltija Dispatch Center a proposal to either (a) require each power system participant to provide the

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capital needed for improvements to its portion of the transmission grid, or (b) share the cost of such capital improvements according to an arrangement that the power system participants consider equitable. If a power system participant provides the capital needed for improvements to its portion of the transmission grid, it may include these costs in the calculation of capacity or energy charges for sales or transmission service and it may recover a portion of these capital costs through capacity or energy charges. If a cost sharing arrangement is implemented, the shared capital costs shall not be included in the calculation of capacity or energy charges for sales or transmission service provided by any power system participant to any other power system participant. In either case - with or without cast sharing - the responsibility of each power system participant to own, maintain, and operate its portion of the transmission grid will not be affected.

If there is any disagreement among the power system participants regarding the ownership of facilities on the Estonian-Latvian border or on the Latvian-Lithuanian border, the power system participants will ask Baltic Energy Council to issue a decision on the ownership of the facilities in question.

Article 6
Delivery and Metering

Delivery points. Electric power shall be delivered at the Estonian-Latvian border and at the Latvian-Lithuanian border at any of the existing interconnections in the transmission grid. These interconnections shall remain in operation at all times.

Metering. Appropriate metering devices shall be installed as required to provide readings at least hourly of power and energy interchange. The meters shall be located as required to determine the quantities of energy and power delivered at the delivery points. Each power system participant shall own, operate, and maintain the metering equipment located within its borders, but metering equipment on the Estonian-Latvian border or the Latvian-Lithuanian border may be jointly owned, operated, and maintained by the power system participants sharing the border. Where joint ownership exists, all capital, operation, and maintenance costs of the jointly owned metering equipment will be shared by the owners on a 50-50 basis.

Inspection and testing. Any properly designated representative of the power system participants shall have access to the billing meters for the purpose of reading the meters. The accuracy of the meters shall be verified by proper tests at least once a year or upon reasonable notice given by one power system participant to another. Each power system participant shall be entitled to have a representative present at such verification.

Meters out of service. When the billing meters are out of service for testing or repairs or because of failure or malfunction, power and energy flow during the period of outage or malfunction shall be determined by the Baltija Dispatch Center from other meter readings, if available. If other meter readings are not available, power an energy flow during the period of outage or malfunction shall be estimated and agreed to by the Baltija Dispatch Center.

Article 7
Reactive Power Compensation

If any power system participant finds it necessary to operate turbines in synchronous condenser mode or to start up additional units in thermal power plants to compensate for surplus reactive power, that power system will estimate the amount of active power lost as a result of operation of the turbines in synchronous condenser mode or startup of additional units. For each month, each power system participant will estimate its incremental cost associated with active power losses resulting from operation of the turbines in synchronous condenser mode and startup of additional units in thermal power plants to compensate for surplus reactive power. These costs will be shared among the power system participants in proportion to the amount of energy consumed during the same month. The estimates of incremental cost will be submitted to the Baltija Dispatch Center, which will prepare a set of invoices needed to allow the power systems to share the costs in proportion to the amount of energy consumed during the month.

The provisions of Article 5 regarding capital investment may be applied to investment in equipment needed to control the flow of reactive power or compensate for a surplus of reactive power.

Article 8
Time of Use Periods

If a power system participant sells power to, or wheels power for, another power system participant according to a tariff schedule with time of use rates, such tariffs will reflect three time periods per week during the winter season and three time periods per week during the summer season. These time periods are as follows:

Winter season: November 1 through March 31

Peak: Monday through Friday, 12 noon - 6 pm

Near peak: Monday through Friday, 7 am - 12 noon and 6 pm - 11 pm; Saturday and Sunday 7 am - 11 pm

Off-peak: Monday through Sunday, 11 pm - 7 am

Summer season: April 1 through October 31

Peak: Monday through Friday, 12 noon - 6 pm

Near peak: Monday through Friday, 7 am - 12 noon and 6 pm - 11 pm; Saturday and Sunday 7 am - 11 pm

Off-peak: Monday through Sunday, 11 pm - 7 am

These time periods will be used in power sales transactions whenever the buyer and seller are power system participants.

Each power system participant may select its own time periods for time of use rates to retail customers and may select its own method for calculating the differences in retail tariffs for different time periods. The ratio of peak to off-peak retail tariffs, for example, will be determined independently by each power system participant.

Article 9
Supplements

The services provided oursuant to this agreement and the related terms, conditions, rates, and charges are set forth in supplements to this agreement. The supplements made a part of this agreement are as follows:

Supplement 1: Firm Power Generated From Nuclear Energy and Oil Shale

Supplement 2: Firm Power Generated From Oil and Natural Gas

Supplement 3: Firm Power Generated from Hydroelectric Stations

Supplement 4: Non-Firm Power Generated From Nuclear Energy and Oil Shale

Supplement 5: Non-Firm Power Generated From Oil and Natural Gas

Supplement 6: Non-Firm Power Generated from Hydroelectric Stations

Supplement 7: Emergency Power

No power system participant may sell to another power system participant any category of power other than the categories listed above. The accounting records for every power sale transaction between power sale participants must separately identify the capacity and energy associated with different categories of power.

Article 10
Wheeling Charges

There will be no charge for a wheeling transaction in which a power system participant receives power from another power system participant and delivers

power to that same power system participant. Subject to this restriction, charges are as follows:

Estonia. The charge for wheeling power from any point on the Estonian border to any other point on the Estonian border shall vary according to time periods, as follows:

Peak: 8 percent of the amount of energy received for wheeling

Near peak: 6 percent of the amount of energy received for wheeling

Off peak: 4 percent of the amount of energy received for wheeling.

Latvia. The charge for wheeling power from any point on the Latvian border to any other point on the Latvian border shall vary according to time periods, as follows:

Peak: 8 percent of the amount of energy received for wheeling

Near peak: 6 percent of the amount of energy received for wheeling

Off peak: 4 percent of the amount of energy received for wheeling.

Lithuania. The charge for wheeling power from any point on the Lithuanian border to any other point on the Lithuanian border shall vary according to time periods, as follows:

Peak: 8 percent of the amount of energy received for wheeling

Near peak: 6 percent of the amount of energy received for wheeling

Off peak: 4 percent of the amount of energy received for wheeling.

Article 11
Billing

Within ten days after the end of each calendar month, a bill or bills shall be rendered for any services provided during the month under the terms of this agreement. If the monthly billing is unavoidably delayed, an interim bill based on estimated charges may be issued.

The currency or currencies in which bills are payable will be determined by mutual agreement among the power system participants. Although the Baltija Dispatch Center is responsible for preparing invoices associated with compensation for reactive power and with shared capital investment in the transmission grid, the Baltija Dispatch Center will not act as an intermediary in financial transactions and will not be responsible for currency conversion arrangements.

Unless otherwise indicated in writing by Eesti Energia, all payments due to Eesti Energia will be made by transfer to a bank account in Tallinn, Estonia designated by Eesti Energia.

Unless otherwise indicated in writing by Latvenergo, all payments due to Latvenergo will be made by transfer to a bank account in Riga, Latvia designated by Latvenergo.

Unless otherwise indicated in writing by the Lithuanian State Power System, all payments due to the Lithuanian State Power System will be made by transfer to a bank account in Vilnius, Lithuania designated by the Lithuanian State Power System.

All bills will be payable within 30 days following their receipt unless agreed otherwise by the Baltija Dispatch Center. All amounts due but not paid within 40 days following their receipt shall be subject to interest at an interest rate equal to the interest that would be earned if the funds had been paid in DM and invested in an interest-bearing account at a German bank. The calculation of this interest rate shall be done by the power system participant to whom the bill is due, and shall be reviewed by the Baltija Dispatch Center.

In the event a power system participant disputes a portion of a bill, such power system participant shall pay the undisputed portion within 30 days following the receipt of the bill.

Article 12
Responsibilities of the Baltija Dispatch Center

Responsibilities. The responsibilities of the Baltija Dispatch Center include but are not limited to:

(a) All matters related to the interconnection of the transmission grid owned by the power system participants

(b) The coordination of generating unit dispatch

(c) The coordination of maintenance schedules

(d) The preparation of short range forecasts of load and capability requirements.

(e) All matters related to the metering, accounting and billing for power sales transactions and wheeling transactions

(f) The review of power system participants' estimates of incremental cost of active power losses associated with operation of turbines as synchronous condensers and startup of additional units on thermal power plants to compensate for surplus reactive power

(g) the preparation of a set of invoices needed to allow the power systems to share the costs of reactive power compensation (paragraph f) in proportion to the amount of energy consumed during the month

(h) The preparation of coordinated development plans for the transmission grid, and the review of proposed cost-sharing arrangements for capital investments in the transmission grid

(i) The measurement of transmission losses and allocation of transmission losses to each power system participant.

(j) The review of calculations of wheeling charges proposed by any power system participant for wheeling services provided to other power system participants.

Access to records and documents. The Baltija Dispatch Center shall have access at all reasonable times to the pertinent and relevant records of the power system participants required to substantiate any fact pertaining to this agreement.

Article 13
Force Majeure, Liability, Assignability, and Applicable Law

Force Majeure. Each power system participant shall use all due diligence to peform its obligations under this agreement but conditions may arise which prevent or delay performance because of causes beyond a power system's reasonable control, including failure of facilities, flood, earthquake, storm, lightning, fire, explosion, epidemic, war, riot, civil disturbance, labor trouble, strike, sabotage, and governmental restraint which the power system participant could not be expected to avoid by exercise of due diligence and foresight. If a power system participant is rendered unable to fulfill any obligations by reason of such causes, it shall be excused from performing to the extent it is prevented or delayed from so doing but shall exercise due diligence to correct such inability as soon as practicable, and shall not be liable for injury, damage, or loss resulting from such inability.

Liability. No power system participant shall make any claim upon another power system participant by reason of one power system participant's circuits or system being damaged or rendered inoperative for any period as a result of an occurrence on the circuits or system of another power system participant. No power system participant shall be held responsible for any loss or damage sustained by another power system participant if the delivery of power is interrupted, increased or decreased or if the voltage or frequency of the delivered power is increased or decreased.

Assignability. Any successor to or assignee of the rights of a power system participant shall be subject to all of the provisions and conditions of this agreement to the same extent as though such successor or assignee were the original power system participant hereunder. If a power system participant is reorganized or privatized, it shall notify the other power system participants no later than five days after the signing of the legal documents through which the reorganization or privatization is initiated. If a power system participant plans to assign its rights to another entity, the power system participant shall notify the other power system participants at least 90 days before the effective date of the assignment of rights to another entity.

Applicable law. If a dispute arises in connection with this agreement, the dispute shall first be referred to the Baltic Energy Council. If the Baltic Energy Council cannot resolve the dispute, the Baltic Energy Council shall designate the court before which the dispute may be brought.

Article 14
Effective Date and Term; Termination

Subject to Article 1, this agreement shall take effect on January 1, 1993 and shall continue in full force until terminated. This agreement may be terminated at any time by mutual agreement. This agreement may also be terminated by a power system participant giving 12 months prior written notice to the other power system participants. Any supplement to this agreement may be terminated by a power system participant giving 3 months written notice to the other power system participants.

IN WITNESS WHEREOF, the power systems hereto have caused this Agreement to be signed by their duly authorized officers as of the first day of January 1993.

_____
General Director, Eesti Energia

_____
General Director, Latvenergo

_____
General Director, Lithuanian State Power System

Supplement 1

Firm Power Generated From Nuclear Energy and Oil Shale

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of firm power generated in the Ignalina atomic electric station, the Baltic thermal (oil shale) station, and the Estonian thermal (oil shale) station. This supplement covers transactions in which Eesti Energia or the Lithuanian State Power System is the seller and Latvenergo is the buyer.

Section 2. Scheduling of Deliveries

Each transaction under this schedule must be covered by a written agreement in which the seller makes a commitment to supply firm power to the buyer for a period of at least one month. The seller must provide a specified amount of generating unit capacity in megawatts. For each calendar month, the amount of firm capacity under each transaction will be reported to the Baltija Dispatch Center at least two weeks before the beginning of the month.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

Section 4. Determination of Firm Capacity Obligation

For each transaction the seller shall specify an amount of generating unit capacity in megawatts that will be provided on a firm basis. This amount will be negotiated between buyer and seller. The buyer shall provide the Baltija Dispatch Center with a copy of the agreement specifying this firm capacity as well as the total firm capacity the generating unit can provide, on a monthly basis.

Section 5. Sharing of Fixed Costs

The buyer is not required to pay a capacity payment or demand charge. However, the seller shall send an invoice to the buyer on a monthly basis, so that in each month the buyer may pay one-twelfth of the sum of annual fixed costs and annual capital expenditures associated with the generating unit(s) providing power, multiplied by the buyer's share of capacity. The buyer's share of capacity equals the firm capacity commitment to the buyer, divided by the total firm capacity of the unit. A copy of each invoice will be provided to the Baltija Dispatch Center.

Supplement 2

Firm Power Generated From Oil and Natural Gas

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of firm power generated in thermal stations using heavy fuel oil, natural gas, or light fuel oil.

Section 2. Scheduling of Deliveries

Each transaction under this schedule must be covered by a written agreement in which the seller makes a commitment to supply firm power to the buyer for a period of at least one month. The seller must provide a specified amount of generating unit capacity in megawatts. For each calendar month, the amount of firm capacity under each transaction will be reported to the Baltija Dispatch Center at least two weeks before the beginning of the month.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

Section 4. Determination of Firm Capacity Obligation

For each transaction the seller shall specify an amount of generating unit capacity in megawatts that will be provided on a firm basis. This amount will be negotiated between buyer and seller. The buyer shall provide the Baltija Dispatch Center with a copy of the agreement specifying this firm capacity as well as the total firm capacity the generating unit can provide, on a monthly basis.

Section 5. Sharing of Fixed Costs

The buyer is not required to pay a capacity payment or demand charge. However, the seller shall send an invoice to the buyer on a monthly basis, so that in each month the buyer may pay one-twelfth of the sum of annual fixed costs and annual capital expenditures associated with the generating unit(s) providing power, multiplied by the buyer's share of capacity. The buyer's share of capacity equals the firm capacity commitment to the buyer, divided by the total firm capacity of the unit. A copy of each invoice will be provided to the Baltija Dispatch Center.

Supplement 3

Firm Power Generated from Hydroelectric Stations

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of firm power generated in hydroelectric stations. This supplement covers transactions in which Latvenergo is the seller and Eesti Energia or the Lithuanian State Power System is the buyer.

Section 2. Scheduling of Deliveries

Each transaction under this schedule must be covered by a written agreement in which the seller makes a commitment to supply firm power to the buyer for a period of at least one month. The seller must provide a specified amount of generating unit capacity in megawatts. For each calendar month, the amount of firm capacity under each transaction will be reported to the Baltija Dispatch Center at least two weeks before the beginning of the month.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

Section 4. Determination of Firm Capacity Obligation

For each transaction the seller shall specify an amount of generating unit capacity in megawatts that will be provided on a firm basis. This amount will be negotiated between buyer and seller. The buyer shall provide the Baltija Dispatch Center with a copy of the agreement specifying this firm capacity as well as the total firm capacity the generating unit can provide, on a monthly basis.

Section 5. Sharing of Fixed Costs

The buyer is not required to pay a capacity payment or demand charge. However, the seller shall send an invoice to the buyer on a monthly basis, so that in each month the buyer may pay one-twelfth of the sum of annual fixed costs and annual capital expenditures associated with the generating unit(s) providing power, multiplied by the buyer's share of capacity. The buyer's share of capacity equals the firm capacity commitment to the buyer, divided by the total firm capacity of the unit. A copy of each invoice will be provided to the Baltija Dispatch Center.

Supplement 4

Non-Firm Power Generated From Nuclear Energy and Oil Shale

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of non-firm power generated in the Ignalina atomic electric station, the Baltic thermal (oil shale) station, and the Estonian thermal (oil shale) station. This supplement covers transactions in which Eesti Energia or the Lithuanian State Power System is the seller and Latvenergo is the buyer.

Section 2. Scheduling of Deliveries

A transaction under this schedule can be arranged at any time by the Baltija Dispatch Center. No advance notice is necessary. The buyer and seller do not need to submit requests to the Baltija Dispatch Center to schedule non-firm power transactions under this supplement.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

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Supplement 5

Non-Firm Power Generated From Oil and Natural Gas

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of non-firm power generated in thermal stations using heavy fuel oil, natural gas, or light fuel oil.

Section 2. Scheduling of Deliveries

A transaction under this schedule can be arranged at any time by the Baltija Dispatch Center. No advance notice is necessary. The buyer and seller do not need to submit requests to the Baltija Dispatch Center to schedule non-firm power transactions under this supplement.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

Supplement 6

Non-Firm Power Generated from Hydroelectric Stations

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for the sale of non-firm power generated in hydroelectric stations. This supplement covers transactions in which Latvenergo is the seller and Eesti Energia or the Lithuanian State Power System is the buyer.

Section 2. Scheduling of Deliveries

A transaction under this schedule can be arranged at any time by the Baltija Dispatch Center. No advance notice is necessary. The buyer and seller do not need to submit requests to the Baltija Dispatch Center to schedule non-firm power transactions under this supplement.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be a positive amount equal to one-half of the difference between the seller's incremental cost and the buyer's decremental cost.

Supplement 7

Emergency Power

Section 1. Service to be Provided.

This supplement defines the tariffs and terms of service for firm power required by the buyer but not provided under supplements 1, 2, or 3. This supplement covers firm power that is not scheduled in advance.

Section 2. Scheduling of Deliveries

A transaction under this schedule can be arranged at any time by the buyer and seller. No advance notice is necessary. The buyer and seller must submit a request to the Baltija Dispatch Center to schedule firm power transactions under this supplement.

Section 3. Energy Charges

Energy delivered to the border of the seller's system shall be metered and sold at a price equal to 10 pfennig per kWh during peak periods, 8 pfennig per kWh during near-peak periods, and 4 pfenning per kWh during off-peak periods. Payment may be made in currencies other than DM but the currency conversion must be based upon market exchange rates offered by a commercial bank or banks and verified by the Baltija Dispatch Center.

Section 4. Determination of Firm Capacity Obligation

For each transaction the seller shall specify an amount of generating unit capacity in megawatts that will be provided on a firm basis for a specified time period. This amount will be negotiated between buyer and seller. Both the buyer and the seller must notify the Baltija Dispatch Center of the amount of firm capacity provided under this supplement and the time period over which the firm capacity will be provided.

Section 5. Sharing of Fixed Costs

The buyer is not required to pay a capacity payment or demand charge, and is not required to make any payments other than the energy charge. The seller is allowed to recover fixed costs and profits through the energy charge.

PROCEEDINGS OF A SEMINAR ON INTERCHANGE AGREEMENTS, CAPACITY CONTRACTS, AND JOINT VENTURES

Riga, Latvia
February 17-18, 1993

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LIST OF PARTICIPANTS

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- Robert Stein, "Benefits and Disadvantages of Capacity Contracts and Joint Ventures"

- Charles F. Zimmermann, "Measurement of Costs Associated With Energy Charges, Sharing of Fixed Costs, Joint Ventures, and Capacity Contracts"

ADDITIONAL DOCUMENTS

- Sample short-term contract for capacity and energy: Contract between Public Service Company of New Hampshire and Central Vermont Public Service Corporation for the sale of capacity and energy from the Newington generating unit.

- Sample financial statements: Financial statements from the 1991 Annual Report of the New England Electric System

- Ernst & Young Vneshaudit, "Comparison of GAAP and CIS Accounting Practices," January 11, 1993

Note: Following the December 1992 seminar, the draft Interconnection Agreement contained in the seminar proceedings was translated into Russian and submitted to the Baltic Energy Council by the director of the Baltija Dispatch Center. Copies for seminar participants were distributed by the Baltija Dispatch Center.

DESCRIPTION OF THE SEMINAR

On February 17 and 18, 1993, a seminar on electric power agreements and transactions was held at the Baltija Dispatch Center in Riga, Latvia. This seminar was organized by the Dispatch Center in cooperation with the U.S. Agency for International Development (AID) and with RCG/Hagler, Bailly, Inc., a U.S. consulting firm whose participation in the seminar was funded by AID's Bureau for Europe. Participants from Estonia, Latvia, and Lithuania attended the seminar and took part in the discussions. Presentations were given by two representatives of the Baltija Dispatch Center and by two U.S. participants. The seminar focused on four topics:

- generating capacity requirements and capacity availability over the 1993-2000 period, and requirements for reconstruction of existing plants

- negotiation of short term capacity contracts, joint venture financing with specific capital assets, joint ownership, and long term power purchases

- methods of measuring costs associated with agreements to share capacity or sell capacity and energy

- potential interconnections between the Baltic power systems and western Europe, and the implications for electricity trade.

The key participants in the seminar are the members of a working group on electric power contracting and pricing. The members of this working group were selected on September 10, 1992 in accordance with a decision of the Baltic Energy Council, an organization containing representatives of the three power systems (Eesti Energia, Latvenergo, and the Lithuanian State Power System) and the three energy ministries (the Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy). The Baltija Dispatch Center is a limited liability company that is owned by all three countries, managed by the Baltic Energy Council, and funded by the three power systems. In this context the Baltic Energy Council has a management role that is comparable to the role of the board of directors of a private corporation. The responsibility of the working group is to assist the Baltic Energy Council in developing international agreements on electric power interconnections, sales, and wheeling.

The working group includes representatives of Eesti Energi, Latvenergo, the Lithuanian State Power System, and the Baltija Dispatch Center. The Estonian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Lithuanian Ministry of Energy were invited to send representatives to the seminar. The Lithuanian ministry sent a representative but the other two ministries did not.

The topics for the February 1993 seminar were selected by the Baltija Dispatch Center on the basis of discussions with the members of the working group and with RCG/Hagler, Bailly. The role of U.S. participants in the seminar was to provide information to the working group on the types of interconnection agreements and power sales agreements made by power systems in the United States, Canada, and western Europe.

The seminar had three objectives:

1. To define the need for capacity additions and reconstruction of existing generating capacity in the Baltic region.

   The combined generating capacity of the three countries currently is higher than the level needed to meet demand. The drop in industrial production in the Baltics has caused a drop in electricity demand which has created a capacity surplus. There is no target reserve margin for the region, but even a recovery in demand growth will probably not create a need for new capacity, for several years.

2. To facilitate the negotiation of agreements in which generating capacity is shared by the Baltic power systems.

   Capacity can be shared through short term capacity contracts, joint venture financing with specific capital assets, joint ownership, and long term power purchases. The advantages and disadvantages of each form of sharing arrangement were discussed in the seminar.

3. To facilitate the negotiation of an interconnection agreement based on the December 1992 draft.

   The draft interconnection agreement contains supplements to define pricing principles for the sale of capacity and energy. The seminar included a discussion of the changes in accounting procedure that would be needed to implement these pricing principles.

This seminar is the third in a series of seminars in an electric power contracting and pricing program funded by AID. The broader objectives of this program are:

(1) To work with the Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries

(2) To promote the development of pricing principles that are consistent with the efficient operation of the regional electric system and consistent with economic efficiency objectives.

(3) To provide information to the Baltic countries regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structures.

Before the working group on power contracting and pricing was formed by the Baltic Energy Council, two regional seminars were organized and implemented with AID funding. A seminar on international power pricing was held at the Baltija Dispatch Center on May 27-28, 1992, and a regional seminar on energy pricing was held at the Institute of Physical Energetics of the Latvian Academy of Sciences on July 16-17, 1992. These earlier seminars covered topics related to electricity pricing, including the terms of power pooling agreements and the development of tariffs based on marginal cost pricing principles.

DISTRIBUTION OF COPIES OF SAMPLE CONTRACTS

The sample contract for the Newington generating unit is included in these seminar proceedings and was distributed to all of the participants in the seminar. This is a simple short-term contract that might be used as a basis for a short-term contract between Baltic countries. At the February 1993 seminar the Dispatch Center and each power system also received a copy of World Bank Energy Series Paper No. 42, A Review of International Power Sales Agreements (August 1991), which contains sample contracts.

In February 1993 two additional sample contracts were provided to the Baltija Dispatch Center, but not distributed to all of the participants in the seminar. These contracts are:

- Sample contract for a bank-financed independent power plant: Contract between Central Vermont Public Service Corporation and Bonneville Pacific Corporation for the sale of capacity and energy from Sheldon Springs Project, Unit 1

- Sample contract for a joint ownership arrangement: Sharing Agreement for Millstone Unit 3 ("Connecticut Nuclear Unit")

At the November 1992 seminar, the following contract was distributed to the seminar participants as a supplement to the proceedings:

- Sample short-term contract for the sale of capacity and energy: Contract between Appalachian Power Company and Virginia Electric and Power Company, Modification No. 19

This contract is similar (in terms and conditions, but not in format) to the contract for capacity and energy from the Newington generating unit.

At the November 1992 seminar, the three power systems (Eesti Energia, Latvenergo, and the Lithuanian State Power System) each received one copy of the Interconnection Agreement between Hydro-Quebec and NEPOOL, translated into Russian.

At the November 1992 seminar, four additional contractual documents were provided to the Baltija Dispatch Center but not distributed to all of the participants in the seminar:

- the Interchange Agreement between Union Electric Company and Kansas Power & Light Company

- the Enerex Interchange Agreement (among electric companies in Iowa)

- the Enerex Partnership Agreement (among electric companies in Iowa)

- selected amendments to the Interconnection Agreement between Carolina Power & Light Company and Virginia Electric & Power Company.

Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures

Agenda

Location: Dispatch Center Baltija, 1 Shmerla str., Riga, Latvia

Date: Wednesday, February 17 and Thursday, February 18, 1993

Countries involved: Estonia, Latvia, Lithuania

Agenda for Wednesday, February 17, 1993

10:00	Introductory remarks by Vilnis Kreslinsh
10:15	Presentation by Metcheslav Vonsovich (DC Baltija) on existing power stations in the Baltic countries and the outlook for their utilization through the year 2000
10:45	Discussion of existing power stations in the Baltic countries and the outlook for their utilization over the next five years
11:00	Presentation by Vilnis Kreslinsh (DC Baltija) on possible ways to organize a Baltic ring and on interconnection to UCPTE
11:30	Discussion led by Vilnis Kreslinsh (DC Baltija) on proposals regarding power station utilization through 2000 and on possible ways to reconstruct older units
13:30	Lunch
14:30	Presentation by Robert Stein (Central Vermont Public Service Corporation) on benefits and disadvantages of capacity contracts and joint ventures
16:00	Discussion led by Vilnis Kreslinsh (DC Baltija) on benefits and disadvantages of capacity contracts and joint ventures

Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures

Agenda (continued)

Agenda for Thursday, February 19, 1993

9:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on measurement of costs associated with energy charges, sharing of fixed costs, joint ventures, and capacity contracts
12:00	Discussion led by Vilnis Kreslinsh (DC Baltija) of measurement of costs associated with energy charges, sharing of fixed costs, joint ventures, and capacity contracts
13:30	Lunch
14:30	Presentation by Joury Pervoushin (DC Baltija) on U.S. electric power transactions and regulatory framework; description of the information found in publications provided by RCG/Hagler, Bailly, Inc. at the 1992 seminars
15:30	Closing remarks by Vilnis Kreslinsh (DC Baltija)

Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures

Riga, Latvia
February 17-18, 1993

List of Participants

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* These individuals made plans to attend but cancelled these plans just before the seminar. In addition Juris Ozolinsh was invited to represent the Ministry of Industry and Energy but he left his job at the Ministry to begin work in a firm named LEA.

BENEFITS AND DISADVANTAGES OF CAPACITY CONTRACTS AND JOINT VENTURES

BY

ROBERT STEIN, CENTRAL VERMONT PUBLIC SERVICE CORPORATION

FEBRUARY 17, 1993

INTRODUCTION

My company is a member of a regional power pool called the New England Power Pool (NEPOOL). Utilities in NEPOOL have been practicing joint ventures and capacity contract arrangements since at least the mid 1960's. The New England region which consists of the six New England states and has a long history of intra-regional business arrangements extending as far back as the colonial era in the 1800's and this historic relationship has helped foster a close working relationship among utilities.

There are over 100 separate utilities in New England, some municipally-owned, others which comprise the vast majority of the load privately-owned, there is a strong inter-connected transmission system 345KV and lower voltages. NEPOOL is also interconnected with Canada at 450 KV DC. Virtually all the utilities are also members of NEPOOL which provides access to transmission and a structured market for exchanging energy on a short-term basis.

In this paper, I will be applying the principles of NEPOOL to the situation of the Baltics. I will introduce the concept of Capability Responsibility, a term of art in the U.S. which describes a utility's responsibility to provide sufficient

generating capability to meet its own load, regardless of a regions total capacity. I will also discuss NEPOOL's role in facilitating energy transactions, describe NEPOOL utilities contractual and joint venture arrangements and the advantages and disadvantages of each.

CAPABILITY RESPONSIBILITY

As I understand the situation in Latvia, Lithuania, and Estonia, the region generally has sufficient capacity to meet the regions loads and at times has capacity available for export. Individual countries do not necessarily have sufficient capacity to meet their load and in some cases, the type of capacity that they have cannot economically meet the country's load. The situation in NEPOOL is precisely the same. In the aggregate, NEPOOL has sufficient capacity to meet its loads. Some individual companies, on an ownership basis, have insufficient capacity to meet their load, others more capacity than necessary, and finally others have sufficient capacity but too much base-load generation or peaking generation. NEPOOL enables the New England utilities to develop contractual agreements which allow efficient use of the generating resources among all companies.

One key NEPOOL requirement is that each company is obligated to have contractual rights to generating capacity sufficient to meet its own load plus any required reserves, this MW amount is referred to as a utility's Capability Responsibility. Capability Responsibility may be met by building individually owned units,

establishing joint ventures in which the utility receives a share of a generating unit, jointly building capacity with other utilities in which ownership interests are shared, but financing is obtained separately or by contracting for capacity in all or portions of existing units for periods of time of as little as one day or as long as 20 years. More typically the short-term contracts will be of a minimum of one month and a maximum of 5 years.

Capacity short utilities purchase generating capacity to meet their own load. Utilities with excess capacity will seek to market it, either to utilities within their region or outside it. Other contracts are also arranged, however. For example, many company's arrange for short term contracts to optimize the mix of generating resources that they have. A utility may have sufficient capacity to meet its own load but it may have more base load generation than economic. Those utilities seek to sell the capacity of the type that are not needed and purchase other capacity resulting in a better mix of resources to meet its own load. The result is a lower cost of production.

Having sufficient capability to meet one's own load, allows individual utilities to transact on an energy basis. They can buy and sell energy knowing that customer loads can always be served with capacity under contract if more economic sources are not available. In NEPOOL, there is a very active market for contracts of one day to one week where the purpose is to obtain or sell energy to lower production costs or to sell energy surplus to a

utility's needs. NEPOOL also provides an additional hourly market by dispatching all the units within New England on a one system or most-economic basis - comparing the cost that a utility would have had if it only had its own generating resources and dividing the savings between the two parties. The key, however, is to have sufficient capacity to meet one's own load.

CAPACITY CONTRACTS AND JOINT VENTURES

Capacity Contracts

The simplest form of inter-utility arrangement is a capacity contract in an existing unit. We have provided an actual contract that my company entered into for a small share of the output of the Newington Station. This unit is a 400 MW oil-fired unit located in the state of New Hampshire, about 150 kilometers from my company's service territory. The unit has been operating since the mid 1970's, is in good condition, and the contract is for a small percentage of the unit for a relatively small period of time. In it the seller agrees to provide a share of the units output to CVPS. The two companies directly interconnect so that wheeling can be arranged between the two companies without involving another company. There are also contracts signed in NEPOOL where intervening utilities are paid wheeling to move the power from one system to another. No capital additions are contemplated with this contract and even if they were the purchaser would not be obligated to pay for them if they were needed. This provides price security to the purchaser but the contract cannot be used by the seller to obtain financing if capital additions are needed since only actual

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existing costs are being supported.

Several exhibits at the back of the contract demonstrate the actual cost of the unit. The major components are the original investment cost less the depreciation of the unit since it was commercially brought on line, usually calculated on a straight-line thirty year basis and any other fixed annual costs of the unit. The investment is converted into an annual cost by multiplying it by the cost of the utility's borrowed funds or capital (approximately 15% in this case) and the entire resulting cost is divided by the capacity of the unit to yield a per/kilowatt cost. The resulting cost is about $55 per KW per year. The seller's transmission system is similarly priced yielding a cost of about $22 per kilowatt year. Note that although the seller has shown an actual cost of about $77 per KW year, the capacity plus wheeling is being sold at $55 per kilowatt year. This is because of the capacity situation within New England at the time of this contractual arrangement. Considerable capacity exists in NEPOOL in excess of the load plus required reserves. This regional problem extends beyond NEPOOL into the entire Northeastern United States. As a result, competitive forces have resulted in heavy discounting of capacity sold, particularly capacity sold on the short-term market. My company was able to arrange a significant discount in this transaction because of the number of utilities which were competing for the contract with us. Energy cost is supplied at actual cost including fuel burned and any applicable variable operating and maintenance costs.

Contracts of this type have a number of advantages. Their short-term nature reduces risks on both sides, they can be used to meet capability responsibility and they can build a business relationship among parties. For the purchaser to be confident that the selling utility will perform depends in part on contract language and in part on how the contract is constructed. In my company's case, we attempt to purchase a minority interest in an individual unit as a way of increasing the probability of good performance. Since the selling utility retains a majority ownership, they will have an incentive to maintain and operate the unit well since it is in its own best interest to have it available to reliably provide energy for its own customers needs. We also have language which defines the selling utility responsibilities.

JOINT VENTURES

In the mid 1960's, a number of New England utilities entered into joint ventures to build nuclear units. A single asset utility was formed with stock held privately by utilities in proportion to the output of the unit that they were to receive. For example, my company holds 30% of the stock in a joint venture which constructed a 560 MW nuclear unit in Vermont. We received 30% of the power from that unit, provided 30% of the equity, and are responsible for 30% of the debt payments as equity holders. A separate power purchase agreement was signed by each utility obligating the utilities to purchase the power. The power purchase agreement becomes the security for the debt that was issued to construct the plant. 75% of the cost of the plant is supported by bonds and 25%

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by equity contributions from the owners.

From a power contracting point of view, this arrangement is fairly simple. A separate company generating electricity delivers power to the owners. There is a separate management structure operating the plant. The debt is, in theory, an obligation of the joint venture and not of the contracting utilities so that a company's liability is limited only to the equity contributed. The arrangement has fallen out of favor in the U.S. in recent years for several reasons.

The first is that while the owning utility may be limited to its equity contribution in principle, it is unlikely in the case of a nuclear unit for the company's liability to be that limited. In the U.S., liabilities for events such as nuclear accidents are likely to be imputed to the owning company so that even though there the owning company's liability is limited to its equity contribution, the owning company will likely be obligated to contribute additional funds beyond its equity contribution.

Another problem with joint ventures in the U.S. is that in the event that one party defaults, the remaining parties as equity holders may be forced to contribute additional equity if they wish to maintain operation of the project. In order to preserve the project's viability, the remaining equity owners may be forced to contribute considerable additional equity in the event that one of the partners cannot meet their obligations.

Single asset utilities, particularly nuclear utilities, have also encountered problems receiving financing in recent years in

the United States. Lenders have perceived additional risk because of the single asset structure. This has led to concept of a joint ownership arrangement in which utilities jointly owned an asset but are not equity participants.

JOINT OWNERSHIP

In a joint ownership arrangement, each owner has an undivided interest in a project. The principle is similar to a joint venture in that the project is jointly owned but cannot be severed into its individual pieces. Unlike the joint venture where equity is contributed, funds are provided by each utility using their own individual borrowing capabilities. A number of units in New England have been constructed in this way, both nuclear and fossil fueled.

Each company provides its own financing and in return receives an undivided interest in the asset. In this way, the financing capability of the entire utility is available to provide construction funds and the asset is available in percentage ownership to provide value to all lenders to the utility. Bankruptcy of an individual utility is not as great a problem as it is in a joint venture since there is no equity ownership but there still can be problems. For example, one of the utility's may fail to meet its construction cost obligations. Typical joint ownership arrangements provide that in that event the defaulting participant will either be excluded from participation in the project or will have a reduced ownership. Typically there is a lead participant that owns a majority of the unit, usually 65% or greater, and it

takes responsibility for all aspects of the project including construction and operation of the unit after it becomes commercially available. In that respect, this is similar to a short-term contract arrangement. If the lead participant's interests are the same as the other owning utilities, good utility practice will prevail. In practice however problems have arisen particularly if the lead participant becomes short of capital funds and delays completion of the unit when other utilities would want speedy completion.

Joint ownership arrangements are still viable in New England, but the market is quite different now with smaller projects being built, and independent non-utility developers (NUGS) providing capacity to utilities from units which the developers finance themselves. That has lead to an arrangement known as a power purchase agreement.

POWER PURCHASE AGREEMENT

A contract between a developer who is usually not a utility and a utility which needs the power obligates the developer to construct, operate, and maintain a power plant. It also obligates the purchasing utilities to buy the power at an agreed upon price and the arrangement is known as a take and pay contract. If the developer provides power to the utility, the utility is obligated to pay for the delivery. Payments are typically made in the form of a separate capacity and energy payment with the capacity payment often tied to the actual cost of the capacity and energy prices tied to the actual cost of fuel. Capacity payments may be fixed or

escalate at a pre-determined rate, energy payments often fluctuate with the world price for the fuel used.

The take and pay nature of the contract is necessary because the developer uses it as collateral to finance the non-equity portion of the project. Typically, the developer will contribute 20% equity and borrow the remaining 80%, often from banks. The bank or other lender requires a high degree of assurance that the capacity payment will be made so that the debt will be repaid. The utility requires detailed language on performance criteria to assure itself that its payments will have value. In addition, how the unit will operate must be addressed in detail. Such items as the units ability to operate base load unit or be capable of cycling must be addressed.

These projects are attractive to utility's in several respects. They require no capital outlay so there is no added debt to the utility. Often the development risk is borne by the developer since failure to meet the performance criteria will result in no payments being made for capacity or energy. The utility, however, loses a measure of control over the project. For example, if the capacity is needed but the developer fails to construct the project, no payments are made but the utility may not be able to meet its load. Workmanship can also be a problem. A developer may choose to work at a lower standard of construction than a utility would and in later years the plant could encounter problems in maintainability or availability. If major capital additions are required later, the developer may go bankrupt rather

than meet the requirements and the utility will again be short of capacity.

This industry is maturing in the United States, however, and a number of New England utilities are buying significant portions of their new capacity needs by signing power purchase arrangements with large independent power producers.

CONTRACTS INVOLVING REFURBISHMENT OF EXISTING CAPACITY

There is little experience in this area in the United States. Most contracts, joint ventures, joint ownership, and power purchase arrangements are for new developments on new sites. The arrangements described will work for refurbishment however. The major task if one partner is contributing existing facilities to a project would be to determine the value of this contribution. The value could be derived from the availability of a site, the existence of existing equipment which is capable of producing energy or technical expertise. Once the value of the contribution is determined, the partner contributing that value would receive an additional share of the output of the refurbished project based on the value contributed.

OUTLINE OF STEIN PRESENTATION

FEBRUARY 17, 1993

BENEFITS AND DISADVANTAGES OF CAPACITY CONTRACT AND JOINT VENTURES

RIGA, LATVIA

I. **Organizing a Rational Market**

A. Introduce concept of Capability Responsibility

1. Each company must own or have under contract capacity to cover load and reserves

a. How model works in NEPOOL

b. Capacity can be owned, part of a joint venture or contracted for

c. With sufficient capacity, utilities can sell and buy energy or enter into shorter term capacity contracts which make most efficient use of generating resources

II. **Short term capacity contracts**

A. Existing plants for various time periods (6 months - 5 years)

1. less risk than long-term venture

2. could be basis for NEPOOL type energy transactions

3. no capital investment needed

4. cannot be used for financing additions, refurbishments

5. could be first step towards long-term

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contracts

6. should be for a minority of plant

B. Pricing

1. Priced at actual capacity and energy costs

2. Prices can be discounted to reflect market conditions

III. **Joint Venture financing for specific capital assets**

A. Each utility has equity ownership (usually 20 - 25%)

B. Single asset entity

1. Debt issued for entity

2. Can be difficult to finance in U.S. now, especially for nuclear units

C. Joint venture operates as a separate company

1. pays construction operating and fuel costs

D. Liability limited

1. only equity contribution is at risk

2. may not be true in practice

IV. **Joint Ownership**

A. Long term (life of unit) usually new plant in U.S.

B. Each party arranges financing

1. In U.S. company borrowing capacity typically used

C. Need common interests among parties

1. Usually a "lead Participant" has responsibility

D. Each party pays a share of construction, operating and fuel costs and receives a share of output

2.

V. **Long term Power Purchases**

A. Long Term (up to 20 years) from existing plants or refurbished/repowered plants

1. must be take and pay contract
   a. concept of financial ability
   b. capacity and energy payments
2. Purchasers do not contribute capital
3. Partners must each have incentive to perform
   a. detailed language on performance
   b. partners should have common needs i.e. base load cycling etc.
4. Basis for project financing
   a. bankable contract
      1. but need equity of some form (25%?)
   b. maintenance standards
   c. continuing capital additions

VI. **Special considerations for Refurbishment**

A. Not appropriate for short-term capacity contracts
   1. No basis for major new investment

B. Appropriate for all long-term arrangements
   1. These contracts can have provisions for new investments
   2. Some basic must be developed for determining the value of the contributing utility's assets.

MEASUREMENT OF COSTS ASSOCIATED WITH ENERGY CHARGES, SHARING OF FIXED COSTS, JOINT VENTURES, AND CAPACITY CONTRACTS

Prepared for:

Seminar on Interchange Agreements,
Capacity Contracts, and Joint Ventures
December 9-10, 1992

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OUTLINE

- Problems and issues to be resolved
- Energy charges based on incremental cost
- Sharing of fixed costs
- Joint ventures
- Capacity contracts

TRANSACTIONS THAT REQUIRE SHARING OF INFORMATION ON COSTS

Interconnected power systems need to share information on costs when the following types of transactions are made:

- **Sales of electricity at prices based on cost.** Buyer and seller agree that the price must be calculated from the seller's cost of producing and transmitting electricity. The seller agrees to provide the buyer with information justifying the price requested by the seller. The buyer has the right to ask questions and request changes in the calculations.

- **Joint ventures.** Two or more power systems form a joint venture to reconstruct an existing plant or build a new power plant. They agree that the price of electricity produced by this power plant will be based upon production costs.

- **Capacity contract negotiations.** A power system offers to reconstruct an existing plant or build a new plant and sell electricity to another system at prices based on cost. The potential seller agrees to provide the potential buyer with projections of future costs, so that the potential buyer can develop a least-cost plan.

- **Sales of electricity at prices escalated on the basis of cost.** The price for the first month is established through negotiation. Buyer and seller agree that the price will be adjusted on the basis of changes in the seller's costs (for example, on the basis of the percentage change in the seller's average cost per kWh).

If cost information is not shared, it will be difficult to implement any of these types of transactions, and therefore it may be difficult to work out cooperative arrangements.

Many types of transactions common in North America require cost information to be shared. Regulatory agencies usually require prices to be based on cost.

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TRANSACTIONS THAT DO NOT REQUIRE SHARING OF INFORMATION ON COSTS

Power systems do not need to share cost information in the following situations:

- when the seller is able to charge a price that is higher than his cost and not related to his cost
- when electricity is sold under a barter arrangement
- when the seller is willing to sell electricity only when the price is based on prices in other countries
- when there are several buyers or several sellers, and the price is determined competitively
- when the seller is unwilling to discuss any price other than his offer, or the buyer is unwilling to discuss any price other than his offer.

When cost information is not shared, and the prices are not determined competitively, it is difficult to work out arrangements that minimize the total production cost of two or more power systems in a region.

PROBLEMS AND ISSUES TO BE RESOLVED

In electric power transactions among the Baltic countries, it may be very difficult to establish a system for relating electricity prices to costs. The problems are obvious:

- Prices are rapidly changing.

- Estonian, Latvian, and Lithuanian currencies are not fully convertible. Each country needs to increase its hard currency earnings.

- Fuel (other than oil shale) is purchased from Russia, but the Russian ruble is unstable and subject to very high inflation.

- The transition to a market economy is not complete. Some prices are set in markets that are not competitive. Some prices are controlled by governments.

- The price of oil shale is not determined in international markets.

- When there are shortages of fuel, the true value of fuel in storage may be higher than the price paid for this fuel.

In power transactions in North America and western Europe, however, it is very common to have transactions that require sharing of information on costs.

- Are cost-based transactions going to be possible in international trade among Baltic countries?

This is one of the issues that needs to be resolved in an Interconnection Agreement.

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DEVELOPMENT OF NEW ACCOUNTING RULES

Even if international power transactions are not related to costs, it may be necessary for power systems in the Baltic countries to develop new accounting rules to cope with two developments:

- **Changes in national accounting laws.** Power systems will need to adapt their accounting procedures to comply with new laws on annual reports and other accounting issues.

- **Negotiation of loans from western banks.** If a power system obtains a loan from a western bank - either a commercial bank or a development bank - it will be necessary to provide the bank with accounting information based on western accounting procedure. If the national government obtains the loan and then lends money to the power system, the same requirements may be made.

In general, the transition to a market economy will require a different method of measuring the costs associated with fixed assets.

International power transactions may also require changes in accounting rules, due to:

- **Changes in tariff calculations.** If the buyer and seller agree to a new method of setting prices - for example, capacity charges as well as energy charges - the seller may need to implement a new method of measuring costs.

- **Joint ventures.** If two or more power systems form a joint venture company, they will have to agree on the accounting procedures to be used by the new company.

TOPICS DISCUSSED IN THIS REPORT

In this report, accounting issues are discussed in relation to the following topics, which were addressed in the November and December seminars:

- **Energy charges**. The draft Interconnection Agreement discussed at the December seminar contains a set of Supplements that define electricity prices. In the Supplements there are sections on "Energy Charges." The energy charges are based on the seller's incremental cost (except for emergency power).

- **Sharing of fixed costs**. In the Supplements to the draft Interconnection Agreement there are sections on "Sharing of Fixed Costs." The proposed cost sharing arrangement represents an alternative to capacity charges.

- **Joint ventures**. The suggestion was made that the Baltic power systems might form joint ventures to improve the transmission system, reconstruct existing power stations, or construct new power stations. Joint ventures are not explicitly mentioned in the draft Interconnection Agreement, however.

- **Capacity contracts**. At the December seminar the suggestion was made that the Baltic power systems might negotiate capacity contracts to ensure an adequate level of installed reserves. Article 4 of the draft Interconnection Agreement states:

  > To achieve its target level of installed reserves, each power system participant shall rebuild existing capacity, construct new generating capacity, or purchase firm capacity under long-term contracts.

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PROPOSED ENERGY CHARGES BASED ON INCREMENTAL COST

Under the draft Interconnection Agreement, Supplements 1 through 5 contain the following section:

> Section 3. Energy charges. Energy delivered to the border of the seller's system shall be metered and sold at a price equal to the seller's incremental cost plus an energy premium. The energy premium shall be ten percent of the seller's incremental cost.

Article 1 contains the following definition:

1.13 For a particular power sales transaction, the "seller's incremental cost" is the sum of the following costs:

(a) the incremental cost of the fuel, operating labor, and maintenance required to generate the energy necessary to supply (1) the delivery to the buyer, plus (2) the incremental transmission losses incurred on the seller's system, plus (3) the energy supplied to any intervening power system as compensation for transmission losses.

(b) the incremental cost of starting and operating any generating units which must be started by the seller as a result of supplying such energy, and

(c) the seller's cost of energy purchased from other power systems, if the purchase is made as a result of the seller's obligation or decision to supply energy to the buyer.

In the Baltic power systems the largest component of the seller's incremental cost is probably the fuel cost. Because the power systems do not usually purchase energy for the purpose of reselling it, paragraph (c) may be rarely used.

WHY SHOULD PRICES BE BASED ON INCREMENTAL COST?

Suppose power system A sells electricity to B under a one-month agreement in which B does not pay for capacity and A does not guarantee to provide a certain amount of capacity.

For any hour in the month, the seller's incremental cost is the difference between:

- the seller's actual total cost of producing and transmitting electricity, including electricity delivered to the buyer, and

- the total cost that the seller would have incurred if electricity had not been delivered to the buyer.

For any particular hour, the seller's incremental cost is the most accurate measure of the cost of the electricity delivered to the buyer. It is much better measure than the seller's average cost per kWh of electricity produced. The average production cost is not the true cost of the electricity delivered to the buyer.

For the month as a whole, the seller's incremental cost can be calculated as the sum of the hourly values.

Next, suppose power system A sells electricity to B under a one-month agreement in which B pays for capacity, but the capacity payment is completely separate from the energy payment.

For any particular hour, the seller's incremental cost is the most accurate measure of the cost of the <u>energy</u> delivered to the buyer. This is the most accurate way to calculate an energy payment.

Why is accuracy important, in computing energy charges?

The seller is assured that none of the electricity was sold at a loss. For each kWh, the cost of fuel and transmission losses is recovered from the buyer, even if there is a large difference between "planned" and "actual" expenses.

The buyer is assured that the seller's profit is exactly equal to the premium specified in the interconnection agreement as a percentage of the seller's incremental cost. (If the premium is zero, there is no profit.)

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MEASUREMENT OF THE SELLER'S INCREMENTAL COST

If the seller's incremental cost is to become a basis for energy charges, power systems will need to agree on procedures to measure this cost. Either the accounting department or the dispatch department will have to measure it.

The dispatch department is probably the appropriate department for measuring this cost, for two reasons:

- The dispatch department manages hourly information, and the accounting department manages quarterly or annual information. The seller's incremental cost changes hour by hour depending on the marginal generating unit. (For example, see the diagrams prepared by M. Krakauskas for the Lithuanian State Power System).

- The dispatch department needs to keep information on the availability of fuel for power generation. It should be possible to keep information on fuel prices as well as fuel availability.

Plan vs. actual

To measure the seller's incremental cost it is not necessary to compare "planned" and "actual" values. The only measure needed is "actual."

Dynamic pricing

The seller's incremental cost should be measured hourly. Therefore it is an example of dynamic pricing. When fuel prices are frequently changing, dynamic pricing is needed to protect the seller against the risk of selling below cost.

WHAT IS THE VALUE OF FUEL CONSUMED TO EXPORT POWER?

To measure the seller's incremental cost it is necessary to measure the value of fuel consumed on a particular day or in a particular hour. There are different ways to estimate the value of fuel consumed.

In the Baltic countries this issue is complicated because:

- Shortages of natural gas and mazut can exist. On some days there may be no price at which these fuels can be purchased.
- The value of oil shale is not determined in international markets.
- Fuel purchases are made in different currencies.

If fuel is available only from storage, and cannot be purchased for immediate delivery, the value of fuel may be measured by one of the following criteria:

- the price that was paid for the most recent delivery of fuel
- an estimate of the price that will be paid when it will be possible to buy fuel to make up for the amount consumed
- the price at which fuel can be sold, on a daily basis
- an estimate of the highest price at which it would be possible to sell fuel supplies at any time during the winter season.

The value of oil shale may be measured by the price paid for oil shale, or by the price per unit of energy that would be paid for an equivalent amount of low-quality coal.

If fuel import prices are based upon prices in dollars, it may be worthwhile to keep accounting records measured in dollars.

In international transactions it is best to value fuel according to a consistent methodology, rather than changing methodologies from time to time.

If fuel is available in the marketplace, and not only from storage, the value of fuel may be measured by the price that was paid for the most recent delivery of fuel.

Some alternative measures might be considered:

- an estimate of the market price in effect, on a daily basis
- an estimate of the price that will be paid when the next delivery is made

These alternatives are not based on actual payments by the seller, and therefore these alternatives may not be acceptable to the buyer of electricity.

U.S. accounting procedure

Federal regulations define a Uniform System of Accounts which includes a very detailed description of balance sheet accounts and income statement accounts.

One of the current assets in the balance sheet of a major U.S. power system is fuel in storage. Its value is measured by account 151, Fuel Stock, which includes "the book cost of fuel on hand" and is measured by "invoice price of fuel less cash or other discounts."

Annual operation and maintenance expenses include account 501, Fuel. According to federal regulations "The cost of fuel shall be charged initially to account 151, Fuel Stock ... and cleared to this account on the basis of the fuel used."

COMPONENTS OF ELECTRIC TARIFFS

There are three basic types of charges, in U.S. electric tariffs:

Energy charges. An energy charge is a price per kWh of electricity delivered to the buyer. In some situations energy charges are the only component of the electric tariff. In other situations energy charges are used by a power system to recover the costs that vary according to the number of kWh generated.

Capacity charges. A capacity charge, or demand charge, is a price per kW (or per kVA) per month. It may be related to the amount of capacity reserved for a customer's use, or the actual peak capacity used by a customer. Capacity charges are used by a power system to recover the costs that vary according to the amount of capacity required to meet the peak load.

Customer charges. A customer charge is a fixed payment per customer per month. It is not related to the kW of peak load or the kWh of energy delivered. Customer charges are used by a power system to recover the costs that vary according to the number of customers.

In traditional U.S. electric tariff studies, costs are classified as customer-related, capacity-related, or energy-related. (See The Art of Rate Design, pages 38-44.)

In transactions among power systems, **sharing of fixed costs** is an alternative to capacity charges.

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SHARING OF FIXED COSTS

In the draft Interconnection Agreement, Supplement 1, section 5 is as follows:

> Sharing of Fixed Costs. The buyer is not required to pay a capacity payment or demand charge. However, the seller shall send an invoice to the buyer on a monthly basis, so that in each month the buyer may pay one-twelfth of the sum of annual fixed costs and annual capital expenditures associated with the generating unit(s) providing power, multiplied by the buyer's share of capacity. The buyer's share of capacity equals the firm capacity commitment to the buyer, divided by the total firm capacity of the unit. A copy of each invoice will be provided to the Baltija Dispatch Center.

This concept is not based on power sales agreements in North America. The idea of sharing fixed costs is a proposal developed specifically for this working group, based on the situation in the Baltics. The calculation of annual fixed costs and annual capital expenditures is much simpler than calculation of a capacity charge.

Definition of annual fixed costs

The annual operation and maintenance costs of a generating unit may be classified in two categories: fixed cost and variable cost.

- The level of fixed costs is not influenced by the amount of electricity produced and sold. Fixed costs are the costs that must be incurred, regardless of the amount of electricity produced and sold. For example, scheduled maintenance is a fixed cost.

- The level of variable costs is a function of the amount of electricity produced and sold. Variable costs include fuel costs, for example.

In the United States, each power system must decide which costs are fixed and which costs are variable. The cost allocation is subject to government approval. The Uniform System of Accounts does not make this allocation of costs.

In a power sales contract with capacity and energy charges, fixed costs are typically recovered through the capacity charge.

Definition of annual capital expenditures

For a particular generating unit, the annual capital expenditure is the amount of money spent on construction or reconstruction that is not charged directly to annual operation and maintenance expenses. In western accounting, an expenditure that results in a fixed asset with a useful life of more than one year is typically considered a capital expenditure. The purchase of an asset which must be depreciated is a capital expenditure. (In Russian accounting, an asset with a useful life of more than one year must be depreciated.)

In the United States, the Uniform System of Accounts for power systems defines the types of expenditures that can be charged directly to annual operation and maintenance expenses. For companies that are not power systems and are not subject to the type of price regulation applied to power systems, accounting rules are more flexible.

The Law of the Republic of Latvia, "On Annual Reports of Enterprises," defines certain assets as "long term investments:"

> Article 15. Assets earmarked for long term use or invested in property of long term use are long term investments. Other assets are turnover assets.

In this context one could define capital expenditures as expenditures needed to build or purchase long term investments.

In the United States, the annual report of a power system typically contains a Statement of Cash Flows which describes the level of annual capital expenditures and the sources of funds used to make these expenditures. A statement of cash flows is not required by the Latvian law on annual reports.

JOINT VENTURES

The suggestion has been made that the Baltic power systems might form joint ventures to improve the transmission system, reconstruct existing power stations, or construct new power stations. Joint ventures are not explicitly mentioned in the draft Interconnection Agreement, however.

Two accounting issues may be raised, in connection with joint ventures:

- **Shareholders' equity**. On the balance sheet, shareholders' equity must be allocated among the joint venture partners. A western-style balance sheet is needed to represent shareholders' equity.

- **Revaluation of assets**. The power systems must agree on the principles used to measure the value of long-term assets. Some type of revaluation may be necessary to offset inflation.

Shareholders' equity

In the area of accounting, a transition to a market economy in the Baltics has not been completed. Some of the procedures used in Soviet accounting are still in use. The Latvian accounting law on annual reports provides an example.

Article 10 of the Latvian law "On Annual Reports of Enterprises" defines the following balance sheet accounts under the heading of "Equity capital:"

1. Share capital (basic capital)
2. Share premium account
3. Re-valuation reserve
4. Reserves:
   (a) reserves set by law;
   (b) reserves for company shares;
   (c) reserves set by company statutes;
   (d) other reserves.
5. Profit or loss brought forward
   (a) brought forward from previous years
   (b) brought forward from profit and loss account for the current financial year.

In western accounting, items 1, 2 and 5 are included in shareholders' equity but not items 3 and 4.

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Revaluation of assets

Article 29 of the Latvian law "On Annual Reports of Enterprises" does not define a methodology for revaluation of assets. The law reads as follows:

> Basic assets and long term financial investments, where the value is significantly higher than their cost of purchase or production or their value in the previous year's balance sheet, may be valued according to the higher value if it can be assumed that the higher value will continue.
>
> ... The increased value resulting from such a valuation should be entered in the item "Revaluation reserve" under "Equity Capital."

If a joint venture is created among Baltic power systems to build a generating station, the following questions must be addressed:

- What methodology should be used to establish a "higher value" for a generating station?

- If the book value of the generating station is raised, how will the price of electricity produced by this station be affected?

If the book value of the generating station is measured in a currency subject to a high inflation rate, it will be necessary to either adjust the book value for inflation or allow the joint venture to earn a high rate of return on the book value of shareholders' equity.

IMPLICATIONS OF CURRENCY CONVERTIBILITY

Currency reform

The Estonian Kroon is a relatively stable currency. If Latvia and Lithuania introduce similar currencies it should be possible for the national banks to establish stable exchange rates and enable commercial banks to exchange these currencies freely and directly.

- If currencies are freely convertible and exchange rates are stable, it will be possible to set electricity prices payable in the buyer's currency on the basis of costs measured in the seller's currency.

- If a country's inflation rate is low (for example, no more than 5 percent per year), it becomes much easier to measure costs associated with fixed assets.

Although these conditions have not yet been achieved in all three Baltic countries, any long-term agreement among power systems should take into account the possibility that in the future it will be easier to set prices on the basis of cost.

Measurement of costs in hard currency

If a power plant reconstruction project is financed with hard currency, and the plant is supplied with oil or natural gas, it may be possible to measure production costs in hard currency for that individual power plant. Under these conditions the price of power sold from that power plant may be expressed in hard currency.

CAPACITY CONTRACTS

If a contract provides for the sale of capacity as well as energy, there are two ways to set up the electricity tariff:

- The simplest approach is to have a price per kWh delivered, and include all costs in this price per kWh. However, there are problems with this approach:

  If the actual amount of energy delivered is lower than the amount planned, the seller may have a lower profit and may not be able to recover his fixed costs.

  If the actual amount of energy delivered is higher than the amount planned, the seller may have a higher profit and the buyer may object to this level of profit.

- The alternative is to have a capacity charge as well as an energy charge. The capacity charge is a price per kW per month.

Calculation of capacity charges

The details of a capacity charge calculation may be complex, but the basic concept (in North American practice) is to include five cost components:

- Depreciation and amortization

- An allowance for interest on long-term debt and for profit on shareholders' equity. This is called a "return on investment."

- Taxes on profits

- Taxes on the value of fixed assets, and other taxes

- Fixed costs of operation and maintenance.

In some contracts there is also an allowance for administrative costs.

To negotiate the terms of a capacity charge for a generating station, power systems will need to address the following issues:

- What is the useful life of the generating station and the equipment it contains? Depreciation should be based upon the useful life of the plant and equipment. The buyer and seller should reach agreement on the depreciation rates to be used.

- How should the value of the power plant be measured? To calculate the return on investment it will be necessary to multiply this value by a rate of return on invested capital.

- What are the sources of financing for the generating station? Can the sources of capital be categorized simply as long-term debt and shareholders' equity?

- Does the seller have long-term debt, comparable to the long-term debt held by western power systems? What is the interest rate on long-term debt?

- What rate of return on shareholders' equity is reasonable and necessary? How much profit should the seller receive?

- In an international transaction, should the buyer be asked to pay (indirectly) tax payments to the government in which the seller is located? What level of tax is reasonable and acceptable, for electricity sold internationally?

- Should the buyer reimburse the seller for administrative costs?

These questions cannot be answered easily on the basis of western experience. It may be necessary to re-negotiate capacity charges every year, or give the seller the opportunity to request renegotiation under conditions such as high inflation.

RISKS FACED BY BUYERS AND SELLERS

A power system with a capacity deficit faces a choice among three options:

- Investing in the construction of new generating stations, to achieve self-sufficiency and eliminate the capacity deficit

- Investing in the construction of new generating stations, to reduce the size of the capacity deficit, while continuing to purchase capacity

- Continuing to purchase capacity, and allowing the deficit to remain.

A decision to purchase capacity involves the risk that the seller will be unable or unwilling to provide the amount of capacity stated in the purchase agreement. To compensate for this risk the buyer may offer a capacity charge that is discounted below the buyer's cost of constructing new capacity. The higher the risk of not receiving power from the seller, the larger the discount.

A system with a capacity surplus also faces a choice among three options:

- maintaining only the capacity needed to meet the power system's own load, exporting capacity on a short-term or interruptible basis only, and allowing the level of firm capacity to decline

- maintaining capacity at the current level, investing in reconstruction needed to maintain this level, and negotiating agreements to sell the capacity that is not needed to meet the power system's own load

- increasing the power system's capacity, investing in the construction of new generating stations as well as reconstruction of existing stations, and negotiating agreements to sell the capacity that is not needed to meet the power system's own load.

An investment in capacity for export involves the risk that the buyer will be unable or unwilling to pay for this capacity. To compensate for this risk the seller may require the capacity charge to contain a premium above the seller's cost of providing capacity. The higher the risk of not receiving payment from the buyer, the higher the premium. The premium may be a percentage of the seller's cost (for example, 50 percent).

IN SOME SITUATIONS, COST ESTIMATES DO NOT NEED TO BE PRECISE

The buyer's viewpoint

Suppose a power system with a capacity deficit is very concerned about energy security and self-sufficiency, and therefore will offer to buy capacity from other power systems at a price (in DM per kW per month) equal to about half the cost of new capacity constructed in its own territory. Even if the calculation of the cost of purchased capacity is not precise, a decision whether to buy or to build can be made on the basis of the cost estimates available. If the cost of buying capacity is only half the cost of building capacity, precise figures may not be necessary.

It would be a mistake to reject the opportunity to buy capacity, on the grounds that the capacity charge calculation are not precise, when the cost of building capacity is much higher than the cost of buying it.

The seller's viewpoint

Suppose a power system with a capacity surplus is very concerned about financial security, and therefore will offer to sell capacity to other power systems at a price (in DM per kW per month) equal to about 1.5 times the cost of building and maintaining capacity for export. Even if the calculation of the cost of building and maintaining capacity for export is not precise, a decision whether to invest in export capacity can be made on the basis of the cost estimates available.

It would be a mistake to reject the opportunity to sell capacity, on the grounds that the capacity charge calculation is not precise, when the capacity charge is much higher than the cost of maintaining export capacity.

The North American situation

Power systems in North America are accustomed to making precise calculations of capacity charges on the basis of costs. The decision whether to buy or to build is based upon precise calculations, with little or no adjustment for risk. The risks facing buyers and sellers are much smaller than in the Baltics.

CONCLUSION

This report has described some of the challenges involved in setting prices on the basis of costs, in relation to four topics:

- Energy charges based on seller's incremental cost
- Sharing of fixed costs
- Joint ventures
- Capacity contracts.

From a North American perspective, sharing of cost information is a fundamental part of power transactions.

To support power system planning in the Baltics, it would be desirable for the power systems and their governments to decide whether sharing of cost information will be implemented, and whether prices will be negotiated on the basis of costs.

SAMPLE SHORT-TERM CONTRACT FOR CAPACITY AND ENERGY

**Contract between Public Service Company of New Hampshire
and Central Vermont Public Service Corporation
for the sale of capacity and energy
from the Newington generating unit**

This document is included as a supplement to the presentation by Robert Stein on "Benefits and Disadvantages of Capacity Contracts and Joint Ventures to Reconstruct Existing Power Stations."

PURCHASE AGREEMENT

WITH RESPECT TO NEWINGTON

This AGREEMENT ("Agreement") dated as of December 1, 1991, between PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE (hereinafter called "Seller"), a New Hampshire corporation and CENTRAL VERMONT PUBLIC SERVICE CORPORATION (hereinafter called "Buyer"), a Vermont corporation.

WHEREAS, Seller is the owner of a number of generating units located on the PSNH system; and

WHEREAS, Buyer wishes to buy additional generating capability, energy, and related transmission to meet its system requirements; and

WHEREAS, the parties hereto desire to provide for the terms and conditions pursuant to which Seller will sell to Buyer and Buyer will buy from Seller a portion of the capability, and related energy output of PSNH's Newington generating unit ("Unit"), and transmission services.

NOW, THEREFORE, in consideration of the understandings and agreements herein contained, the parties hereto covenant and agree as follows:

(1) Sale and Purchase

Seller agrees to furnish and deliver, and Buyer agrees to receive and make payments for, amounts of capability and energy corresponding thereto and transmission service in accordance with the provisions and subject to the conditions of this Agreement.

(2) Term of Agreement

The Term of this Agreement shall commence at 0001 hours on December 1, 1991 and shall terminate at 2400 hours on February 29, 1992. The applicable provisions of this Agreement shall continue in effect after termination of this Agreement to the extent necessary to provide for final billing, billing adjustments and payments.

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(3) Purchase Amount of Generating Capability and Operation of the Unit

Buyer shall buy and seller shall sell 7 megawatts of capacity and related energy from the Unit for the term ("Purchase Amount").

The maximum winter capability rating of the Unit has been determined in accordance with New England Power Pool ("NEPOOL") procedures, and as of the date hereof is 406 MW. The parties understand that the Unit may have a maximum capability rating and a lesser normal and reserve capability rating. Seller represents that the normal and maximum capability ratings specified in Appendix A have been demonstrated as of the date hereof and are correctly stated as set forth above and in Appendix A.

Seller agrees to perform the future capability audits of the Unit, as required by NEPOOL, and to submit the results of such audits to NEPOOL. In the event that any subsequent capability audit conducted in accordance with the applicable procedures of NEPOOL results in a change in the capability of the Unit, then such capability shall apply as and to the extent appropriate. Such rerating shall cause Buyer's Entitlement Percentage, as defined herein, to be recalculated such that the megawatt amount of capacity entitlement equals the Purchase Amount.

It is agreed that, except when the New England Power Exchange ("NEPEX"), the dispatching agency of NEPOOL, has determined that operating conditions require operation at the maximum capability rating in order to maintain the reliability of the New England bulk power supply system, Seller is not obligated hereunder to operate the Unit in excess of its normal capability rating and Buyer may not schedule deliveries of energy from the Unit based on operations in excess of such normal capability ratings. The difference between the normal and the reserve capability rating, if any, will normally be available as ten-minute reserve capacity.

(4) Entitlement in Capacity

The percentage of capacity and related energy from the Unit to be made available to Buyer hereunder is referred to herein as the "Entitlement Percentage." The Entitlement Percentage shall be calculated by dividing

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the Purchase Amount by the maximum claimed capability rating of the Unit in effect at the time. Seller shall make available at and from the Unit for delivery to Buyer, for the Term of this Agreement, the Entitlement Percentage together with the energy corresponding thereto.

(5) Delivery Point and Transmission

The energy made available from the Unit to Buyer as provided herein shall be measured at the point where the output of the Unit is metered. Seller shall be responsible for non-firm transmission service to deliver such energy from the Unit to the boundary of the Seller's system, subject to the need to use the Seller's transmission system to supply Seller's own customers' requirements and to such NEPOOL rules and priorities existing now or adopted during the term of this Agreement. The amount of energy available to Buyer pursuant to this Agreement at such boundary shall be reduced to reflect electrical losses on the Seller's system. Determination of the transmission losses shall be in accordance with NEPEX procedures which are, or may be, applicable during the Term.

Buyer shall be solely responsible for arrangements for any transmission service required from the boundary of the Seller's system.

(6) Dispatch of the Unit

The Unit is dispatchable and will be dispatched by NEPEX, or a satellite thereof, on the load curve representing the aggregate load of the participants to the NEPOOL Agreement and subject to such dispatch will be operated, to the extent operable, in accordance with good electric utility practice. The Seller will advise NEPEX of the Buyer's Entitlement Percentage in the Unit.

(7) Outage Service

Outage service for the Unit will be provided by NEPOOL, in accordance with NEPOOL rules as they apply to unit entitlements.

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(8) Payment for Purchases

Buyer shall pay to Seller for each month for the Unit the sum of the following:

(a) Capacity and Transmission Charges, and
(b) Energy Charge

Each such Charge shall be as determined below with respect to each calendar month during the Term:

(a) The Capacity and Transmission Charges for the particular month shall be calculated by multiplying the Purchase Amount for the period times one thousand, times $55.00 per kilowatt year divided by twelve.
(b) The monthly energy charge for the Unit shall be Buyer's entitlement percentage of the amounts properly charged by Seller with respect to the Unit to Account No. 501, Fuel, of the Uniform System of Accounts.

(9) Performance

Seller shall use reasonable diligence to make available to Buyer, regularly and without interruption, the energy to which Buyer is entitled under this Agreement.

(10) Billing and Payment

A bill with respect to the charges hereunder shall be rendered by the Seller to the Buyer as soon as practicable after the end of each calendar month. Each such bill shall incorporate such information as may be reasonably necessary to determine the payments due with respect to such month.

Bills may be based in whole, or in part, upon estimates. Each bill shall be subject to adjustment for any errors in arithmetic, computation, meter readings, estimating, or otherwise. All payments shown

to be due on each bill, subject to subsequent adjustment as heretofore provided, shall be due and payable not later that the Due Date, defined as fifteen (15) days after issuance of such bill. Any amount remaining unpaid after such Due Date shall bear interest at the annual rate of two (2) percentage points over the current interest rate on prime commercial loans then in effect at the main office of the Bank of New York or its successor, located in New York City, New York, applied from the Due Date to the date of payment.

(11) Metering

Metering equipment required for the Unit shall be furnished, owned and maintained by Seller in accordance with good electric utility practice. Each meter shall be tested from time to time and maintained in an accurate condition by Seller. If at any time a meter is found to be inaccurate by more than 2% up or down, Seller shall make it accurate, and the charges and meter readings for the period of inaccuracy, so far as the same can reasonably be ascertained, shall be adjusted.

In addition to routine tests, Buyer may have any meter used to measure the energy output of the Unit tested at any time upon written request. If such meter proves accurate within 2% up or down, the expense of the test shall be borne by Buyer.

Should any metering equipment at any time fail to register, or should the registration thereof be so erratic as to be meaningless, the quantities of power and energy sold shall be determined from the best information available.

(12) Operation and Maintenance

Seller shall, subject to the provisions of Sections 3 and 6 of the Agreement and to applicable restrictions of law and order duly promulgated by public authorities:

(a) At all times maintain its generating units in accordance with good electric utility practice; and

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(b) Make reasonable efforts to have all of its units operable at its normal net capability rating, whenever practicable, consistent with good electric utility practice.

(13) Liability and Indemnification

Except for willful misconduct and gross negligence by Seller, (including their trustees, directors, officers, employees, and agents) Seller shall not be liable to Buyer in tort, contract, or otherwise for any damages, costs, fines, penalties, or claims whatsoever which may result from disruptions in service, including, but not limited to, service interruptions, deficiencies in the quantity or quality of service, or any other abnormal provision of service. Buyer agrees to indemnify, defend, and hold Seller, its trustees, directors, officers, employees, and agents harmless from and against any and all such costs, claims, liabilities, actions, or proceedings whatsoever arising from or claimed to have arisen from such disruptions in service, except for such costs, claims, liabilities, actions, or proceedings caused by Seller's willful misconduct or gross negligence.

Except as provided for in the above paragraph, each party agrees to indemnify, defend, and hold the other party (including the other party's affiliated companies, trustees, directors, officers, employees, and agents) harmless from and against any and all third party damages, costs, claims, liabilities, actions, or proceedings arising from or claimed to have arisen from the negligent acts or omissions of the indemnifying party's employees or agents.

(14) Force Majeure

As used in this Agreement, "Force Majeure" means any cause beyond the reasonable control of, and without the fault or negligence of, the party claiming Force Majeure. It shall include, without limitation, sabotage, strikes, riots or civil disturbance, acts of God, act of public enemy, drought, earthquake, flood, explosion, fire, lightning, landslide, or similarly cataclysmic occurrence. Economic hardship of either party shall not constitute a Force Majeure under this Agreement.

If either party is rendered wholly or partly unable to perform its obligations under this Agreement because of Force Majeure as defined above, that party shall be excused from whatever performance is affected by the Force Majeure, to the extent so affected, provided that:

(a) The nonperforming party promptly, but in no case longer than five working days after the occurrence of the Force Majeure, gives the other party written notice describing the particulars of the occurrence.

(b) The suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure.

(c) The nonperforming party uses reasonable efforts to remedy its inability to perform.

(d) The Buyer's obligation to pay for energy and the Seller's obligation to provide energy shall be modified in proportion to the effect of Force Majeure conditions upon each party's obligations under this Agreement. In no event shall (i) the Buyer be required to pay for energy not delivered to Seller's system boundary, or to NEPEX, or (ii) the Seller be obligated to deliver energy to such boundary or to NEPEX without payment by the Buyer.

(15) Laws, Regulations, Orders, Approvals and Permits

Seller shall file this Agreement with the Federal Energy Regulatory Commission ("FERC") as a "Rate Schedule" within the meaning of 18 C.F.R. Part 35. The Buyer authorizes Seller to act as its designated representative in complying with 18 C.F.R. Part 35 and agrees to support such filing and cooperate with Seller and provide any information reasonably required by Seller to comply with applicable filing requirements.

This Agreement is made subject to present and future local, state and federal laws and to the regulations or orders of any local, state or federal regulatory authorities having jurisdiction over the matters set forth herein; and Seller's performance hereunder is conditioned upon

securing and retaining such local, state or federal approvals, grants or permits as may from time to time be necessary with respect to such performance. All parties agree to use their best efforts to secure and retain all such approvals, grants, or permits. However, the rates and charges for capacity, energy, and transmission are not subject to change by Seller under 16 U.S.C. Section 824 d.

(16) Assignment

This Agreement shall be binding upon and shall inure to the benefit of, and may be performed by, the successors and assigns of the parties; provided, however, that no assignment, pledge or other transfer of this Agreement by any party shall operate to release the assignor, pledgor, or transferor from any of its obligations under this Agreement unless: (i) the other party (or its successors or assigns) consents in writing to the assignment, pledge or other transfer and expressly releases the assignor, pledgor or transferor from its obligations hereunder; or (ii) the assignment, pledge or other transfer is to another company in the same holding company system as the assignor, pledgor or transferee of the obligations of the assignor, pledgor or transferee or (iii) such transfer is incident to a merger or consolidation with, or transfer of all or substantially all of the assets of the transferor to another person or business entity which shall, as a part of such succession, assume all the obligations of the transferor under this Agreement.

(17) Interpretation

The interpretation and performance of this Agreement shall be in accordance with and controlled by the Federal Power Act and regulations and orders of the FERC thereunder and, to the extent not controlled thereby, by the laws of the State of New Hampshire.

(18) Waiver of Defaults

No waiver of a party of the performance of any obligation under this Agreement, or with respect to any default or any other matter arising in connection with this Agreement, shall be deemed a waiver with respect to any subsequent performance, default or matter.

(19) Notices

Any notice, demand or request required or authorized by this Agreement to be given to a party shall be in writing, and shall either be personally delivered to a representative customarily authorized to receive such notice, demand or request, or it shall be mailed, postage prepaid, to the party at the appropriate address shown below:

Public Service Company of New Hampshire
60 W. Pennacook Street
P. O. Box 330
Manchester, NH 03105
Attention: Joyce M. D. Wood, Manager, Power Contracts

Central Vermont Public Service Corporation
77 Grove Street
Rutland, VT 05701
Attention: Marc Schaefer, Director, Power Supply

The designation of such address may be changed at any time by either party by written notice given to the other party.

Any notice, demand or request so addressed and mailed by registered or certified mail or by overnight delivery shall be deemed to be given when so mailed, and shall be deemed to be received on the third business day following its deposit in the U.S. mail, or the following business day if an overnight delivery service is used.

(20) Miscellaneous

(a) Each party shall prepare, execute and deliver any documents reasonably required to implement any provisions hereof.
(b) Any number of counterparts of this Agreement may be executed and each shall have the same force and effect as the original.

(c) This Agreement shall constitute the entire understanding between the parties and shall supersede any and all previous understandings pertaining to the subject matter of this Agreement.

(d) This Agreement may be modified only by an instrument in writing signed by the parties hereto.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be signed by their respective duly authorized representatives as of the date first written above.

SELLER: PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

By _____
Its Vice President

Date: November 20, 1991

BUYER: CENTRAL VERMONT PUBLIC SERVICE CORPORATION

By _____
Its ~~Vice President~~ Director, Power Supply

Date: _____

Basis of the Proposed Newington Capacity Charge and Non-Firm Transmission Charge for the Sale to Central Vermont Public Service Corporation and an Explanation of How the Proposed Charge was derived:

The capacity and non-firm transmission charges for the particular month shall be calculated by multiplying the Purchase Amount (in megawatts) for the period times one thousand, times $55.00 per kilowatt year divided by twelve. The charge for capacity and transmission service is fixed at $55.00 per kilowatt year for the duration of the contract and was mutually agreed to by the parties to the contract through arms-length negotiations. The contractual capacity charge of $55.00 per kilowatt year is substantially below the combined embedded capacity and transmission cost of $77.39 per kilowatt year. The monthly energy charge associated with the sale of 7 megawatts from PSNH's Newington generating unit shall be Buyer's entitlement percentage of the amounts properly charged by Seller with respect to the Unit to Account No. 501, fuel, of the Uniform System of Accounts.

The cost justification of the capacity component of the proposed rate is based upon an analysis of the Newington generating unit's total annual capacity-related expenses and plant investment for calendar year 1990. The transmission component of the Capacity and Transmission Charge is based on PSNH's FERC Electric Tariff Original Volume No. 1 for non-firm transmission service as approved in FERC Docket No. ER89-207-000. The charge for service provided under the tariff is based on a formula and is recomputed on an annual basis. The revised rate effective June 1, 1991 is $22.45 per kilowatt per year.

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
CALCULATION OF NEWINGTON GENERATOR CAPACITY COST
BASED ON DATA FOR CALENDAR YEAR 1990
($000)

INVESTMENT BASE:	NEWINGTON STATION CAPACITY COST
TOTAL PROD. INVESTMENT	$86,583
ACCUMULATED DEPREC.	(41,876)
NET PRODUCTION PLANT	$44,707
MATERIALS AND SUPPLIES	1,459
GENERAL PLANT ALLOC.	1,588
FUEL WORKING CAPITAL	3,771
O&M WORKING CAPITAL	1,503
FUEL INVENTORY ALLOW.	3,058
ACCUM. DEFER. INC. TAX	(8,338)
NET INVESTMENT BASE	$47,748

ANNUAL EXPENSE:	
OPERATION AND MAINT.	$6,164
A&G EXPENSE ALLOC.	5,858
DEPRECIATION - PROD.	2,316
DEPRECIATION - GENL.	73
PROPERTY TAXES	772
RETURN ON INV. (15.063%)	7,192
INCOME TAX ALLOW.	810
TOTAL CAPACITY COSTS	$23,185
TOTAL UNIT CAPACITY	422.00 MW
1990 CAPACITY COST	$54.94 KW/YR

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
ANNUAL NON-FIRM TRANSMISSION TARIFF RATE
BASED ON CALENDAR YEAR 1990 DATA
EFFECTIVE JUNE 1, 1991 - MAY 31, 1992

Investment Base

1.	Avg. Gross Transmission Plant	$179,353,341
2.	Less: Avg. Accumulated Depreciation	(61,110,405)
3.	Avg. Net Transmission Plant	$118,242,936
4.	Add: Materials and Supplies	3,235,598
5.	Working Capital Allowance	2,233,912
6.	Avg. Net General Plant	1,922,809
7.	Avg. Prepayments	453,779
8.	Less: Avg. Accumulated Deferred Income Tax	(11,009,341)
9.	Investment Base	$115,079,693

Expenses

10.	Return on Investment (14.934%)	$17,186,001
11.	Operation and Maintenance	13,672,262
12.	Administrative and General	4,199,037
13.	Depreciation	5,466,004
14.	Property Taxes	1,143,278
15.	Income Tax Allowance	1,855,182
16.	Payroll Taxes	440,409
17.	Total Transmission Expense	$43,962,173
18.	Less: Transmission Support Revenue	$(3,323,424)
19.	Net Annual Transmission Expense	$40,638,749
20.	Firm Peak Load and Reserve	1,810,018 KW
21.	Annual Charge (Line 19 ÷ Line 20)	$22.45/KW Per Year

ESTIMATED CAPACITY AND ENERGY REVENUE TO BE RECEIVED BY PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE FROM THE SALE OF CAPACITY TO CENTRAL VERMONT PUBLIC SERVICE CORP.

MONTH	CAPACITY (KW)	CAPACITY AND TRANS. CHG. REV.	ESTIMATED FUEL REVENUE	TOTAL REVENUE
DECEMBER, 1991	7,000	$32,083.33 (1)	$77,488.00	$109,571.33
JANUARY, 1992	7,000	$32,083.33	$77,488.00	$109,571.33
FEBRUARY, 1992	7,000	$32,083.33	$59,622.00	$91,705.33
TOTAL		$96,250.00	$214,598.00	$310,848.00

(1) $55.00 PER KILOWATT PER YEAR / 12 = $4.5833/KW-MONTH

SAMPLE FINANCIAL STATEMENTS

FINANCIAL STATEMENTS FROM THE 1991 ANNUAL REPORT OF THE NEW ENGLAND ELECTRIC SYSTEM

These statements are included as a supplement to the presentation by Charles Zimmermann on the "Measurement of Costs Associated With Energy Charges, Sharing of Fixed Costs, Joint Ventures, and Capacity Contracts." The principal reason for including these statements is to present the concept of a Statement of Cash Flows. Such a statement is not uniformly used in the Baltics (for example, it is not required by the Latvian law "On Annual Report of Enterprises"). This type of statement may be needed to implement sharing of fixed costs (including annual capital expenditures).

Statements of Consolidated Income

Year ended December 31 (thousands of dollars)

	1991	1990	1989
Operating revenue	**$2,094,378**	$1,908,826	$1,705,488
Operating expenses:			
Fuel for generation	**268,022**	294,171	295,132
Purchased electric energy:			
Fossil and interchange	**360,168**	294,599	262,792
Nuclear entitlements	**111,105**	110,289	104,989
Other operation	**428,652**	385,148	289,532
Maintenance	**148,266**	137,117	121,582
Depreciation and amortization	**278,126**	259,115	256,881
Taxes, other than income taxes	**105,332**	92,596	83,156
Income taxes	**103,702**	81,920	49,286
Total operating expenses	**1,803,373**	1,654,955	1,463,350
Operating income	**291,005**	253,871	242,138
Other income:			
Allowance for equity funds used during construction	**1,961**	14,387	12,281
Equity in income of generating companies	**10,370**	6,836	6,288
Other income (expense)—net	**16,020**	(2,961)	(584)
Seabrook rate settlement adjustment (Note C)		133,590	
Federal and state taxes on Seabrook rate settlement adjustment (Note C)		(18,503)	
Operating and other income	**319,356**	387,220	260,123
Interest:			
Interest on long-term debt	**118,846**	116,565	110,535
Other interest	**3,308**	7,267	12,340
Allowance for borrowed funds used during construction	**(2,330)**	(17,486)	(17,465)
Total interest	**119,824**	106,346	105,410
Income after interest	**199,532**	280,874	154,713
Preferred dividends of subsidiaries	**10,572**	10,572	10,572
Minority interests	**9,150**	8,252	5,491
Net income (Note C)	**$ 179,810**	$ 262,050	$ 138,650
Average common shares	**64,916,599**	63,818,386	58,836,246
Per share data:			
Net income	**$ 2.77**	$ 4.11	$ 2.36
Dividends declared	**$ 2.07**	$ 2.04	$ 2.04

The accompanying notes are an integral part of these financial statements.

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COMPARISON OF GENERALLY ACCEPTED ACCOUNTING PRINCIPLES (GAAP) AND CIS ACCOUNTING PRACTICES

January 11, 1993

Prepared by:
Ernst & Young Vneshaudit
Podsosensky pereulok 20/12
Moscow 103062 Russia

This document is included as a supplement to the presentation by Charles Zimmermann on the "Measurement of Costs Associated With Energy Charges, Sharing of Fixed Costs, Joint Ventures, and Capacity Contracts." Although the Baltic countries are not part of the CIS, their accounting systems were precisely the same as the CIS accounting systems until the fall of 1991. The starting point for a transition to western accounting is therefore the same.

This document is included in these seminar proceedings with the permission of Richard Lewis, Director of Tax at Ernst & Young Vneshaudit.

COMPARISON OF GAAP AND CIS ACCOUNTING PRACTICES

GAAP	CIS
Recognition of Sales Determined by user and set out in accounting policies. Sales usually recognized at the date of delivery to customers. Distinction drawn between sale and collection of related receivable	Local: • on receipt of cash, or • on issue of invoice, or • on presentation of documents to bank for collection provided in each case that goods have been delivered or services rendered Export: • also on passing of title or risk
Definition of production cost Determined by the user and may include the following costs: • Direct materials • Direct labor • Manufacturing overheads General and administrative overheads are generally excluded	Accounted for as • Production costs (A/c 20) • Production overhead (A/c 25) • General overhead (A/c 26) Production costs are categorized/ grouped as follows: • Raw materials • Labor costs • Social costs (Pension Fund) • Depreciation of Fixed assets • Other costs Costs disallowed for tax purposes must be generally excluded General overhead may be defined as period costs and therefore excluded from costs of production and expensed directly
Tax disallowed costs Included with other costs and adjusted in tax return (added back)	Charged to distributable profits (A/c 81 "Utilization of Profit")
Valuation of Inventory Valued at lower of cost or market value Cost based on production or purchase cost, as appropriate	Manufactured goods valued at production cost, including or excluding general overhead. See above. Purchased goods valued at purchase cost normally with or without inward freight, duties, etc. May be written down to realizable value, if lower than cost, at year end
Accounting for Inventory User to determine. The basic inventory costing methods are specific identification, average cost, FIFO, LIFO and standard cost	Ordinarily FIFO Can use "accounting prices" for inventory during the month and write off differences from actual prices as material is used/sold

Obsolete inventory **Impaired inventory** Write down to realisable value or provide for reinstatement	Write down to realisable value
Bad Debt Provision Calculated on any reasonable basis	Allowance to be calculated based on specific identification of bad and doubtful debts
Low value and short life fixed assets User to determine treatment, including: • capitalization, • expensing on acqusition or • capitalising initial purchase and expensing all subsequent replacements	Assets costing up to 100 rubles expensed on issue Assets costing 100-3000 rubles or with useful life less than one year must be capitalised and depreciated 50% on first use and 50% on retirement.
Year-end closing All income and expense accounts are cleared to profit and loss account at the end of the financial year	All income and expense accounts is cleared down to profit and loss account at the end of each month.
Stock taking shortages Written off to production etc as appropriate	Shortages within norms are charged to production costs. Shortages in excess of norms are charged to responsible person, if determinable, otherwise to profit and loss account
Accruals of estimated costs Costs incurred but not precisely determinable must be accrued on an estimated basis	Accruals are not permitted, except for warranty costs, annual leave, annual specific employees' bonuses and fixed asset repairs
Provisions at the year end for known costs Costs incurred and precisely determinable must be provided for	Where costs have been invoiced only after the year end, they are not to be provided for, but commonly, they are provided for
Anticipated future losses Must be provided for	May not be provided for, but recognised only when realised
Anticipated future expenses (eg. dismantlement) Must be provided over the period benefiting from that future expense	Will be recognised only when incurred

Reserve accounting Reserves for future costs may not be set up, nor costs charged to such reserves. Reserves are to be distinguished from provisions for costs or losses incurred in one year but settled or realized in a subsequent year	Reserves for future unexpected costs may be set up out of distributable profits
Bank accounting Receipts booked when cheque etc deposited. Payments booked when cheque etc drawn	Transactions only booked when notified by bank
Depreciation Cost less scrap value to be amortised over economic life of the asset on any appropriate basis. Different rates and bases may be reqired for tax purposes	Straight line depreciation at rates set for tax. Some businesses may use accelerated depreciation for plant and machinery. Book and tax rates are identical
Depreciation of fixed assets not in use Depreciation may continue	Depreciation should cease for the period of non use. Not always applied
Obsolete or impaired fixed assets Fixed asset must be written down to its value to the user	Accelerated depreciation norms may be used for writing down of obsolete or impaired fixed assets
Interest expense for bank loans Interest is charged in full amount to general overheads or capitalised under certain circumstances	Interest within norms is charged to general overheads. Interest in excess of norms is charged to distributable profits
Recording of Land Normally recorded as a fixed asset unless held strictly as an investment or real estate inventory	Normally state property and not reflected in balance sheet. Capital cost of right to use is classified as an intangible asset and is amortised over its useful life
Deferred tax In so far as tax treatment, eg. different depreciation rates, gives rise to taxable profit that is lower than book profit, tax must be provided on the differential, because it will be payable at some future date	Book and tax profit has historically been the same. No concept therefore of deferred tax

Loss carry forward Loss for a year is carried forward or offset against profits. For tax purposes, loss may be brought forward or back to previous years (varies between tax jurisdictions)	Loss for a year is carried forward or offset against profits brought forward or, sometimes reserves. For tax purposes, loss may be only be offset against next five year profits
Transactions in foreign currency User to determine precise manner of conversion, usually at the rate at which the currency amount in question could have been purchased or sold. Rate usually determined either on transaction by transaction basis or monthly average or standard rate	Each transaction must be booked at the market rate laid down by the central bank applicable to the date of the transaction. Sometimes the rate ruling when the transaction is booked is used instead.
Financial year User can determine and even change his financial year	Must be same as calendar year (= 31 December year end)
Substance over form The actual or financial nature of the transaction must be recorded, not its legal form where this is different.	The legal form of the transaction rules how it is to be recorded

Appendix C.4

Lithuania-Latvia Agreement for 1993

Agreement on Mutual Interchange of Electric Energy
Between the Lithuanian State Power System
and the State Enterprise Latvernergo

AGREEMENT

ON MUTUAL INTERCHANGE OF ELECTRIC ENERGY BETWEEN THE LITHUANIAN STATE POWER SYSTEM AND THE STATE ENTERPRISE LATVENERGO

The Lithuanian state power system and the state enterprise Latvenergo (hereinafter referred to as the "Parties").

WHEREAS the Parties are acting in accordance with the legislation of the respective countries.and

WHEREAS the Parties are guided by the principles of the European Energy Charter executed in the Hague on 17th December.1991.and inter-governmental treaties between the governments of the Republic of Latvia and the Republic of Lithuania.

WHEREAS the Parties are wishing to develop mutually beneficial cooperation between the Parties

NOW THEREFORE the Parties have executed this Agreement as follows:

1.Subject of the Agreements and terms of the electric energy supply

This Agreement constitutes the basic legal instrument governing relations between the Parties on mutual interchange of electric energy between power systems of Latvia and Lithuania. The Parties have agreed to supply electric energy on the following terms:

1.1. Depending whether the party shall act as a receiver of the electric energy from the power system of the other party or a supplier of the electric energy to the other party's power system. both parties may appear either as a Buyer or a Seller.

1.2. The Party acting as a Seller shall supply and the Party acting as a Buyer shall receive the amount of electric energy based on the results of accounting balance of the interchange energy between the countries in accordance with the approximate planned mutual interchange of electric energy per year with the lay-out for quarters (Supplement 1) and monthly commercial contract (Supplement 2)

1.3. In addition to the monthly commercial contracts short term additional supplies of electric energy may be carried out on the terms other than defined in the monthly commercial contract provided the Parties shall sign a separate spot commercial contract on supply of electric energy.(Supplement 3)

1.4. Monthly and spot commercial contracts must state:

1) supply period

2) amount of electric energy,
3) price for 1 kwhr in hard currency or in Latvian roubles at a rate of the Bank of Latvia, unless other intergovernmental treaties exist.

1.5. The duly signed monthly or spot commercial contracts may be sent by fax or courier and they have equal legal force.

1.6. In case of emergency any Party has the right to request assistance from the other party with the purpose to amend the amount and terms of the validly existing monthly commercial contracts followed up by the consequent written spot commercial contract no later than 5 days following the occurrence of the amendments.

1.7. The state enterprise Latvenergo shall provide the availability of operational capacity reserve for the Lithuanian power system to cover emergency loss of capacity.

2.Term and procedure to execute monthly contracts

2.1. The Monthly commercial contracts must be signed no later than 3 days prior to the commencement of a new month.The data to prepare monthly contracts is presented to Dispatch Centre Baltija 10 days prior to the commencement of a month. DC Baltija shall present its remarks to the power systems 5 days prior to a new month.

2.2. In case of price rise for fuel which could serve cause to any Party to come with an intiative to change the price for 1 kwhr of electric energy, the initiating Party shall inform in writing the other Party no later than 15 days prior to the commencement of the next consecutive month.

2.3. The price for 1 kwhr of electric energy defined in the Monthly commercial contract may not be changed.

3. Commercial metering of electric energy supplied under this Agreement

3.1. Each Party under this Agreement shall own, operate and maintain metering equipment located within its borders. Commercial metering equipment must be meteorological equipped.

3.2. The accuracy of the metering equipment must be verified by means of appropriate tests no less than once a year or on the basis of substantiated request by the Party herein.

3.3. In cases of outage of metering equipment due to tests or repair the points of commercial metering for this period are deemed to be readings of the commercial metering of the opposite end.

3.4. The start-up point of the reading of the commercial metering equipment shall be at 00.00 hours of the last day of the respective month.

3.5. The Parties are obligated to check the metering devices and eliminate the inaccuracy when the difference in readings of the commercial meters located at the both ends of the international transmission line is more than 3.5 percent with the account to the losses in the transmission lines.

3.6. Commercial metering points are defined in the Supplement 4.

3.7. The Parties have to notify each other five days prior to any planned alterations in the commercial metering of electric energy, like: replacement of the metering devices or any work in the auxiliary circuits which may affect the accuracy of the readings.In the cases inaccuracy of the metering devices is detected the Parties have to notify each other immediately.

4.Wheeled power and terms of payment for it.

4.1. By "wheeled power" is understood electric power received from the other Party or other power systems and transmitted through the power grid of the either Party. Neither Party has the rights to hinder the wheeling of such power through its power grid within its technical capability.

4.2. The compensation of expenses related to the wheeling to Lithuania through Latvia from Lithuania is determined to be 5 percent.

The supply of energy to Lithuania exceeding the amount received from the Lithuanian power system is deemed to be wheeled power from the Northern power systems and is determined as the difference between the received and supplied electric power, accounted according to the meters defined in the Supplement Nr.4.The Accounts based on the accounting balance of supplied and received power are performed by DC Baltija taking into consideration transmission losses and the payment for wheeling which is determined to be 8.3% of the amount of the wheeled power.

4.3. Monthly accounts of the power wheeled through the systems of the Parties is performed by the DC Baltija.

5.Planning and operational regime

5.1. Planning and operational regimes necessary to provide the performance of the Agreement are determined by the DC Baltija in accordance with the multilateral agreement on parallel operation among the DC Baltija and separate power systems of the Baltic Interconnected System for the year 1993.

6.Billing procedure

6.1. The billing period is deemed to be one calendar month. Control is performed on the incremental basis. Mutual supplies in the billing period are balanced and payments are executed by the Party to which the balance is showing the surplus.

6.2. The Party acting as a Buyer is executing the payment to the Party acting as the Seller by payment order on 5,11, 17, 23, 29 day of the month. The amount of the payment is set to be 1/5 of the planned amount of the supply of the balance. The amount of the last monthly payment may be made based on the planned supply at the respective month. In case the payment day falls on Saturday, the remittance is performed the preceding day, in case it is Sunday or state holiday - the next working day.

6.3. The final billing for the actual supplies of electric energy (including the payment for the wheeling) is performed by the second regular payment of the following month.

6.4. In case of delayed transfer of regular payments, the Buyer is obligated to pay penalty of 0.3 percent for each delayed day beginning with the first day following the due date of payment until the day of actual payment inclusive. Such penalty is included in the next regular payment and marked in a separate item.

6.5. Verification of mutual accounts on the basis of supplied and received electric energy is done by exchange of notices between the parties by fax no later than the 5th day of the month following such verification.

6.6. All the duties and other deductions related to this Agreement stipulated by the law of the Republic of Latvia and the Republic of Lithuania are paid by the respective Party in their countries and they waive the rights to any claims for such payment.

7.Force Majeure

7.1. The Seller and the Buyer are not responsible for the failure to supply or receive in full or in part the amount of the electric energy or power when such failure is caused by the Act of God (flooding, storm etc.) or civil disturbance (war actions, sabotage, blockade etc.) and in cases when such delivery caused to be impossible due to decisions by legislative bodies or the governments of the parties under the agreement.

7.2. The Parties shall immediately notify each other on the occurrence of the force majeure circumstances.

8.Liabilities of the Parties.

8.1.The parties shall assume commitment not to incur damage to the other party under scope of this Agreement.

The Parties under this Agreement shall have no rights to assign unilaterally their rights or the rights of the other party under this Agreement to a third party unless there is a written agreement between the Parties.

In case of the transfer of property (sale, leasing etc.) designed to generate, transmit and distribute electric energy, the successor by receiving such rights assumes obligations under this Agreement equal to the initial Party herein.

8.2. In case of the failure of the Buyer to take the agreed monthly amount of electric energy (more than 10%) (Supplement 2), the amount not taken is to be paid for by the Buyer on the basis of 10 percent of a price for one kWh.(Supplement 2) as per data on the actual deviation from the balance of the electric energy of the Seller.

8.3.In case such failure to deliver in full or in part the monthly agreed amount of electric energy (more than 10%) has caused the Buyer to purchase electric energy from

a third party for a tariff higher than known, the Seller is obligated to indemnify the difference in the tariff.

8.4. Financial penalties in accordance with the Articles 8.2 and 8.3 are applied on the basis of the document signed by the Parties and DC Baltija.

9. Confidentiality

9.1. The parties agree not to disclose the commercial terms of the Agreement to any third party without prior consent by the other party.

10. Arbitration.

12.1. All the matters under dispute arising in the course of execution of this contract, the parties shall try to settle amicably. In case it is impossible to resolve a matter amicably, the disputed matter shall be submitted to the authority considering business disputes in the country of the defendant.

12.2. In dispute settlement is applied the governing law of the country where dispute is considered.

11.Term and duration of this Agreement.

11.1. This Agreement shall enter in force upon its signing and shall remain in force until its termination.

All prior written or verbal agreements related to this Agreement are invalid and void and may not be used in the construction of this Agreement.

11.2. The Agreement may be terminated at any time by mutual consent of the Parties.

11.3. All the changes and amendments to the present Agreement are executed in written form and with the mutual consent of the Parties. Unilateral changes or amendments to the existing Agreement are unacceptable.

11.4. Each Party may waive its obligations under this Agreement. The Party announcing such waiver must notify the other party six months in advance, provided that the Party agrees to perform earlier assumed obligations.

11.5. This Agreement is executed in Russian in 4 (four) equal copies each one having equal legal force. The Parties have signed the four copies of the Agreement and two copies are kept by each Party. All the copies have equal legal force.

12.Supplements, legal addresses and bank requisites of the Parties.

12.1. The following supplements for an integral part of this Agreement:

1. SUPPLEMENT 1. Approximate planned interchange of the electric energy per year with the lay-out for quarters.

2. SUPPLEMENT 2. Monthly commercial Contracts.

3. SUPPLEMENT 3. Spot commercial Contracts when signed during the respective month.

4. SUPPLEMENT 4. Points of commercial metering between the Latvian and Lithuanian power systems.

5. SUPPLEMENT 5. Operating reserve, terms of billing and payment.

12.2.Legal addresses of the Parties and bank requisites.

Lithuanian state power system
2748, Republic of Lithuania, Vilnuis, Žvejų 14, Fax 753271
Current account 07080591 at a VITIS bank in Vilnuis bank code 260101596

The state enterprise LATVENERGO
LV-1230 Riga, Ganibu Dambis 12, Latvenergo
Current Account 0002212208 in the Riga City Council Bank, bank code 310101311

General Director Lithuanian Power System	General Director Latvenergo
V. Sirutis	J. Pāvuls

SUPPLEMENT 1

Approximate planned mutual interchange of electric energy for the year 1993 with the lay-out for quarters.

	I	II	III	IV	T-l
Amount of electric energy supplied from Lithuania to Latvia (million kwh)	52	0	0	215	267
Amount of electric energy supplied from Latvia to Lithuania (million kwh)	0	0	0	0	0

General Director
Lithuanian Power System

V. Sirutis

General Director
Latvenergo

J. Pāvuls

SUPPLEMENT 5

Operating reserve. terms of billing and payment.

The operating reserve means the amount of capacity (MW) which can be available within three minutes and which can be activated in the in the moment of contingency.

1. The amount of operating reserve subject to be paid by the Lithuanian power system is calculated by DC Baltija for each day according to the following principles:

- availability of the operating reserve in the Lithuanian power system itself;
- availablity of the operating reserve in the Latvian power system;
- availability of the operating reserve in the Baltic interconnected system received from other power systems.

2. The amount of the operating reserve is calculated according to the folowing method:

P(operating reserve)=P(Latvian reserve)-
(P Lithuanian reserve + P reserve Interconnected System)

P(Latvian reserve)=P(installed reserve Hydro plant) - (P repair of Hydro plant + Pload of Hydro plant)

P(Lithuanian reserve) = P(Kaunas Hydro plant reserve) + P(Kaishadoras pump storage reserve)

P(Kaunas hydro plant reserve) = 100.8 - (P repair + P load)

P(Kaishadoras pump storage reserve) = 400 - (P repair + P load) provided headwater of the Kaishadoras pupm storage plant is higher than 140.0 m.

Operating reserve of the Baltic interconnected system is equal to 300 MW.

Components of the amount of operating reserve subject to be paid by the Lithuanian power system are integrated every hour and every day.

3. The payment for the availability of the operating reserve is determined in amount of 1 (one) percent of the potential generation based on the actual reserve capacity and is billed at the final account for the preceding month.

DC Baltija present to the Parties integrated components which determine the amount of the operating reserve subject of payment (MW), integrated amount of the operating reserve subject of payment and eventual generation (MWhr) derived from that amount.

General Director Lithuanian Power System	General Director Latvenergo
V. Sirutis	J. Pāvuls

N.B. This supplement is not signed but the parties have agreed on the terms of this supplement and they assigned the DC Baltija to work out the procedure for the technical implementation of this supplement using electronic equipment. It is assumed that when such procedure is ready it will be signed and enforced.

Appendix C.5

Estonia-Latvia Agreement for First Quarter 1993

Contract on Supply of Energy and Power
Between the State Enterprise Eesti Energia
and the State Enterprise Latvenergo
for the First Quarter of 1993

CONTRACT

ON SUPPLY OF ELECTRIC ENERGY AND POWER BETWEEN THE STATE ENTERPRISE "EESTI ENERGIA" AND THE STATE ENTERPRISE "LATVENERGO" FOR THE FIRST QUARTER OF 1993.

The present contract is signed with the purpose of promoting in the best possible way the business relationship between the parties herein in the energy area. Business relations between the state enterprise EESTI ENERGIA and the state enterprise LATVENERGO are based on mutually beneficial principles, equitable cooperation and the maximum benefit from the joint cooperation. This contract is concluded on the basis of the legislation of the Republic of Estonia and the Republic of Latvia.

1. Parties in the contract.

The parties in the contract are the state enterprise EESTI ENERGIA of the Republic of Estonia represented by the general director Udo Lehtse, hereinafter referred to as the "Seller," and the state enterprise LATVENERGO represented by the general director Jānis Pāvuls, hereinafter referred to as the "Buyer".

2. Subject of the contract and terms of delivery.

The parties have agreed on the delivery of electric energy and capacity on the following terms.

2.1. The Seller shall deliver and the Buyer shall receive electric energy and power according to the firm delivery based on the accounting balance of interchange power in the interconnected system 250 MW with permissible deviations +/- 10 percent (i.e., an amount of power between 225 MW and 275 MW) at any period of day and night from 01.01.93. till the spring flood period on the river Daugava.

From the beginning of the spring flood in the hydro electric station of the Daugava cascade (exceeding 600 m3/sec) the Buyer may refuse to receive electric energy as per the firm delivery based on the accounting balance of interchange power in the interconnected system.

2.2. The volume of electric energy delivered by the Seller according to the firm delivery based on the accounting balance of interchange power in the interconnected system shall constitute:

January	no less than 186 million kwhr
February	no less than 168 million kwhr

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March approximately 60 million kwhr depending on the commencement and intensity of the spring flood.

2.3. The Seller has the right to deliver and the Buyer to receive electric energy and power beyond the aforesaid amount in Articles 2.1. and 2.2. herein, in part as the accounting balance of interchange power in the interconnected system up to 600 MW (approximately) and in part as the following:

January 300 million kwhr (approximately)

February 300 million kwhr (approximately)

March 150 million kwhr (approximately)

2.4. Price for 1 kwhr of electric energy delivered by the Seller shall be 0.022 DM/kwhr

The price may not be changed for electric energy delivered by the Seller in accordance with the firm delivery based on the accounting balance of interchange power in the interconnected system equal to 250 MW.

The price may be changed for the electric energy delivered by the Seller in excess of the firm delivery based on the accounting balance of interchange power in the interconnected system by mutual agreement between the parties, but no later than 14 days prior to the regular payment.

3. Measurement of the delivered power and electric energy under this contract.

3.1. The amount of the supplied energy is measured:

a) transmission line 330 kw Tartu-Valmiera by meter L-301 at the substation Tartu;

b) transmission line 110 kw Tsirguliina-Valka by meter L-677 at the substation Tsirguliina:

c) transmission line 330 kw Tsirguliina-Valmiera by meter L-354 at the substation Tsirguliina:

d) tranformer 110/20/10 kw at the substation in Valga by meter T-2035;

e) transmission line 110 kw Ruusmae-Aluksne by meter L-683 at the substation in Rheums.

3.2. The volume of the received energy is messaged:

a) transmission line 330 kw Valmiera-Tartu by meter at the substation in Valmiera;

b) transmission line 330 kw Valmiera Tsirguliina by meter L-354 at the substation in Valmiera:

c) transmission line 110 kw Valka-Tsirguliina by meter L-677 at the substation in Valka;

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d) through transformer 110/20/10 kw at the substation Valga by meter T-2035 at the substation Valga;

e) transmission line 110 kw Aluksne-Ruusmae by meter L-083 at the substation Aluksne.

3.3. Deviation from the actual amount of 250 MW +/- 10 percent as per Article 2 herein is metered by every hour (in cumulative result with interval of 30 sec) through the energy management system of dispatch centre Baltija. The results of these measurements are presented to the Seller and Buyer with the maximum interval five days.

3.4. The commercial accounts of the supplied electric energy are conducted by the dispatch centre Baltija based on the commercial meter readings defined in Articles 3.1. and 3.2.(Article 3.4. is incorporated in this contract as amendment duly signed by the parties in this contract on February 8.1993. On behalf of LATVENERGO signed by R.Leveiko, deputy director general and on behalf of EESTI ENERGIA by Enn Kallikorm .deputy director general)

4. Wheeled power.

4.1. By "wheeled power" is understood electric power received from a third party which is transmitted through the Seller's power grid and designated for the Buyer.

4.2. The Buyer shall compensate the Seller for expenses related to wheeling of electric power through the Seller's power grid on the basis of 8.3 percent of the amount of the wheeled power; Seller may receive this compensation in kind or in payment according to the tariff defined in Article 2.4.

5. Planning and operating regime.

5.1. All the questions related to the planning and operating regimes under this contract are determined by dispatch centre Baltija pursuant the agreement on parallel operation among the DC Baltija and power system participants of the interconnected system Baltija for 1993.

6. Billing procedure.

6.1. The billing period is deemed to be one calendar month. The Buyer shall settle accounts with the Seller following the actual receipt of the electric energy and issuance of payment documents sent by cable on 3, 8, 13, 18, 23, 28 day of the month. In case the payment day falls on Saturday, the remittance is performed the preceding day, in case it is Sunday or state holiday - the next day.

The final billing for the preceding month is performed by the first regular payment of next month.

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In case the regular payments or billing are not executed in due time, the Buyer is obligated to pay 0.5 percent for each delayed day beginning with the first day following the due date of payment until the day of actual payment inclusive.

6.2. Verification of mutual accounts on the basis of supplied and received electric energy is done by exchange of notices between the parties by cable with consecutive confirmation sent by mail no later than 3rd day of the month following such verification.

7. Term of the contract.

7.1. This contract enters into force from January 1.1993 and remains in force until March 31.1993.

8. Amendments, termination and rights to extend the contract.

8.1. All the amendments to the contract are executed in writing by mutual consent of the parties.

8.2. In case the Buyer is willing to purchase the electric energy and power following the expiration date of this contract, he has to notify the Seller no later than one month prior to the expiration of the term. In this case the parties are entitled to extend the contract for a new mutually agreed term by exchange of appropriate letters or by concluding a new contract.

8.3. Termination of the contract in the period of its effective term by one party is not admissible. The party wishing to terminate the sale or purchase of electric energy on the expiration date of the contract has to notify the other party no later than one month prior to this date.

9.Liability of the parties.

9.1.The parties assume commitment not to incur damage to the other party under scope of this contract.

9.2. In case of the failure of the Buyer to take the firm delivery of power based on the accounting balance of interchange power in the interconnected system, the amount not taken (up to 250 MW) is to be paid for by the Buyer on the basis of a price of 0,022 DM/kwhr based on the actual amount not taken, performed in accordance with Article 2 of this contract by DC Baltija.

9.3. In the event that the Seller's failure to supply in full or in part the required power (250 MW) causes the Buyer to experience spillage of storage reservoir on the hydrostations on the Daugava cascade below the normal headwater level (Plavina Hydro water level lower than 71.00 meters), the Seller is obligated to indemnify the Buyer for damage incurred due to the operation in the lower level, and the amount of

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damages shall be determined for each separate case. In case such failure to deliver in full or in part causes additional generation of electric energy on the Buyer's thermal stations, the Seller is obligated to indemnify the fuel component of the production costs for 1 kwhr in the condensing regime providing justifying accounts and confirmation by DC Baltija with regard to the start-up of the Buyer's thermal stations in the condensing regime with the indication of the amount of electric energy generated in such regime in the period of the Seller's failure to deliver power in full or in part. In addition the Buyer informs the Seller, by means of DC Baltija, immediately about the time of command to start-up of thermal unit in condense regime and the actual time of start-up of such equipment. In case such failure to deliver in full or in part has caused the Buyer to purchase electric energy from a third party for a tariff higher than 0.022 DM/kwhr, the Seller is obligated to indemnify the difference in the tariff.

9.4. The Buyer is obligated in due time and order prescribed in this contract to pay for the electric energy received from the Seller. For each delayed day the Buyer is obligated to pay a penalty in accordance with the provisions of Article 6.1. herein.

9.5. On all changes in the measurement system of electric energy, replacement of meters and recorded inaccuracies, and the work in auxiliary cuircits that may affect the accuracy of measurement, the parties are to inform each other immediately.

9.6. No remedies are applied in the cases prescribed in Article 9.2. and 9.3. in case the Seller or the Buyer have to perform emergency work or testing provided for the appropriate consent by the Seller, the Buyer or DC Baltija. This consent should be taken into account by developing short time operation regimes and submitting operational information to DC Baltija. No remedies are applied in the cases when such failure to deliver in full or in part is caused by the actions of a third party or by operational restrictions issued by DC Baltija, subject to approval by DC Baltija.

9.7. The requirements defined in Article 9.2 and 9.3 are not effective during the adjustment period (ending on January 31, 1993) under the new system of billing for the deviations from the firm delivery based on the accounting balance in the interconnected system (250 MW +/-10%).

10. Force Majeure.

10.1. The Seller and the Buyer are not responsible for the failure to supply or receive in full or in part the amount of the electric energy or power under this contract when such failure is caused by the Act of God (flooding, storm etc.) or civil disturbance (war actions, sabotage, blockade etc.) and in cases when such delivery is impossible due to decisions by legislative bodies or the governments of the parties in the contract.

10.2. The parties immediately shall notify each other on the occurrence of force majeure.

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11. Confidentiality.

11.1. The parties agree not to disclose to any third party without prior consent by the other party financial data related to the contract.

12. Dispute settlement and governing law.

12.1. All the matters under dispute arising in the course of execution of this contract, the parties shall try to settle amicably. In case it is impossible to resolve a matter amicably, the disputed matter shall be submitted to the authority considering business disputes in the country of the defendant.

12.2. In dispute settlement is applied the governing law of the country where dispute is considered.

13. Legal addresses and payment requisites of the parties.

Seller	Buyer
General director	General director
State enterprise	State enterprise
EESTI ENERGIA	LATVENERGO
Udo Lehtse	Jānis Pāvuls

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Commentary on the contract

Under the Soviet system of power interchange, payments were made for the delivery of energy but not for the guarantee of capacity. The concept of a capacity contract was therefore unfamiliar to power system officials when Estonia and Latvia became independent countries. This contract represents the first agreement among Baltic nations in which there is an explicit consideration of the amount of power in MW as well as the amount of energy in kWh. However, this is not really a capacity contract. This contract establishes a certain price level for the energy in kWh associated with the delivery of at least 225 MW and not more than 275 MW of power.

The contract does not specify whether this level of power in MW is an average over some time period (quarterly, monthly, daily, or hourly) or an instantaneous measurement. In May 1993 Eesti Energia sent a letter to the Baltija Dispatch Center declaring that the contract should be interpreted to require a delivery of 225 MW to 275 MW of power on an hourly average basis. Latvenergo did not accept this interpretation, and the dispute has not yet been resolved.

The concept of "firm delivery" does not involve the delivery of a specific amount of MW specified in the contract. The contract provides for "firm delivery" despite the fact that a level of firm capacity is not specified. In the Soviet system the concept of "firm delivery" meant that the quotas established by central planners must be fulfilled; in this case, the Seller must deliver the amounts of kWh and MW specified in instructions issued by the Baltija Dispatch Center.

It is understood that the contract will be administered in accordance with instructions from the Baltija Dispatch Center, which is not a party to the contract. The "accounting balance of interchange power in the interconnected system" is prepared by the Dispatch Center and is either (a) a monthly or daily plan showing planned power transfers or (b) an accounting record showing actual power transfers.

Charles Zimmermann
Manager, RCG/Hagler, Bailly, Inc.
May 14, 1993

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Appendix C.2

Description of the Multilateral Agreement for 1994

Multilateral Agreement on Parallel Operation
among the State Enterprise Eesti Energia,
State Joint Stock Company Latvenergo,
Lithuanian State Power System and Dispatch Center Baltija
on Parallel Operation of Estonian, Latvian, and Lithuanian Power Systems
for the Year 1994

Multilateral Agreement on Parallel Operation among the State Enterprise Eesti Energia, State Joint Stock Company Latvenergo, Lithuanian State Power System and Dispatch Center Baltija on Parallel Operation of Estonian, Latvian, and Lithuanian Power Systems for the Year 1994

The Agreement is made on 6 pages, and 6 Appendices are attached, namely:

1. Procedure of operational dispatch management
2. Schemes and operational regimes of the parallel operation
3. Relay protection and automatic devices
4. Planning and implementation of operational regimes
5. Terms of interchange of electric energy on the basis of bilateral agreements
6. Provision of information

The Agreement has the following chapters:

1. *General Provisions*, where it is determined that the agreement is effective upon its signing and remains effective until December 1994. The agreement shall be extended for the next year, unless any party issues a termination notice one month before the end of the term. It is also noted in the general provisions that disputes are resolved in the Arbitration in Stockholm at the Industry and Commerce Chamber according to the regulation of UNCITRAL.

2. *Terms of parallel operation.* It is defined in this chapter that the Baltic power systems have parallel operation with Interconnected Power System of Russia and Belarus. The agreement on parallel operation with Interconnected Power System of Russia and Belarus shall be concluded by DC Baltija, provided written approval by all the parties.

3. *Reliability of the parallel operation.* It is determined in this chapter that the reliability standards are based on the principles of securing reliability of the system when there is a loss of any element in the network or any generating unit (principle n-1).

4. *Planning of the operational regime.* It is described in this chapter that the planning of reserve of the active power is based on the share of each Baltic power system in covering the necessary amount of reserve in the Interconnected Baltic Power System. The methods of planning and implementation of operational regimes related to import/export balance of the active and reactive power, reserve or active power, planned outages in the network or in the power plants are described in detail in the Appendix 4.

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5. *Mutual economic relations.* It is explained in this chapter that mutual economic relations among Baltic power systems are based on the bilateral agreements on interchange of electric power and energy. Before signing, such bilateral agreements are submitted to DC Baltija for approval in the aspect of technical implementation capability of such agreements.

6. *Perspective planning of the Interconnected Baltic System.* It is said in this chapter that the parties agree on construction of new energy objects and reconstruction of old energy objects and management equipment affecting the operation regime of the Interconnected Baltic Power System in the period of validity of this agreement.

7. *Obligations of the parties.* It is agreed in this chapter that the parties should not by their uncoordinated actions incur damage to the other party, or lower the quality of the electric energy and reliability of energy supply.

8. *Rights of the parties.* It is defined in this chapter that parties are free to conclude agreements on interchange and transit of energy not only among themselves, but also with the third parties: to take part in the investigations of the accidents in the other power system, if such have affected normal operation and incurred damage to the other party; to claim to indemnify the incurred damage in case of default of the other party.

9. *Responsibility of the parties.* It is stated that the parties assume equal responsibility.

10. *Subject of the agreement.*

11. *Legal addresses of the parties.*

The agreement was signed in Riga in the premises of DC Baltija.

Appendix C.3

Draft Multilateral Agreement for 1994

Multilateral Agreement Among the State Enterprise Eesti Energia, State Enterprise Latvenergo, and Lithuanian State Power System on the Parallel Operation of the Power Systems of Estonia, Latvia, and Lithuania

MULTILATERAL AGREEMENT AMONG THE STATE ENTERPRISE EESTI ENERGIA, STATE ENTERPRISE LATVENERGO AND LITHUANIAN STATE POWER SYSTEM ON THE PARALLEL OPERATION OF THE POWER SYSTEMS OF ESTONIA, LATVIA AND LITHUANIA

The state enterprise ***Eesti Energia*** represented by the general director U. Lehtse acting on the basis of the charter of the state enterprise Eesti Energia, the state enterprise ***Latvenergo*** represented by the general director G.Koemecs acting on the charter of the state enterprise Latvenergo and ***Lithuanian State Power System*** represented by the general director B. Sirutis acting on the basis of the charter of the Lithuanian State Power System, hereinafter referred to as "the Parties", with the aim of providing a reliable power supply to the customers and implementing economically mutually beneficial supplies of electric power and energy, have concluded the multilateral agreement on the parallel operation of the Baltic interconnected power system.

1. General provisions

1.1. The present agreement has been made based on the agreement on parallel operation of the power system of the Republic of Latvia, the Republic of Estonia and the Republic of Lithuania signed on 07.01. 1992. by the Energy Ministers based on the government assignment of the respective countries.

1.2. The present agreement shall be the basic legal instrument governing the terms of parallel operation of the power systems in the Baltic Interconnected Power system and the obligations, rights and responsibilities of the Parties under this Agreement.

The agreement shall be effective upon its signing and the duration of the agreement is not limited.

1.3. The amendments and Appendices to the Agreement may be performed by mutual agreement among the Parties.

1.4. The Agreement may be terminated in the following cases:

- by mutual consent of the Parties.
- by a notice of any Party one year prior the termination of the parallel operation in the Baltic Interconnected Power System.

1.5. The highest body empowered to decide the cardinal issues related to the parallel operation of the Baltic power systems shall be the Council of the Baltic Interconnected Power System.

2. *Terms of parallel operation*

2.1. The parallel operation of the Estonian, Latvian and Lithuanian power systems shall be carried out through existing and planned intersystem transmission lines of 330 kV and, if it is technically acceptable and economically feasible, through 110 kV lines.

2.2. The detailed schemes of parallel interconnection for the characteristic seasons of the year shall be prepared by the Dispatch Center Baltija taking into account the actual regimes and the planned repair subject to be coordinated among the Parties.

2.3. The Baltic Interconnected Power System shall normally operate in parallel with the Single Power Grid (of the former USSR) and the Belarus Interconnected Power system. The Central Dispatch Center of the Single Power Grid shall provide frequency control, but the Baltic power system shall provide the control over the accounting energy balance specified by the Dispatch Center Baltija .

2.4. The following deviations from the normal operational regime are accepted:

> *2.4.1.* Parallel operational regime with the Single Power Grid only through one interconnection: either Estonian power system - North West Single Power Grid or Lithuanian power system - Belarus Interconnected power system.
>
> *2.4.2.* The operation regime providing for a split within the Baltic Interconnected system, preserving the parallel operation of its separate parts with the North West Single Power Grid and the Belarus Interconnected power system.
>
> *2.4.3.* The operational regime providing insulation of the Baltic Interconnected system from the Single Power Grid and the Belorus Interconnected power system but preserving the parallel operation with Pskovenergo and Kaliningradenergo.

2.5. The operational regimes stated above, as a rule, should not be long lasting and should be filed in the form of claim subject to be agreed upon among the Parties.

2.6. The agreements on the parallel operation with the Single Power Grid and the Belarus Interconnected power system based on the assignment by the Parties are concluded by the Dispatch Center Baltija and the Central dispatch center of the Single Power Grid and the Dispatch Center of the Belarus Interconnected power system.

3. *Reliability of parallel operation*

3.1. The reliability of the parallel operation among the Parties is provided by meeting the adopted reliability standards and by coordinating the actions affecting the operation of the other Parties through Dispatch Center Baltija.

3.2. The Parties have agreed to put as the basis for the reliability standards the principle accepted by NORDEL and UCPTE to provide reliability in the situation of loss of any element in the network or loss of any generating unit. (principle N-1)

3.3. The principles of operation of existing and planned relay protection devices, regime and anti-accident automatic devices affecting the parallel operation of the Baltic Interconnected Power System and the choice in selection of such devices shall be carried out by the Parties in cooperation with the Dispatch Center Baltija in accordance with the Appendix 2.

3.4. If an emergency situation occurs in the Baltic Interconnected System affecting the interests of several Parties, the liquidation of such emergency situation shall be performed under the guidance and coordination of the chief operator of the Dispatcher Center Baltija.

3.5. The investigation of the accidents affecting the interests of several Parties shall be carried out by the Parties concerned with the participation of the Dispatch Center Baltija, and if it is necessary, with the Central Dispatch Center of the Single Power Grid and with the Belarus Interconnected power system.

3.6. If the members of the commission performing the investigation cannot agree on the common decision, the issue shall be considered by the Energy Council of the Baltic Interconnected Power System.

4. *Planning of active capacity reserve*

4.1. The reserve is necessary for the following purposes:

> ***4.1.1.*** To cover the consumption in cases of a deviation from the projected consumption. In addition, this reserve must be computed for the increased active load in power stations in the peak hours and for the decrease of the active load in the off-peak hours. The amount of this reserve must be within 3-5% of the consumption. The utilization of this reserve (spinning) could be on the hydro station and on hydro pump storage station (to 7 minutes) and in thermal station (up to 30 minutes) by altering the load of the switched -in equipment.
>
> ***4.1.2.*** To cover the loss of generation capacity in the result of the emergency outage of equipment in the power stations.

In this case of instantaneous black-out of the equipment, the reserve from the Single Power Grid is automatically utilized (by means of altering the external energy balance of the Baltic Interconnected Power System) with the subsequent utilization of the spinning reserve on the hydro station, pump storage power stations and thermal and heat power station.

If the decreased generating capacity cannot be covered with the spinning reserve of the Baltic Interconnected Power System and the agreed reserve from the Single Power Grid , by the order from the Dispatch Center Baltija and provided approval from the Parties the rest of the reserve equipment is utilized (cold reserve).

4.2. The amount of spinning reserve for each power system is planned by the Dispatch Center Baltija for a week with the adjustments for each day.

The amount of the spinning reserve with the consideration of the effect of the anti-accident equipment should make it possibile to continue with the parallel operation without reliability violation and without an inadmissible overloading of the network equipment.

4.3. During the start-up of the cold reserve, if necessary, by the direction from Dispatch Center Baltija and accident disconnection and restrictions on consumers in accordance with the Regulation on the emergency disconnection and restriction on the consumers in the Baltic Interconnected Power System provided parallel operation with the Single Power Grid.

4.4. The indemnification of the economic damage incurred to one Party caused by the utilization of any sort of reserve due to the emergency event in the power system of another Party shall be resolved in each separate case by the Parties involved based on the data presented by the power systems and the Dispatch Center Baltija.

4.5. In addition to the above mentioned types of reserves, the instantaneous reserve shall be available: this reserve shall be utilized automatically by regulating the speed of revolutions on hydro units and turbines at the decreased frequencies.

The amount and the speed of utilization of this reserve depends on the tuning of the revolution regulatory device (static, sensibility) and the parameters of the boilers.

5. Economic relations among power systems, and the provision of mutual supplies of electric power and energy.

5.1. The economic relations among the power systems are based on the bilateral agreements and monthly supply contracts of the electric energy products and should not contradict to the provisions of the present agreement.

5.2. The power systems shall provide the Dispatch Center Baltija in due time with the all contractual and operational documentation necessary for planning and operational regimes.

5.3. Dispatch Center Baltija shall provide the operational regime based on the adopted monthly contracts, bilateral agreements and the provisions of this agreement.

5.4. Dispatch Center Baltija shall regularly inform the power systems on the results of the performance under the contracts for the preceding period and on the prospects of future performance.

5.5. Should there be considerable deviations from the amounts defined by the contracts, the Dispatch Center Baltija shall arrange spot and emergency supplies and shall decide on the changes in the operational regime in coordination with the power systems affected by such changes.

6. The procedure of execution of bilateral Agreements among the Baltic power systems and adjoining power systems on mutual supply or wheeling of electric power and energy.

6.1. The subject of the Agreement and the list of agreement documents.

6.1.1. The subject of the agreement concerning the supply of energy products may be:

- supply of electric energy,
- supply of electric capacity,
- wheeling of electric energy,
- supply (compensation) of reactive energy,
- capacity reserve,
- fuel supply.

6.1.2. The contracting parties depending of the needs in the given types of energy products may conclude agreements between the Parties on all or part of the products described in the Approximate Mutual Supplies of Energy Products for a Year with the Allocation in Quarters.

6.1.3. The annual supplies are adjusted every month, in amount and in terms, by preparing Monthly Commercial Contracts thereof.

6.1.4. In addition to the monthly contracts short term additional and emergency energy or capacity supplies may be performed on terms other than in the monthly contracts.

6.1.5. Any of the contracting parties (power systems) may act as an agent in execution of the "direct" contracts between separate companies within respective country (buyers) and the companies in another country (suppliers) provided that the payment for the supplied products is any of the above energy products. Such transactions should be taken into account into monthly or spot contracts.

6.2. The procedure and term to prepare contract documents.

6.2.1. The agreement "On Approximate Mutual Supplies of Energy Products for a Year" must be prepared, agreed upon with the Dispatch Center Baltija, and signed no later than a month before its effective date.

6.2.2. The monthly commercial contracts must be signed no later than 3 days before the beginning of the month.

Data on monthly contracts are to be submitted to the Dispatch Center Baltija no later than 10 days before the beginning of the month.

The Dispatch Center Baltija shall present its considerations concerning contracts to the power systems no later than 5 days before the beginning of the month.

The monthly contracts with external suppliers (or buyers) must be coordinated with the Central Russian Dispatch Center of the Single Power Grid.

6.2.3. If the tariffs change for the supplied products the Party initiating the changes is obligated to notify in writing the other party no later than 15 days prior the effective date of the changes.

6.3. The basic requirements to the content of the bilateral agreements and commercial contracts.

6.3.1. The amount and the terms of supplies are to be determined based on the natural energy flows and not in contradiction to the separate provisions of this agreement; only such terms can be accepted which are subject to operational control, based on the existing technical informational level.

6.3.2. The basic content of bilateral agreement must be available to the employees of the Parties and the Dispatch Center Baltija, providing performance of these Agreements.

6.3.3. The monthly contracts must contain the list the equipment utilized in cases of emergency and the price of electric energy generated using such equipment. The Dispatch Center Baltija, if necessary, shall provide emergency supplies based on the presented data. The data concerning the tariffs on emergency supplies cannot be deemed to be commercial secret.

6.3.4. The agreement should state the location and commercial metering devices of electric power and energy, billing procedure, force majeure, indemnification of losses, responsibilities of the Parties, arbitration, term and terms of the agreement.

6.4. All the bilateral agreements and contracts must be subject to the expertise by the Dispatch Center Baltija, but agreements with the power systems in Russia and Belarus must be coordinated with the Central Dispatch Center of Russia of the Single Power Grid.

7. Schedule of equipment repair in the generating stations and in the network.

7.1. The Parties agree to coordinate the schedule of equipment repair in the stations and in the portion of the network under operational management of the Dispatch Center Baltija for every calendar month and every year.

The coordination of the proposals submitted by the Parties concerning the repair of equipment in the stations and network shall be performed by the Dispatch Center Baltija'shall forward the schedules coordinated with the Parties to the concerned Parties.

7.2. The Parties present their proposal concerning the monthly schedules of repair until 20 day of the respective month, but annual schedules of equipment in the stations until August 1 and concerning the network equipment - until November 1.

The Dispatch Center Baltija shall inform about the coordinated with the Parties repair schedules to the concerned Parties in five day term concerning monthly repair schedules and in a month term - concerning annual schedules.

8. Perspective planning in the Baltic Interconnected Power System.

8.1. The parties agree to undertake coordinated actions regarding the construction of energy objects and the installation of automatic devices affecting the operation of the Baltic Interconnected Power System.

8.2. The Party intending to construct energy object or devices affecting the operation of the Baltic Interconnected Power System shall inform the other parties thereof and the Dispatch Center Baltija at the meeting of the Energy Council of the Baltic Interconnected Power System.

8.3. The Parties agree if necessary form working groups for specific cases to consider and coordinate issues of perspective planning among the Parties.

The working groups shall be formed by the representatives form the Parties concerned and the Dispatch Center Baltija and are approved by the Energy Council of the Baltic Interconnected Power System.

9. *System of operational power system dispatching in the Baltic Interconnected Power System*

9.1. All technical, economic and organizational matters of operational dispatching are solved independently by the Parties within the respective power systems.

9.2. The overall operational dispatching of the Baltic Interconnected Power System with consideration of the parallel operation with the Single Power Grid and the Belarus Power system and other countries is assigned to be performed by the Dispatch center Baltija pursuant to the Articles of Association of the Dispatch Center Baltija and other governing regulations.

9.3. Operational and dispatching interrelations with Central Dispatch Center of the Single Power Grid and dispatch Center of the Belarus Interconnected System are determined in the Agreement on parallel operation with the Single Power Grid and the Belarus Interconnected System . The Dispatch Center Baltija concludes the above agreement with the Central Dispatch Center of the Single Power Grid and dispatch Center of the Belarus Interconnected System.

10. Obligations of the Parties

10.1. The power systems operated within the Baltic Interconnected Power System and tied up with the unified technological process of generation and distribution of electric energy may not by their uncoordinated actions incur damage to other power systems, decrease the quality of electric energy and reliability of the energy supply, to jeopardize the stability of the parallel operation of the Baltic Interconnected Power System in general.

10.2. To perform the load schedule for power stations and consumers specified by the Dispatch Center Baltija, based on the data presented by the power systems.

10.3. To provide the mutual supplies of electric power and energy in accordance with the annual agreements, monthly contracts and spot transactions and wheeling of electric energy of other countries within technical limits.

10.4. To provide reliable operation of the transmission lines of mutual energy interchange pursuant to the established service borders and the relay protection devices, operational and anti-accident automatic equipment, communication means and telemechanic means of intersystem importance.

10.5. To install new devices of relay protection operational and anti-accident automatic equipment, communication means and telemechanic means of intersystem importance by mutual agreement with Dispatch Center Baltija and the Parties.

10.6. To follow instructions by the Dispatch Center Baltija concerning the restriction and disconnection of electric power and energy in cases of power and energy deficit in accordance with the regulations on the emergency disconnection and restriction on the consumers in the Baltic Interconnected Power System.

10.7. To present the following information to the Dispatch Center Baltija necessary to provide planning and reliability and efficient operational regime of the Baltic power systems and the Baltic Interconnected Power System in general.

10.7.1. Proposals on annual, quarterly, monthly energy balance of power and energy.

10.7.2. Repair schedules for station and network equipment for every year and every month being under operational management of the Dispatch Center Baltija.

10.7.3. To inform the Dispatch Center Baltija and if necessary to the other Party teleinformation on the operation regime of the main network and power stations.

The list of transferred teleinformation shall be mutually agreed upon.

10.7.4. To provide functioning of communication means used by the Dispatch Center Baltija to conduct operational comunication with the power systems.

10.7.5. To cover the costs of the operation of the Dispatch Center Baltija in accordance with the present Agreement based on the budget approved by the energy council of the Baltic Interconnected Power System allocated equally among three Parties.

11. Rights of the parties

11.1. To conclude bilateral agreements and contracts on the sale and purchase of electric power and energy among themselves and other Parties.

11.2. Based on mutual agreements among the Parties, to set the terms for transit of electric power and energy.

11.3. Based on the agreements with the Dispatch Center Baltija and the other Party, to change the monthly contracts on delivery of electric power and energy.

11.4. To set tariffs for the delivered electric power and energy.

11.5. To apply to the Dispatch Center Baltija to make the necessary system calculations which are possible to be made only with the data on the closed circuits of the power system.

11.6. To participate in the investigation of the accidents or another power systems provided that this accident has caused violations in the normal operation and incurred damage to this power system.

12. Responsibility

12.1. To perform the obligations defined in the clause 11.

12.2. For the damage incurred to the other party by its actions.

12.3. To perform the contracts between the Parties and with the Dispatch Center Baltija

12.4. For performance of the resolution by the Energy council of the Baltic Interconnected Power System.

12.5. Disputes arising with regard to the present agreement must be solved by the energy Council of the Baltic Interconnected Power System.

13. Operation of the Dispatch Center Baltija

13.1. The Parties in this agreement have stated the obligations, rights and responsibility of Dispatch Center Baltija in accordance with Appendix 1, subject to the agreement of the Dispatch Center Baltija.

14. Legal addresses of the Parties.

Appendix A.1

Seminar Agendas and Lists of Participants

This appendix contains the agenda and the list of participants for each of the following seminars:

- November 19 - 20, 1992
- December 9 - 10, 1992
- February 17 - 18, 1993
- May 12 - 13, 1993
- November 15 - 16, 1993

These seminars span a one-year period, but the working group was active over a longer period. The initial meeting of the working group was held on October 14 and 15, 1992. The multilateral agreement based on these seminars was signed at the Baltija Dispatch Center on April 5, 1994.

Seminar on Reactive Power, Reserve Capacity, and Alternative Methods of Determining Electricity Prices in Wholesale Markets

Agenda

Location: Dispatch Center Baltija, 1 Shmeria str., Riga, Latvia

Date: Thursday, November 19 and Friday, November 20, 1992

Countries involved: Estonia, Latvia, Lithuania

<u>Agenda for November 19, 1992</u>

9:30	Registration of participants
10:00	Introductory remarks by Vilnis Kreslinsh, director of DC Baltija.
10:30	Presentation by Juri Pervushin (DC Baltija) on reactive power compensation in the Baltic power systems in 1992.
11:00	Presentation by William Dunn (RCG/Hagler, Bailly, Inc.) on consumption of excess reactive power.
11:30	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals regarding excess reactive power.
13:30	Lunch
15:00	Presentation by Metcheslav Vonsovich (DC Baltija) on the present situation with regard to availability of reserve capacity. Identification of issues to be resolved.
15:20	Presentation by William Dunn (RCG/Hagler, Bailly, Inc.) on measurement of reserve capacity and definition of reserve obligations in the New England Power Pool and in the Nordel system.
17:05	Break
17:20	Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals for measurement of reserve capacity and definition of reserve capacity obligations.

Agenda for November 20, 1992

9:30	Meeting of the working group
10:00	Discussion led by Metchesiav Vonsovich (DC Baltija) of proposals for measurement of reserve capacity and definition of reserve capacity obligations. (continued)
11:00	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on alternative methods of determining electricity prices in wholesale markets.
13:30	Lunch
14:20	Discussion led by Metchesiav Vonsovich (DC Baltija) on alternative methods of determining electricity prices in wholesale markets.
16:00	Closing remarks by Vilnis Kreslinsh (DC Baltija), Charles Zimmermann (RCG/Hagler, Bailly, Inc.), William Dunn (ECC, Inc.)

Seminar on Reactive Power, Reserve Capacity, and Alternative Methods of Determining Electricity Prices in Wholesale Markets

Riga, Latvia
November 19-20, 1992

List of Participants

USA

Charles F. Zimmermann	RCG/Hagler, Bailly, Inc., Manager
William Dunn	ECC, Inc., Principal Consultant

DISPATCH CENTER BALTIJA

Vilnis Kreslinsh	Director of Dispatch Center Baltija
Metcheslav Vonsovich	Chief Engineer of Dispatch Center Baltija
Juri Pervushin	Deputy Chief of Grid Network Planning
Janis Ositis	Chief of Dispatch Department
Karl Brinkis	Chief of Relay Protection and Grid Network Planning
Tatiana Ovsjukova	Chief Specialist

ESTONIA

Valerij Peterson	Chief of Dispatch Department of Eesti Energia
Joulo Mejbaum	Deputy Chief of Dispatch Department of Eesti Energia
Mikel Viese	Control Engineer of Dispatch Department of Eesti Energia

LATVIA

A. Berzinsh	Ministry of Industry and Energy
Leons Marcinkus	Chief of Economics Department of Latvenergo
Eduards Rozental	Chief of Dispatch Department of Latvenergo
Peteris Klavinsh	Chief of Planning Department of Energocontrol Division of Latvenergo

LITHUANIA

Ada Maceziskiene	Ministry of Energy
Janas Balinskis	Deputy Director of LSPS
Gedeminas Volskis	Chief of Economic Department of LSPS
Augustinas Kiselius	Deputy Chief of Dispatch Department of LSPS

Seminar on Electric Transmission Pricing,
Time of Use Rates, and Capacity Payments

Agenda

Location: Dispatch Center Baltija, 1 Shmeria str., Riga, Latvia

Date: Wednesday, December 9, and Thursday, December 10, 1992

Countries involved: Estonia, Latvia, Lithuania

Agenda for December 9, 1992

10:00 Introductory remarks by Vilnis Kreslinsh, director of DC Baltija.

10:15 Presentation by Metcheslav Vonsovich (DC Baltija) on existing agreements to provide wheeling service and existing methods of payment for wheeling service.

10:45 Presentation by Mark Lively (RCG/Hagler, Bailly, Inc.) on determination of the appropriate percentage charge to be used to pay for transmission service.

12:15 Discussion led by Metcheslav Vonsovich (DC Baltija) of proposals regarding the percentage charge to be used to pay for transmission service.

13:30 Lunch

14:30 Presentation by Metcheslav Vonsovich (DC Baltija) on existing proposals to establish time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transactions among the Baltic countries.

15:00 Presentation by Mark Lively (RCG/Hagler, Bailly, Inc.) on the potential benefits and methods of implementing time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transaction.

17:00 Discussion led by Metcheslav Vonsovich (DC Baltija) on proposals to establish time of use rates, day/night rate differentials, and seasonal rate differentials in wholesale power transactions.

Agenda for December 10, 1992

10:00	Presentation by Metcheslav Vonsovich (DC Baltija) on the present situation with regard to capacity agreements and capacity payments.
10:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on alternative types of capacity obligations and alternative methods of computing the level of capacity payments.
12:30	Discussion led by Metcheslav Vonsovich (DC Baltija) on capacity obligations and methods of computing capacity payments.
13:30	Lunch
14:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on legislative aspects in contracting in power companies experience.
15:30	Discussion led by Metcheslav Vonsovich (DC Baltija) contracting on legislative uses in power.
16:30	Closing remarks by Vilnis Kreslinsh (DC Baltija).

Seminar on Electric Transmission Pricing,
Time of Use Rates, and Capacity Payments

Riga, Latvia
December 9-10, 1992

List of Participants

USA

Charles F. Zimmermann	RCG/Hagler, Bailly, Inc., Manager
Mark Lively	

DISPATCH CENTER BALTIJA

Vilnis Kreslinsh	Director of Dispatch Center Baltija
Metchesiav Vonsovich	Chief Engineer of Dispatch Center Baltija
Joury Pervoushin	Deputy Chief of Grid Network Planning
Janis Ositis	Chief of Dispatch Department
Tatiana Ovsjukova	Chief Specialist

ESTONIA

Joulo Mejbaum	Deputy Chief of Dispatch Department of Eesti Energia
Mikel Viese	Control Engineer of Dispatch Department of Eesti Energia
Teeju Kaare	Principal Solicitor Eesti Energia

LATVIA

A. Berzinsh	Ministry of Industry and Energy
Leons Marcinkus	Chief of Economics Department of Latvenergo
Eduards Rozental	Chief of Dispatch Department of Latvenergo
Maris Elksnis	Control Engineer of Latvenergo
Valdis Gintars	Chief Engineer of Energocontrol
Peteris Klavinsh	Chief of Planning Department of Energocontrol Division of Latvenergo

LITHUANIA

Rimas Shukis	Ministry of Energy
Mindaugas Krakauskas	Kaunas Energy Institute (for Ministry of Energy)
Janis Mirauskis	Economic Department of LSPS
Augustinas Kiselius	Deputy Chief of Dispatch Department of LSPS

Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures

Agenda

Location: Dispatch Center Baltija, 1 Shmeria str., Riga, Latvia

Date: Wednesday, February 17 and Thursday, February 18, 1993

Countries involved: Estonia, Latvia, Lithuania

Agenda for Wednesday, February 17, 1993

10:00	Introductory remarks by Vilnis Kreslinsh
10:15	Presentation by Metcheslav Vonsovich (DC Baltija) on existing power stations in the Baltic countries and the outlook for their utilization through the year 2000
10:45	Discussion of existing power stations in the Baltic countries and the outlook for their utilization over the next five years
11:00	Presentation by Vilnis Kreslinsh (DC Baltija) on possible ways to organize a Baltic ring and on interconnection to UCPTE
11:30	Discussion led by Vilnis Kreslinsh (DC Baltija) on proposals regarding power station utilization through 2000 and on possible ways to reconstruct older units
13:30	Lunch
14:30	Presentation by Robert Stein (Central Vermont Public Service Corporation) on benefits and disadvantages of capacity contracts and joint ventures
16:00	Discussion led by Vilnis Kreslinsh (DC Baltija) on benefits and disadvantages of capacity contracts and joint ventures

Seminar on Interchange Agreements, Capacity Contracts, and Joint Ventures

Agenda (continued)

Agenda for Thursday, February 19, 1993

9:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly, Inc.) on measurement of costs associated with energy charges, sharing of fixed costs, joint ventures, and capacity contracts
12:00	Discussion led by Vilnis Kreslinsh (DC Baltija) of measurement of costs associated with energy charges, sharing of fixed costs, joint ventures, and capacity contracts
13:30	Lunch
14:30	Presentation by Joury Pervoushin (DC Baltija) on U.S. electric power transactions and regulatory framework; description of the information found in publications provided by RCG/Hagler, Bailly, Inc. at the 1992 seminars
15:30	Closing remarks by Vilnis Kreslinsh (DC Baltija)

Seminar on Interchange Agreements,
Capacity Contracts, and Joint Ventures

Riga, Latvia
February 17-18, 1993

List of Participants

UNITED STATES

Charles F. Zimmermann	Manager, RCG/Hagler, Bailly, Inc. 1530 Wilson Boulevard, Suite 900 Arlington, VA 22209-2406 tel: 1 703 351 0300 fax: 1 703 351 0342
Robert de R. Stein	Vice President, Energy Supply Planning and Engineering Central Vermont Public Service Corporation 77 Grove Street, Rutland, VT 05701 tel: 1 802 747 5552 fax: 1 802 747 2198
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Teeju Kaare*	Principal Solicitor Eesti Energia

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Augustinas Kiselius	Chief of Dispatch Department Lithuanian State Power System tel: 70122 699443 fax: 70122 753271
Gediminas Volskis*	Chief of Economics Department Lithuanian State Power System tel: 70122 777436 fax: 70122 753271

* These individuals made plans to attend but cancelled these plans just before the seminar. In addition Juris Ozolinsh was invited to represent the Ministry of Industry and Energy but he left his job at the Ministry to begin work in a firm named LEA.

Seminar on Power Sales Agreements and Reliability Agreements

Agenda

Location: Dispatch Center Baltija, 1 Shmerla Street, Riga, Latvia

Date: Wednesday, May 12 and Thursday, May 13, 1993

Countries involved: Estonia, Latvia, Lithuania

Agenda for Wednesday, May 12, 1993

10:00	Introductory remarks by Vilnis Kreslinsh (Dispatch Center Baltija)
10:15	Presentation by Metcheslav Vonsovich (DC Baltija) on existing methods of assuring power system reliability in the Baltic countries and on the need to establish reliability standards
12:15	Presentation by Joury Pervoushin (DC Baltija) on common reliability measures needed to implement reliability agreements
13:30	Lunch
14:30	Presentation by Charles Zimmermann (RCG/Hagler Bailly Inc.) on the experience of U.S. power pools regarding agreements to establish reliability standards, and on the relationship between these agreements and power sales agreements
16:00	Discussion led by Vilnis Kreslinsh (DC Baltija) on agreements to establish reliability standards and on the relationship between these agreements and power sales agreements

Seminar on Power Sales Agreements and Reliability Agreements

Agenda (continued)

Agenda for Thursday, May 13, 1993

10:00	Presentation by Metcheslav Vonsovich (DC Baltija) on the existing situation concerning bilateral and multilateral power sales agreements for the Baltic region
11:00	Presentation by Charles Zimmermann (RCG/Hagler Bailly) on alternative types of multilateral power sales agreements that could be used among the Baltic countries
12:00	Discussion led by Vilnis Kreslinsh (DC Baltija) to identify the type of multilateral power sales agreement best suited to the Baltic countries
13:30	Lunch
14:30	Presentation by Charles Zimmermann (RCG/Hagler Bailly) on the responsibilities and activities of the Federal Energy Regulatory Commission and the National Association of Regulatory Utility Commissioners
16:30	Concluding remarks by Vilnis Kreslinsh (DC Baltija)

Seminar on Power Sales Agreements
and Reliability Agreements

Riga, Latvia
May 12-13, 1993

List of Participants

USA

Charles Zimmermann	Manager RCG/Hagler Bailly, Inc. 1530 Wilson Boulevard, Suite 900 Arlington, VA 22209

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Seminar on Power Sales Agreements
and Reliability Agreements

Riga, Latvia
May 12-13, 1993

List of Participants (continued)

Latvia

Aleksandr Osh	Chief of Energy Department Ministry of Industry and Energy
Gunar Berzinsh	Ministry of Industry and Energy
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Lithuania

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Rimas Shukis	Ministry of Energy
Augustinas Kiselius	Chief of Dispatch Department Lithuanian State Power System 13 Juozapaviciaus Street 2600 Vilnius, Lithuania tel: 3702 699443 fax: 3702 753271

Seminar on Liability Clauses and Direct Demand Side Management Programs

Agenda

Location: Dispatch Center Baltija, 1 Shmeria Street, Riga, Latvia

Date: Monday, November 15 and Tuesday, November 16, 1993

Countries involved: Estonia, Latvia, Lithuania

Agenda for Monday, November 15, 1993

12:00	Introductory remarks by Vilnis Kreslinsh (Dispatch Center Baltija)
12:05	Introductory remarks by Robert Archer (AID)
12:15	Presentation by Metcheslav Vonsovich (Dispatch Center Baltija) on the status of the draft multilateral agreement and other electric power agreements involving the Baltic countries. Review of power purchase contracts and pricing over the last year.
13:00	Discussion led by Vilnis Kreslinsh (DC Baltija) of the draft multilateral agreement and possible improvements that might be made in other agreements
14:00	Lunch
15:00	Presentation by Metchislav Vonsovich (DC Baltija) on the existing situation in Eesti Energia, Latvenergo and the Lithuanian State Power System concerning possible damages and the payment of damages
16:00	Baltic power systems' comments on the presentation by Metchislav Vonsovich
16:30	Presentation by Charles Zimmermann (RCG/Hagler, Bailly) on U.S. experience with liability and penalties for non-performance in agreements among power systems, and on penalties and incentives in power sales contracts involving independent power producers. Comments by Thomas Kennedy (NERC) on these issues.
17:00	Discussion led by Vilnis Kreslinsh (DC Baltija) on penalties and incentives in agreements among power systems and in power sales contracts involving independent power producers
18:00	Closing remarks by Vilnis Kreslinsh

Agenda for Tuesday, November 16, 1993

9:00	Presentation by Thomas Kennedy (NERC) on the organization and operations of NERC and the Electric Power Research Institute (EPRI)
9:45	Presentation by Thomas Kennedy (NERC) on North American experience with Interruptible Demand programs. Description of the ability of different types of industries to participate in interruptible demand programs. Methods of encouraging customer participation and enforcing customer compliance with the terms of interruptible service contracts.
10:30	Discussion led by Vilnis Kreslinsh (DC Baltija) of the potential utilization of North American experience with interruptible demand
12:45	Presentation by Augustinas Kiselius (LSPS) on the results of the November 10-12 seminar on "Restructuring of the Lithuanian Energy Sector"
13:00	Lunch
14:00	Presentation by Thomas Kennedy (NERC) and Charles Zimmermann (RCG/Hagler Bailly) on the definition of DSM and an introduction to U.S. DSM programs
14:15	Presentation by Virginijus Buciunas (Nega Watt) on the status of Demand Side Management programs in Lithuania
14:45	Discussion led by Vilnis Kreslinsh (DC Baltija) of the potential utilization of North American and Lithuanian experience with DSM programs
15:15	Presentation by Vilnis Kreslinsh (DC Baltija) of the results of U.S.-Baltic technical cooperation on electricity contracting and pricing and the need for further technical cooperation in the electric power sector
16:15	Concluding remarks by Vilnis Kreslinsh (DC Baltija)

Seminar on Liability Clauses and
Direct Demand Side Management Programs

Riga, Latvia
November 15-16, 1993

List of Participants

USA

Charles Zimmermann	Manager RCG/Hagler Bailly, Inc. 1530 Wilson Boulevard, Suite 900 Arlington, VA 22209
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Baudouin de Marcken	Representative Agency for International Development Republikas laukums 2, Room 1411 Riga, Latvia tel: 3718 830068 fax: 3718 830067
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Dispatch Center Baltija

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Estonia

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Latvia

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World Bank

Dominique Lallement	Chief. EC4IN The World Bank 1818 H Street NW Washington DC 20433

Appendix A.2

List of Reports and Papers Presented

Three bound reports, corresponding to the first three seminars, were prepared under this task:

- Proceedings of a seminar on reactive power, reserve capacity, and alternative methods of determining electricity prices in wholesale markets, Riga, Latvia, November 19-20, 1992.

- Proceedings of a seminar on electric transmission pricing, time of use rates, and capacity payments, Riga, Latvia, December 9-10, 1992.

- Proceedings of a seminar on interchange agreements, capacity contract, and joint ventures, Riga, Latvia, February 17-18, 1993.

U.S. participants presented papers at these seminars and at the November 1993 seminar. A large number of documents was distributed at the May 1993 seminar but papers were not presented.

- Papers presented at the November 19-20, 1992 seminar:

  -- William H. Dunn, Jr. "Consumption of Excess Reactive Power."

  -- William H. Dunn, Jr. "Measurement of Reserve Capacity and Definition of Reserve Obligations."

  -- Charles F. Zimmermann. "Alternative Methods of Determining Electricity Prices in Wholesale Markets." (This presentation was translated into Russian.)

- Papers presented at the December 9-10, 1992 seminar:

  -- Mark B. Lively, "Determining the Appropriate Charge for Transmission services in the Baltic Countries."

- -- Mark B. Lively, "Potential Benefits and Methods for Implementing Time of Use Rates for Wholesale Power Transactions in the Baltic Countries."

- -- Mark B. Lively, "Dynamic Pricing for Wholesale Power Transactions in the Baltic Countries."

- -- Charles F. Zimmermann, "Alternative Types of Capacity Obligations and Methods of Computing Capacity Payments."

- -- Charles F. Zimmermann, "Initial Draft of an Interconnection Agreement." (This was translated into Russian and submitted by the Baltija Dispatch Center to the Baltic Energy Council in December 1992. This initial draft provided a point of departure for negotiations which ultimately led to the signing of the April 5, 1994 interconnection agreement.)

- Papers presented at the February 17-18, 1993 seminar:

  - -- Robert Stein, "Benefits and Disadvantages of Capacity Contracts and Joint Ventures."

  - -- Charles F. Zimmermann, "Measurements of Costs Associated with Energy Charges, Sharing of Fixed Costs, Joint Ventures, and Capacity Contracts."

- Paper presented at the November 1993 seminar:

  - -- Thomas Kennedy, "Interruptible Load Management." (This document was translated into Russian.)

These reports and papers supplement the report of the May 1992 seminar at the Baltija Dispatch Center, which was funded separately under the Emergency Energy Program for Eastern and Central Europe. Papers were presented by William H. Dunn, Jr., David A. Keith, and Charles F. Zimmermann. For information on this seminar, see:

- Proceedings of a seminar on international power pricing, Riga, Latvia, May 27-28, 1992.

Appendix A.3

List of Sample Contracts Distributed

- Contracts distributed at the November 19-20, 1992 seminar:

  -- Interconnection Agreement between Hydro Quebec and NEPOOL. 1982 draft. This agreement was translated into Russian: the original is in French and English. The English version is found in Annex G of Diane C. Minogue, *A Review of International Power Sales Agreements* (The World Bank Industry and Energy Department, Energy Series Paper No. 42, August 1991), which was distributed at the February 1993 seminar.

  -- Filing with FERC by American Electric Power Service Corporation with respect to an interconnection agreement between Appalachian Power Company and Virginia Electric and Power Company. Modification No. 19, filed on October 22, 1982.

     This was used to provide an example of a short-term contract for the sale of capacity and energy, with a calculation of the capacity charge.

  -- Interchange Agreement between Union Electric Company and Kansas City Power & Light Company. November 1, 1967

  -- ENEREX partnership agreement. January 1, 1984. (This agreement was translated into Russian.)

     This agreement was used to provide a simple example of a multilateral agreement among power companies. The document is much shorter than the NEPOOL agreement. It establishes ownership shares and a system of payments for the ENEREX Power Pool, which is located in Iowa.

  -- ENEREX interconnection agreement. January 1, 1984. (This agreement was translated into Russian).

This agreement covers details of the operation of the ENEREX Power Pool.

-- Rate schedule filing with the Federal Energy Regulatory Commission (FERC) relating to amendments of the July 9, 1970 Interconnection Agreement between Carolina Power and Light Company and Virginia Electric and Power Company. Filed on October 18, 1979.

- Contracts distributed at the February 17-18, 1993 seminar:

  -- Contract between Public Service Company of New Hampshire and Central Vermont Public Service Corporation for the sale of capacity and energy from the Newington generating unit. December 1, 1991.

     This was used to provide an example of a simple short-term contract. The attachments include a calculation of capacity cost.

  -- Agreement between Central Vermont Public Service Corporation and Bonneville Pacific Corporation for the sale of capacity and energy from the Sheldon Springs Project, Unit 1. November 15, 1989.

     This was used to provide an example of a contract for power supplied by a bank-financed independent power plant. The Sheldon Springs Project is a combined cycle generating facility.

  -- Sharing Agreement for Millstone Unit 3 (Sharing Agreement for the "Connecticut Nuclear Unit"). September 1, 1979.

     This was used to provide a sample contract for a joint ownership arrangement. It is an agreement among several New England utilities for the sharing of a proposed nuclear unit.

  -- Energy contract between Hydro Quebec and NEPOOL. Included in Annex E of Diane C. Minogue, *A Review of International Power Sales Agreements* (The World Bank Industry and Energy Department, Energy Series Paper No. 42, August 1991).

  -- Firm power contract between Ontario Hydro and Vermont Public Power Supply Authority. Included in Annex F of Diane C. Minogue, *A Review of International Power Sales Agreements* (The World Bank Industry and Energy Department, Energy Series Paper No. 42, August 1991).

- Contracts distributed at the May 12-13, 1993 seminar:

-- NEPOOL Agreement. One copy of the full agreement was given to the Baltija Dispatch Center. Selected sections related to reliability were distributed to all of the seminar participants.

-- Additional copies of the Russian translation of the NEPOOL - Hydro Quebec Agreement.

- Additional contracts are contained in Appendix A of the *Electric Power Purchasing Handbook* (published by the law firm of Reid and Priest), which was distributed at the May 1992 seminar. For example, this appendix includes the Model Power Purchase and Operating Agreement used in Virginia Power's August 15, 1989 solicitation for new capacity.

Appendix A.4

List of Documents Translated into Russian

- -- NEPOOL. "Reliability Standards for the New England Power Pool." (The Russian version was sent by the Baltija Dispatch Center to the Central Dispatch Organization of RAO EES Rossii.)
- -- ENEREX partnership agreement. January 1, 1984.
- -- ENEREX interconnection agreement. January 1, 1984.
- -- Interconnection Agreement between Hydro Quebec and NEPOOL. 1982 draft.
- -- Charles F. Zimmermann. "Initial Draft of an Interconnection Agreement." Presented at the December 1992 seminar. (The Russian version was submitted by the Baltija Dispatch Center to the Baltic Energy Council in December 1992.)
- -- Charles F. Zimmermann. "Alternative Methods of Determining Electricity Prices in Wholesale Markets." Presented at the November 1992 seminar.
- -- Thomas Kennedy. "Interruptible Load Management." Presented at the November 1993 seminar.
- -- Frank Walters. *The Art of Rate Design* (Edison Electric Institute. 1984), selected chapters.

Because Russian was the language of power system engineering throughout the Soviet Union, documents translated into Russian can be used power engineers in all of the Baltic countries as well as the NIS countries. Some of the documents listed above have been sent by the Baltija Dispatch Center to the Central Dispatch Organization of RAO EES Rossii, the company which owns the Russian power grid.

Appendix A.5

List of Reference Materials Distributed

- Document distributed at the November 19-20, 1992 seminar:

  -- Ad Hoc Remvec Voltage Study Group, "Concepts in Control of Voltage." Circa 1980.

- Document distributed at the December 9-10, 1992 seminar:

  -- New England Power Pool (NEPOOL) Operations Committee, "Criteria, Rules and Standards No. 30 (CRS#30): Load Power Factor Correction." Revised August 24, 1989.

- Documents distributed at the February 17-18, 1993 seminar:

  -- Ernst & Young Vneshaudit, "Comparison of GAAP and CIS Accounting Practices." January 11, 1993.

  -- New England Electric System, financial statements from the 1991 annual report.

  -- Frank Walters, *The Art of Rate Design* (Edison Electric Institute, 1984). Selected chapters were translated into Russian.

  -- Diane C. Minogue, *A Review of International Power Sales Agreements* (The World Bank Industry and Energy Department, Energy Series Paper No. 42, August 1991).

- Documents distributed at the May 12-13, 1993 seminar:

  -- North American Electric Reliability Council (NERC), "Overview of Planning Reliability Criteria of the Regional Reliability Councils of NERC." April 1988.

  -- NERC, *1991 System Disturbances: Review of Selected Electric System Disturbances in North America*. July 1992.

-- NERC. "Transfer Capability - A Reference Document." October 1980.

-- NERC. "Impediments to Transfers: an Update." June 5. 1985.

-- Northeast Power Coordinating Council (NPCC). "Basic Criteria for Design and Operation of Interconnected Power Systems." October 1990.

-- NPCC. "Assuring Electric Reliability: The Role of the Northeast Power Coordinating Council." 1992.

-- NPCC Task Force on System Studies. "Summary Report on Task Force on System Studies Review of Hydro-Québec's Reliability." November 14. 1990.

-- NPCC. "NPCC Reliability Assessment Program Status Report: Goals and Responsibilities." April 6. 1993.

-- NPCC, Listing of NPCC Documents by Type. December 1992.

-- New England Power Planning (NEPLAN) staff for the NEPOOL Policy Planning Committee, "Summary of NEPOOL Planning Functions and Criteria for Planning Forecasts." April 1. 1991.

-- NEPLAN, "1992 NEPOOL Resource Adequacy Assessment (1993-2007)." Executive Report. June 1992.

-- NEPLAN, "NEPOOL Triennial Review of Transmission Reliability 1990-1996." June 11. 1991.

-- NEPOOL. "Reliability Standards for the New England Power Pool." (This document was translated into Russian.)

-- National Association of Regulatory Utility Commissioners (NARUC). *Utility Regulatory Policy in the United States and Canada: Compilation 1991-1992.*

-- NARUC. *Electric Utility Cost Allocation Manual.* January 1992.

-- NARUC. *Uniform System of Accounts for Class A and B Electric Utilities.* 1976.

-- NARUC. *Model Valuation. Plant Costs and Continuing Property Records Manual.* 1975.

- -- NARUC. *Electric Power Technology -- Options for Utility Generation and Storage*. 1991
- -- NARUC. *Glossary of Depreciation Terms*. 1980.
- -- NARUC. *Electric & Gas Utility Uncollectible & Service Disconnections for 1990*. 1992.
- -- 2 books on UNCITRAL (United Nations) guidelines for international arbitration of commercial contracts.

- Documents distributed by NERC at the November 15-16, 1993 seminar:
  - -- 4 NERC *Transmission Maps*
  - -- 4 NERC *Operating Manuals*
  - -- 25 brochures *About GADS*
  - -- 25 brochures *Generating Unit Statistics 1988-1992*
  - -- 4 books *Generating Availability Report 1988-1992*
  - -- 25 brochures *Rules of the Road for Electric System Reliability*
  - -- 4 books *Electricity Transfers and Reliability*
  - -- 4 books *Control Area Concepts and Reliability*
  - -- 4 *NERC 1992 Annual Reports*
  - -- 4 books *Reliability Assessment 1993-2002*
  - -- 25 brochures *Electricity Supply & Demand 1993-2002*
  - -- 4 books *Electricity Supply & Demand 1993-2002*
  - -- 4 books *Reliability Concepts*, February 1985
  - -- 4 books *Reliability Considerations for Integrating Non-Utility Generating Facilities with the Bulk Electric Systems*
  - -- 4 books *Overview of Planning Reliability Criteria of the Regional Reliability Councils of NERC*
  - -- 4 handouts on the *pc-G.A.R.* program

-- 4 books *1992 System Disturbances*

- Documents distributed by RCG/Hagler Bailly at the November 15-16, 1993 seminar:

  -- RCG/Hagler Bailly, *Evaluation of Duke Power's Interruptible Service Program*. Prepared for Duke Power Company. June 15, 1993.

  -- RCG/Hagler Bailly, *Process, Impact, and Market Evaluations of the Interruptible Service Program*. Prepared for Duke Power Company. September 17, 1992.

  -- RCG/Hagler Bailly, *The Impact and Process Evaluation of Central Hudson Gas and Electric Corporation's Curtailable Electric Service Program*. Prepared for Central Hudson Gas and Electric Corporation. March 8, 1993.

  -- Paul M. Lavoie (Hydro-Québec), "Interruptible Power in Industry," *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status, Sorrento, Italy, April 2-5, 1991; published by IEA).

  -- Pierre Richer, "Control Techniques for Demand-Side Management at Hydro-Québec," *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status, Sorrento, Italy, April 2-5, 1991; published by IEA).

  -- Hans Heino Möller, "Impact of Load Control Techniques on Commercial and Industrial Customers in Germany," *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status, Sorrento, Italy, April 2-5, 1991; published by IEA).

  -- Juan Temboury-Molina and Fernando Martínez-Fanegas, "Control of the Demand of Large Volume Industrial Customers in Spain: New Automatic System of Management of Interruptibility," *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status, Sorrento, Italy, April 2-5, 1991; published by IEA).

  -- Manuel Armando Guerra Mañanes, "Telemeasure and Telecontrol System for Electric Supplies to Customers Who Are Subscribed to the Interrupt System in Spain," *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status, Sorrento, Italy, April 2-5, 1991; published by IEA).

-- A. Vazio and L. Squintani. "Commercial Actions for the Management of the Industrial Customer's Electric Demand." *Advanced Technologies for Electric Demand-Side Management* (Proceedings: Workshops on DSM Technology Status. Sorrento. Italy. April 2-5. 1991: published by IEA).

- Three magazine subscriptions were purchased for the Baltic power companies in 1993. as a goodwill gesture:

  -- *Public Utilities Fortnightly*. for Eesti Energia

  -- *Nuclear Safety*. for the Lithuanian State Power System

  -- *Hydro Review*. for Latvenergo.

- For the December 1992 discussion of proposed charges for wheeling services provided to Russia. one of the references available to the Baltija Dispatch Center was the following document. which was distributed at the May 1992 seminar:

  -- Kevin Kelly, J. Stephen Henderson. Peter A. Nagler. and Mark Eifert. *Some Economic Principles for Pricing Wheeled Power*, NRRI-87-7 (Columbus Ohio: National Regulatory Research Institute. August 1987).

- Many other reports and books were distributed at the May 1992 seminar. On the topic of electric power contracting, the key reference work was:

  -- Reid & Priest. *Electric Power Purchasing Handbook*. 1991.

Appendix A.6

List of Trip Reports and Supplemental Memoranda

- Trip reports were submitted for six missions to the Baltics. These trips encompassed the following meetings:

  -- the initial meeting of the working group, October 1992

  -- the November 1992 seminar

  -- the December 1992 seminar

  -- the February 1993 seminar

  -- the May 1993 seminar

  -- the November 1993 seminar.

- The following supplemental memoranda were prepared:

  - "International Electric Power Transactions in the Baltics: October 92". Supplement to the trip report for October 1992.

  - "Results of the Baltic electric power contracting and pricing in the Baltics." Supplement to the trip report for May 1993.

  - "Expression of interest in continued AID assistance in the electric power sector in the Baltics." Supplement to the trip report for November 1993.

Appendix B

Viewgraphs Describing the Task

These viewgraphs were presented in the discussion of "Energy/Power Sector Restructuring" at the USAID/CEE Energy Assistance Review Meeting, January 5-6, 1994, at the Department of State, Washington, DC.

Baltic States - Regional Electricity Pricing and Contracting

Objectives/Rationale

Objectives of the regional electricity pricing and contracting project:

1. To work with all three Baltic countries on developing acceptable terms and conditions of electric power transactions among these countries.

2. To promote the development of pricing principles that are consistent with the efficient operation of the regional electrical system and consistent with economic efficiency objectives

3. To provide information to the Baltic countries regarding the choices that are available for electric power pooling arrangements, contracting arrangements, and tariff structures.

4. To help the Baltic countries reach agreement on key issues involving power contracting and pricing.

In July 1992 the three ministries signed an agreement to participate in a study of pricing and contracting. The working group was created by the Baltic Energy Council on September 10, 1992. Participants include Eesti Energia, Latvernergo, LSPS, DC Baltija, and the three energy ministries. When the working group began, power was sold under one-month bilateral agreements consisting of one or two pages of text. There were no written contracts comparable to what we would consider to be contracts. There were verbal agreements backed up by brief notes.

Baltic States - Regional Electricity Pricing and Contracting

Task Description

1. Definitional mission in October 1992. Meetings in Vilnius with LSPS and Ministry of Energy. Initial meeting at the Dispatch Center "Baltija" with the working group on electric power pricing and contracting.

2. Seminar on reactive power, reserve capacity, and alternative methods of determining electricity prices in wholesale markets, November 19-20, 1992. Distribution of copies of sample contracts and interconnection agreements.

3. Seminar on electric transmission pricing, time of use rates, and capacity payments, December 9-10, 1992. Draft of a sample Baltic agreement.

4. Seminar on interchange agreements, capacity contracts, and joint ventures, February 17-18, 1993. Discussion of Estonia-Latvia contract.

5. Seminar on Power Sales Agreements and Reliability Agreements, May 12-13, 1993. Distribution of sample agreements on reliability standards. Discussion of Latvia-Lithuania contract.

6. Seminar on liability clauses and direct demand side management programs, November 15-16, 1993. Discussion of Estonia-Latvia-Lithuania interconnection agreement. Signing of a resolution defining project results.

7. Exchange of information: shipment of books, receipt of power system data.

Baltic States - Regional Electricity Pricing and Contracting

Results/Accomplishments

In September 1992, the Baltic power system was operated without contracts. By December 1993, several agreements had been negotiated - a multilateral interconnection agreement (in draft form) and bilateral agreements (in final form).

At the final seminar, the members of the working group signed a "Resolution Concerning the Results of Technical Cooperation on Electricity Pricing and Contracting arranged by USAID Seminars in Riga 1992-1993." This resolution states:

1. Concepts used in North American power contracts are included in the draft Multilateral Agreement among Baltic countries among the State Enterprise Eesti Energia, State Enterprise Latvenergo and the Lithuanian State Power System.

2. Information about North American experience was used to prepare bilateral agreements, including the Estonia - Latvia power agreements and the Latvia - Lithuania power agreement and Lithuania and Belarus.

3. After the bilateral power agreements were negotiated between Estonia and Latvia and Latvia and Lithuania, these agreements formed the starting point for negotiation of other bilateral agreements energy interchange including Lithuania - Belarus and Latvia - Russia.

4. These agreements have increased the reliability and security of electric power supply in the Baltic countries.

Baltic States - Regional Electricity Pricing and Contracting

Significance/Lessons Learned

- AID provided support to a process initiated by the three countries, rather than trying to impose an organizational structure on these countries.

  The working group was formed by the Baltic Energy Council (i.e, the three ministries and the three power systems) and all meetings were organized by DC Baltija. Meeting agendas were revised on the basis of U.S. input but the initial draft of every agenda was prepared by DC Baltija.

- Ministry representatives did not have the technical expertise to address many of the topics covered in the seminars. Power sales agreements were negotiated by the power systems.

- The Baltic contracts in place today are probably the most detailed electric power agreements in the region encompassed by the former Soviet Union. The program sets an example that other Regional Dispatch Centers may follow.

- The Baltic countries are interested in establishing interconnections with UCPTE and Nordel. A Polish-Swedish-Finnish-Baltic analysis of interconnections should be completed in a few months. The Baltics project establishes a basis on which AID could support a broader program to facilitate interconnection of the Baltic countries with western Europe.

Appendix C

Miscellaneous Documents

This Appendix contains English translations of documents that illustrate the practical results of the seminars conducted in this task. Copies of the Lithuania-Belarus agreement and the Latvia-Russia agreement cited in Appendix C.1 are not included in this appendix: Belarus and Russia did not participate directly in the seminars. Appendix C.5 contains a paper presented by the Chief Engineer of the Baltija Dispatch Center at the November 1993 seminar.

Appendix C.1	Resolution Concerning the Results of Technical Cooperation on Electricity Pricing and Contracting Arranged By USAID Seminars in Riga 1992-1993 (November 16. 1993 resolution. translated from Russian)
Appendix C.2	Multilateral Agreement on Parallel Operation among the State Enterprise Eesti Energia. State Joint Stock Company Latvenergo. Lithuanian State Power System and Dispatch Center Baltija on Parallel Operation of Estonian. Latvian. and Lithuanian Power Systems for the Year 1994 (Document prepared in April 1994 by the Baltija Dispatch Center. describing the key provisions of the agreement)
Appendix C.3	Multilateral Agreement Among the State Enterprise Eesti Energia. State Enterprise Latvenergo. and Lithuanian State Power System on the Parallel Operation of the Power Systems of Estonia. Latvia. and Lithuania [Draft] (November 16. 1993 draft. translated from the original text in Russian. The final version of this agreement was signed on April 5. 1994.)
Appendix C.4	Agreement on Mutual Interchange of Electric Energy Between the Lithuanian State Power System and the State Enterprise Latvernergo

(May 1993 agreement, translated from the original text in Russian)

Appendix C.5 Contract on Supply of Electric Energy and Power Between the State Enterprise Eesti Energia and the State Enterprise Latvenergo for the First Quarter of 1993

(January 1993 agreement, translated from the original text in Russian. The Estonia-Latvia agreement was rolled over in the second, third, and fourth quarters of 1993 and substantially revised in 1994.)

Appendix C.6 Agreement to Participate in a Study of Pricing and Contracting for Electric Power

(September 1992 agreement; the original is in English)

Appendix C.7 Metcheslav Vonsovich, "Mutual Indemnification of Economic Damage to the Other Party Due to the Forced Deviations from the Operational Regime Defined by the Agreement."

(November 15, 1993 draft, translated from Russian)

Appendix C.1

Resolution Concerning the Results of Technical Cooperation on Electricity Pricing and Contracting

The following resolution was drafted on November 15 and signed on November 16. A preliminary draft in English was translated into Russian, debated, revised, and translated back into English. Signed copies in English and in Russian were distributed to the Estonian, Latvian, and Lithuanian delegations as well as the U.S. delegation.

This document states that the series of seminars resulted in the negotiation and signing of international agreements which increased the reliability and security of electric power supply in the Baltic countries. Reliability and security are important issues because:

- The Lithuanian power system is heavily dependent on the Ignalina reactor, and for safety reasons it is important to preserve the capability to shut down the reactor quickly without triggering a widespread failure of the transmission grid.
- The Latvian power system does not have enough generating capacity to meet load, except during periods when heavy rain or snowmelt creates a hydropower surplus. Latvia is dependent on imported power.
- The Estonian power system consists mainly of base-load oil shale power plants that are not capable of cycling rapidly in response to fluctuating loads.
- All three countries need to prevent unjust or unreasonable transfers of reactive power across international borders. From 1990 to 1993 the sharp decline in power demand created a surplus of reactive power that the transmission grid was not designed to handle. To reduce reactive power, portions of the high-voltage transmission grid were disconnected in 1992 and 1993.
- All three countries have high-voltage AC connections to Russia and/or Belarus and need to maintain the capability to respond to a generation system failure originating in Russia (for example, a reactor shutdown leading to an immediate shortage of capacity).

Resolution Concerning the Results of Technical Cooperation on Electricity Pricing and Contracting arranged by USAID Seminars in Riga 1992-1993.

The members of the working group formed by the Baltic Energy Council to address the issues of electricity contracting among Baltic countries on September 9, 1992 on the permanent participants of all the seminars on behalf of all the participants of the seminars would like to state that U.S. – Baltic experts cooperation in the seminars has found practical application.

Namely:

1. Concepts used in North America power contracts are included in the draft Multilateral Agreement among Baltic countries among the State Enterprise Eesti Energia, State Enterprise Latvia and the Lithuanian State Power System.
2. Information about North American experience was used to prepare bilateral agreements, including the Estonia – Latvia power agreements and the Latvia – Lithuania power agreement and Lithuania and Belarus.
3. After the bilateral power agreements were negotiated between Estonia and Latvia and Latvia and Lithuania, these agreements formed the starting point for negotiation of other bilateral agreements on energy interchange including Lithuania – Belarus and Latvia – Russia.
4. These agreements have increased the reliability and security of electric power supply in the Baltic countries.

Chief of Working Group
Chief Ing. DC Baltija M.Vonsovich

Members :

Chief Dispatcher Eesti Energia V.Peterson

Chief Dispatcher Latvenergo E.Rozental

Chief Dispatcher Lithuania PSPS A.Kisielius

Chief of the Dispatch Service
of the Dispatch Center Baltija J.Ositis

Appendix C.6

Agreement to Participate in the Study

Agreement to Participate in a Study
of Pricing and Contracting for Electric Power

An unsigned draft of this agreement was circulated for discussion at a Regional Seminar on Energy Pricing in Estonia, Latvia, and Lithuania. This seminar was supported by AID and was held in Riga, Latvia, on July 16-17, 1992. The document was then signed by the Lithuanian Ministry of Energy on August 8, by the Latvian Ministry of Industry and Energy on August 17, and by the Estonian State Energy Department on September 9. This document provided evidence to AID that the formation of a working group on electric power contracting and pricing was supported by key government representatives in all three countries.

The Lithuanian Ministry of Energy took a leadership role in initiating the seminar series, and participated actively in all of the seminars. Although the fall 1992 elections in Lithuania caused a change in the composition of the Lithuanian parliament and a more cautious approach to market-oriented economic policy, the political shift did not diminish Lithuania's support for the working group on pricing and contracting. In contrast, the participation by the Latvian Ministry of Industry and Energy during the course of the seminars was affected by the elimination of this ministry in 1993 and the reorganization of energy sector activity under the Ministry of Economy. Among government organizations the Estonian Ministry of Energy was the least active participant, although Eesti Energia was well represented in the working group meetings.

Agreement to Participate in a Study of
Pricing and Contracting for Electric Power

This document is an agreement among the Lithuanian Ministry of Energy, the Latvian Ministry of Industry and Energy, and the Estonian State Energy Department (the Ministries).

The Ministries agree that it would be worthwhile for the Dispatch Center "Baltija" to participate in a study of pricing and contracting for electric power transactions, if such a study can be supported by foreign technical assistance under funding from the United States Agency for International Development, the European Bank for Reconstruction and Development, or other organizations providing energy sector assistance to the Baltic countries.

The Ministries agree that electric power transactions among Baltic countries will be necessary for the next five years, at a minimum, and perhaps for an indefinite time period. These transactions are needed to enable Latvia to meet its power requirements, to maximize the reliability of the regional power grid, and to permit the Baltic countries to conduct power transactions with power systems in Russia and Belarus. The Ministries agree that it would be desirable to negotiate long-term agreements regarding the allocation of responsibility for generating capacity (including reserve capacity) and the procedures used to determine tariffs and payments for international electric power transactions. Tariffs should include demand charges, or some form of payment for capacity, as well as payment for energy.

The Ministries welcome foreign technical assistance in this area and encourage the Baltija Dispatch Center to participate in a study of pricing and contracting for electric power transactions. The Ministries also encourage the Lithuanian Power Board, Latvenergo, and Eesti Energia to provide the data needed by the Baltija Dispatch Center to conduct such studies.

Signed:

Lithuanian Ministry of Energy 1992 08 11

Latvian Ministry of Industry and Energy 17. VIII. 1992

Estonian State Energy Department 09 09 1992

Appendix C.7

Discussion Paper on Methods of Sharing Costs Associated With Power System Emergencies

This appendix contains a translation of a paper presented by Metcheslav Vonsovich. Chief Engineer of the Baltija Dispatch Center. at the November 1993 seminar. The paper is entitled "Mutual Indemnification of Economic Damage to the Other Party Due to the Forced Deviations from the Operational Regime Defined by the Agreement."

MUTUAL INDEMNIFICATION OF ECONOMIC DAMAGE TO THE OTHER PARTY DUE TO THE FORCED DEVIATIONS FROM THE OPERATIONAL REGIME DEFINED BY THE AGREEMENT

1. The multilateral agreement among the Baltic power systems on the parallel operation prescribes that the matters related to the indemnification of economic damage incurred to the other party due to the forced deviation from the operational regime defined in the agreement shall be settled in bilateral negotiations , if necessary , with the participation of Dispatch Center Baltija.

2. Shall disputes arise between the parties the matter is settled by the Energy Council of the Baltic Interconnected Power system.

3. The basic events causing damage to the other party are as follows:

3.1. Loss of considerable generating capacity causing in accordance with the operational regime restrictions or disconnection customers.

3.2. Emergency disconnection of electric power transmission line causing overload of the remaining network elements demanding discharging in the form of disconnection or restriction on customers.

3.3. Insulation of the power systems (due to various reasons) with decrease in frequency and performance of automatic devices at such decreased frequency to disconnected customers.

3.4. Occurrence of events demanding the utilization of spinning reserve on hydro units with considerable decrease of water storage resulting in decrease in head and low efficiency of units and forced additional generation on hydro pump storage station with low efficiency equal to 0,65.

3.5. Occurrence of events demanding the firing up heating equipment being in cold reserve. Additional expenses for fuel are required in such firing up in the process of the start-up of thermal units.

4. The above described economic indemnification problem has a long history, however, until today no decision is in effect concerning any of the above mentioned in the clause 3 types of damage.

However, it is necessary to mention that provided the positive energy capacity balance and sufficient capability of transit transmission lines 330 kV such situations in recent years have not occurred, but expecting stabilization in the economic life of the Baltic states accompanied by increase in consumption of electric power, the above problem remains actual.

5. It is necessary to mention that drastic decrease in consumption of active power and electricity (in 1992 it was equal to 40% of 1989) has led to the considerable decrease in consumption of reactive power causing excess of reactive power during summer season due to the generation of reactive power by underload in transmission network of 330 kV at long distances.

Excess of reactive power in its turn caused the increase of voltage in the network of 330kV exceeding the permissible margin of 363 kV.

In order to manage the voltage the following methods were applied in 1992 and 1993:

5.1. Disconnection of underloaded long distance (100-200km) parallel transmission 330 kV lines.

5.2. The operation of units at hydro- and pump-storage stations in the synchronous condensors mode to consume the reactive power.

The above in 5.1. and 5.2. measures ensured the voltage in the permissible limits, but caused economic damage as the disconnection of parallel lines caused additional load on the remaining lines and respective loss of active energy, but operation of units in synchronous condensers mode consumed active energy from the network to cover the electric and mechanic losses in these units.

For example, hydro unit with rating capacity 82,5 MW operated as the synchronous condensor to absorb 55 MVar reactive power shall utilize up 2,8 MW of active energy.

The occurrence of the above technical and economic problem requires adequate settlement and equitable allocation of economic expenses to compensate the excess of reactive power in the Baltic Interconnected System.

At present the dispatch center Baltija has start to prepare a computer programme allowing to calculate billing in real time.

6. To make quantitative illustration of the issue under discussion the operational regime of the cascade of the Daugava hydro stations is shown. Following the decrease in water storage due to the emergency outage of unit in Ignalina atomic plant before the start up of Lithuanian and Estonian thermal condensic units being in cold reserve. Besides the amount of damage at the Daugava hydro cascade depends on the time period the head of water storage may be restored i.e. the amount of generated electric energy at such decreased head of water reservoir.

7. Another type of damage is the start-up of units of cold reserve at the Estonian and Baltisky condensic thermal station operated on the local fuel. As an example could be considered the case when generating capacity is partially

compensated due to the emergency outage of the reactor on Ignalina atomic plant.

It is assumed in this example that an agreement between the dispatch center Baltija and the Central dispatch Board of the former Soviet Union provides that in case of emergency outage of reactor at the Ignalina atomic plant Central Dispatch Board shall provide 650 MW reserve.

$$P_{reserve} = P_{reactor} - P_{subsidiary} - 650 = 1300 - 100 - 650 = 550 \text{ MW}$$

If this reserve is utilized on the Estonian and Baltisky thermal stations, it is necessary to fire up 6 drum boilers at 130 atm pressure and to start up turbines 200 MW each.

In accordance with the data received from the respective thermal station , to do the above ,it is necessary _____ tons of heavy fuel oil and _____ tons of shale oil, which calculated at the present prices shall constitute _____USD.

Following the start-up of the units and further operation, the start -up costs shall drop due to the fact that the tariff for the energy sold is for _____ cents higher that the fuel component of the generation of electric energy at Estonian and Baltisky thermal stations.

As the conclusion to the aforesaid the Dispatch Center Baltija keeps to the view that following the execution of the multilateral agreement among the power systems it is necessary to start the preparation of principles and terms for the indemnification of the economic damage incurred to the other party due to the emergency in his power system.

The seminars held with assistance of RCG/Hagler, Bailey has shown great practical value in studying North-American experience in energy contracting with the aim to provide efficient energy transactions.

Taking into account the importance of issues related to the economic damage and their indemnification for the Baltic interconnected system the Dispatch Center Baltija would like to express request by possible assistance from USAID to arrange 2-3 seminars in 1994 together with RCG/Hagler, Bailly in order to study the USA experience in agreements related to the indemnification of economic damage.

CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT
EUR-0030-C-00-2053-00

Energy Pricing, Energy Efficiency, and Energy Sector Restructuring Component

Regional
Invitational Travel and
AEE Conference - 1992

Task Completion Memorandum

Prepared for:

U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy,
and Urban Development
Energy and Infrastructure Division

Prepared by:

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December 1996

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CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT

Task Completion Memorandum

Regional - Invitational Travel and AEE Conference 1992

Summary Task Description

In October 1992 AID Bureau for Europe, Office of Development Resources, Energy and Infrastructure Division (AID/EUR/DR/EI) sponsored the first delegation of European energy efficiency officials to the United States. The purpose was to introduce Eastern and Central European energy officials to their counterparts in Washington and to provide them with exposure to energy efficiency policies, technologies, issues and companies. Hagler Bailly Consulting, Inc. Worked with AID/EUR/DR/EI in organizing the delegation, including selection of participants, development of an itinerary, coordinating travel arrangements, accompanying the delegation in Washington and Atlanta, obtaining AEE memberships, and collecting evaluation forms from the delegates.

Eighteen people were invited, and fifteen delegates participated. Delegates were selected from five countries - Hungary, CSFR, Bulgaria, Romania, and Poland. The delegation was intentionally balanced to include government energy officials, electric utility representatives, owners of private energy engineering firms, representatives of energy efficiency non-governmental organizations, and industrial energy managers.

The itinerary for the group included a conference in Washington, a tour of the Southwire manufacturing facility in Carrollton, Georgia, participation in the Association of Energy Engineer's World Energy Engineering Congress in Atlanta, and a visit to Georgia Tech Manufacturing Research Center.

Specific Goals and Objectives

Under the Emergency Energy Program and the PEER Program, USAID has developed ongoing relations with Eastern and Central European energy efficiency professionals, many of whom are actively promoting the development of markets for energy efficiency products and services in their respective countries.
Inviting a number of these professionals to attend the World Energy Engineering Congress

Inviting a number of these professionals to attend the World Energy Engineering Congress sponsored by AEE, and to meet with US energy engineers and equipment manufacturers, therefore complemented the activities developed in Eastern and Central Europe.

This activity had the dual objective of providing increased business (trade and investment) for U.S. energy efficiency vendors and local market development for energy efficiency in Eastern Europe. An important objective was to develop ongoing business relationships between energy efficiency officials in Eastern Europe and business people in the United States.

Expected Outputs

The expected outputs from the annual invitational travel were primarily based on the results of the contacts established between the delegates and US organizations; on how much information and new ideas the delegates collect during their trip; and on how this trip reinforces the motivation and ability of the delegates to provide market-based energy efficiency services to potential clients in their countries. These elements were to be first evaluated through a questionnaire given to the participants, but could also be assessed during subsequent in-country trips by Hagler Bailly staff.

Deliverables

- Logistical arrangements
- Invitations
- Conference coordination
- meeting coordination
- Trip report and evaluation

A report on the 1992 invitational travel was prepared, including evaluation by the participants.

Results and Next Steps

The invitational travel task also resulted in 15 participants from Eastern and Central Europe taking parts in the activities. Appendix B includes a list of the 15 delegation members and those who were invited, but unable to attend.

The invitational travel resulted in the scheduled agenda of meetings and conferences being met, as illustrated by Appendix A (Schedule) and Appendix C (Activity Report).

The evaluation forms completed by the delegation members indicated that this program was

well-organized, went smoothly, and met the objectives it set out to achieve. The delegation members were able to meet the individuals and companies they wanted. According to Ewaryst Hille, Head of Poland's FEWE, "For me it was the first opportunity to meet people who are preparing energy and environmental policy in US as well as representatives of US companies." While referring to the trade exhibition in Atlanta, Dan Ionitza, energy manager from Griro Manufacturing in Romania, stated "The trade exhibition made me think that I am participating at the energy top of the world." In addition, the individuals were able to compare and contrast the energy situations in each of their respective countries. Appendix H contains the 11 completed evaluation forms that were received.

The program also provided ample time for the individuals to conduct one-on-one informal meetings. Many of the Eastern Europeans established contacts with American businesspeople who are eager to work with them on installing low-cost energy efficiency equipment, implement performance contracting programs, advise on a variety of legal and regulatory issues and tap into the energy efficiency markets of Eastern Europe.

Subsequent to the trip to the U.S. AID/EUR/DR/EI sponsored three-year memberships for the fifteen delegation members as well as the three representatives who were unable to attend. An AEE membership application is included in Appendix I. As AEE members, the Eastern Europeans will be up to date on energy and environmental issues. They will receive energy journals and quarterly newsletters, including *Energy Engineering, Strategic Planning for Energy and Environment, and AEE Energy Insight*. They will also be able to launch a local AEE chapter once they have a core group of ten members.

Hagler Bailly Consulting continues to work with the delegation members by monitoring the progress of AEE chapters in the Eastern European countries. The energy efficiency market development programs in Romania, Hungary and Bulgaria promote continued contact with the 1992 delegation members. The current energy efficiency market development program includes a two-day Certified Energy Managers (CEM) course which concludes with a certification exam.

Recommendations for Next Steps:

1. **It is recommended that a second delegation from Eastern and Central Europe be invited to participate in a similar program in the fall of 1993**, including participation in the AEE Atlanta Conference and Trade Exhibition. The format for the 16th WEEC is similar to last year's conference and will include a session entitled "International Energy Opportunities." This session will be chaired by Hagler Bailly Consulting Vice President, David Keith. Featured speakers include Jaroslaw Dybovski, from the Polish Power Grid, William Coe from Southern Electric International, Suzanne Goldstein Smith from Hagler Bailly and Ing. Salvador Herrera, from the Fund for Electric Energy Efficiency in Mexico. Appendix J contains the agenda for the 16th World Energy Engineering Congress.

2. **It is recommended that the delegation be invited to remain in the United States for a few more days (perhaps 10 days) to include more site visits and visit to a third city**. Added to the itinerary could be a visit to an electric utility, a privately-operated power plant, or another industrial energy user. The group should remain in Washington, D.C. for more than one day in order to schedule smaller or individual meetings for the group.

3. **The 1993 delegation should include some of the energy managers who pass the CEM course, representatives from the Baltic republics, as well as new representatives from the same organizations that participated last year.**

4. **Planning for the 1993 trip should be combined with planning for follow-up delegation and conference activities to be held in Europe**. When this activity was started in the summer of 1992, it was recommended that the delegation to the United States be followed by similar delegations and conference activities held in Eastern and Central Europe. Recommendations at that time included sponsorship of a business or market development conference in Eastern Europe. Suggestions at that time included a trade show, an energy efficiency investment promotion mission, or a technical/education seminar. It is recommended that the planning effort for the US delegation be focused on follow-on conference activities to be held in the late spring of 1994.

Appendix A - Schedule and Agenda

Itinerary

Eastern and Central European Energy Efficiency Delegation

October 24 - 31, 1992

Saturday, October 24, 1992

4:00pm - 9:00pm Arrivals at Dulles and National airports, Transportation to hotel provided.

Hotel Washington
15th and F St. NW
Washington, D.C.
telephone: (202) 638-5900
fax: (202) 638-4275

Sunday, October 25, 1992

1:00pm - 5:00pm Sightseeing tour of Washington, D.C. Meet at lobby of hotel.

5:30pm Group meeting with Bob Archer, USAID Rooftop Terrace, Hotel Washington Washington, D.C.

Monday, October 26, 1992

9:00am - 5:00pm Meeting on Energy Efficiency in Eastern and Central Europe

6:00pm - 8:00pm National Press Club, Main Lounge
529 14th Street, NW
Washington, D.C.

(See separate agenda)

Tuesday, October 27, 1992

7:45am Depart hotel for National airport Transportation provided.

9:10am Depart for Atlanta, Georgia

12:00pm - 3:30pm Tour of Southwire Company manufacturing facilities and centralized energy management center in Carrollton, Georgia (about 50 miles from Atlanta)

5:00pm Check in at Hotel

Atlanta Hilton
255 Courtland St.
Atlanta, Georgia 30303
telephone: (404) 659-2000
fax: (404) 222-2967

6:30pm Association of Energy Engineers Awards Banquet
Georgia World Congress Center

Wednesday, October 28, 1992
15th World Energy Engineering Congress Conference

8:45am - 11:10am Opening Session

11:30am - 2:00pm Lunch in Exhibit Hall

2:30pm - 5:10pm Concurrent Sessions
Trade Exhibits Open
10:00am - 4:00pm

6:30pm Evening free (Optional shopping)

Thursday, October 29, 1992

9:00am - 5:10pm Morning and afternoon concurrent sessions
Trade Exhibits Open
10:am - 4:00pm

12:00pm Group Working Lunch at Omni Hotel

5:00pm Tour of Georgia Dome Utility Installation

7:30pm Dinner hosted by RCG/Hagler, Bailly
Dante's Down the Hatch
Alabama and Pryor Streets
Atlanta Underground

Friday, October 30, 1992

9:00am - 11:40am Concurrent Sessions

12:20pm Luncheon (Speaker: Amory Lovins, Rocky Mountain Institute)

3:00pm Visit and tour of Georgia Institute of Technology Manufacturing Research Center

Evening Unscheduled

Saturday, October 31, 1992

9:00am Rambling Rec Parade at Georgia Tech Homecoming

1:00pm - 7:00pm Depart Atlanta

Appendix B - Participant List

35

EASTERN EUROPEAN DELEGATION TO WASHINGTON AND WEEC CONGRESS
SEPTEMBER 1992

Mr. Ewaryst Hille
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(Nitrogen Works Factory)
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Mr. Geza Szabo
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Appendix C - Activities

The itinerary for the group included a Sunday of organized sightseeing in Washington, D.C., a conference in Washington, a tour of the Southwire manufacturing facility in Carrollton, Georgia, participation in the Association of Energy Engineer's World Energy Engineering Congress in Atlanta, and a visit to Georgia Tech Manufacturing Research Center.

Washington

Delegates were met at the airport on Saturday evening, October 24. On Sunday they enjoyed an afternoon of organized sightseeing (Capitol, Monuments, and the Air & Space Museum). Sunday evening the group gathered for an introductory meeting with Robert Archer.

On Monday, a one-day conference was held in Washington, D.C. at the National Press Club to introduce the Europeans to their counterparts in Washington. Attendance was by invitation only and approximately 40 people attended. Robert Archer moderated a program that included a good mix of government policy, NGO and company business presentations by both American and Europeans.

The Washington meeting provided a forum for the selected individuals from Eastern Europe to present ongoing energy efficiency activities in their countries. For example, Ivo Slavotinek, project manager of Prague's energy efficiency center. SEVEn, discussed the development, funding, goals and achievements of the energy efficiency centers in Eastern Europe. Mr. Geza Szabo, general director of the Buszesz Yeast and Alcohol Factory in Hungary made a presentation on the 30% energy savings that resulted from Buszesz' energy management program, initiated by Hagler Bailly Consulting under the Emergency Energy Efficiency Project.

The afternoon session included presentations from the U.S. energy efficiency sector. Gerry Decker provided the key-note luncheon speech entitled "Private Power and Efficiency: Cogeneration." Representatives from UE Systems, Honeywell, Inc., Armstrong Machine Works and Bacharach, Inc. discussed products that were purchased under the Emergency Energy Project and their company's business interests in Eastern Europe. The manufacturers expressed concern about the level of demand for energy efficiency products, the ability to obtain hard currency payments, and finding the best local partners. Notwithstanding various comments regarding lack of financing, Christian Spassov, president of Ecotechproduct in Sofia, indicated that under his marketing agreement for Armstrong steam traps, he has been able to purchase products for cash in advance of shipment. The Ecotechproduct-Armstrong partnership seems to exemplify an ideal entry for many U.S. companies into the Eastern Europe market.

In the evening Hagler Bailly Consulting, Inc. sponsored a dinner reception for the delegation at Hagler Bailly's Office in Arlington, VA.

Georgia

On Tuesday morning, October 27, the delegation flew to Atlanta and boarded a bus at the airport to visit the Southwire Corporation in Carrollton, Georgia. Southwire is the world's largest wire and cable manufacturer. The company is a fully integrated manufacturer with several energy intensive copper smelters in Georgia and elsewhere in the South. The company has won several awards for its energy management programs which have reduced energy cost by more than 50% through conservation, interruptible rates, self-generation, and automated control and monitoring systems. Southwire hosted a luncheon for the delegation where the group was briefed on the background and development of Southwire Corporation. The Senior Energy Engineer at Southwire conducted a tour of the cable and wire manufacturing facility and made a presentation on the automated control systems and the company's energy management program.

The delegation — accompanied by AID's project officer, Robert Archer, and David Keith, Suzanne Goldstein Smith and Wendi Norris of Hagler Bailly Consulting — attended the 15th World Energy Engineering Congress at the Georgia World Congress Center in Atlanta. The WEEC, which is organized by the Association of Energy Engineers, represents the largest technical conference on energy efficiency in the United States. The program includes a large exhibition of U.S. energy efficiency and environmental technologies as well as approximately 150 technical presentations from energy experts on the latest developments and applications in energy engineering. Delegates participated in two-days of concurrent sessions of presentations.

On the second day of the conference Hagler Bailly Consulting organized a working group luncheon in order to introduce the Eastern European delegation to several leading energy efficiency experts in the U.S. Al Thumann, Executive Director of the Association of Energy Engineers, provided the group with information on AEE chapters overseas. Chris Klein, assistant to Senator John Glenn, discussed the legislative process behind passage of the National Energy Policy Act of 1992.

The delegation also visited the Georgia Institute of Technology Manufacturing Research Center. The Associate Director of the Center gave the group an overview of how academic research institutions in the United States coordinate with private industrial companies. This included a description of the center's sources of funding, the types of energy and environmental projects in which they are involved, and a tour of the award-winning facility and its laboratories.

The Atlanta portion of the trip also allowed Hagler Bailly Consulting staff to network with the U.S. energy efficiency equipment exhibitors and determine the exhibitor's level of interest in doing business in Eastern Europe. In general, the level of interest was mixed. Some of the companies are quite interested in increasing exports, including to Eastern Europe. Other companies were start-up companies with technologies not considered appropriate for Eastern Europe or small companies with limited marketing resources. In other cases the person manning the trade booth in Atlanta was not the right person to talk to about doing business in Europe. We developed about 25 company leads from attendance at this exhibit.

The European delegates found the trade exhibition to be an excellent way to learn about product availability and new energy efficient technologies. Some of the delegates made good contacts and may have subsequently pursued more business.

On the last day of the WEEC Hagler Bailly Consulting sponsored a dinner for the delegation and several invited guests at a local restaurant and jazz club, Dante's Down the Hatch.

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION TO THE UNITED STATES

Final Report

Prepared for:

AID/BUREAU FOR EUROPE
Office of Development Resources
Energy and Infrastructure Division
Washington, DC 20523
(202) 647-8274

HBI Reference No. 90-4070-202-01

Prepared by:

RCG/HAGLER, BAILLY, INC.
1530 Wilson Boulevard
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July 1993

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D: Presentation by Geza Szabo, General Director of Buszesz Yeast and Alcohol Factory, "Results of an Energy Efficiency Audit"

E: Presentation by Dr. Virgil Musatescu, Secretary of State, Romanian Ministry of Industry, "Role of Public and Private Support for Energy Efficiency"

F: Presentation by Gerald Decker, "Private Power and Efficiency: Cogeneration"

G: Program for 15th World Energy Engineering Congress

H: Evaluation Forms Completed by Delegation Members

I: AEE Membership Application

J: Program for 16th World Energy Engineering Congress (October 1993)

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION TO THE UNITED STATES

October 24 - 31, 1992

BACKGROUND

In October 1992 AID Bureau for Europe, Office of Development Resources, Energy and Infrastructure Division (AID/EUR/DR/EI) sponsored the first delegation of European energy efficiency officials to the United States. The purpose was to introduce Eastern and Central European energy officials to their counterparts in Washington and to provide them with exposure to energy efficiency policies, technologies, issues and companies. RCG/Hagler, Bailly, Inc. worked with AID/EUR/DR/EI in organizing the delegation, including selection of participants, development of an itinerary, coordinating travel arrangements, accompanying the delegation in Washington and Atlanta, obtaining AEE memberships, and collecting evaluation forms from the delegates.

Eighteen people were invited, and fifteen delegates participated. Delegates were selected from five countries - Hungary, .CSFR, Bulgaria, Romania, and Poland. The delegation was intentionally balanced to include government energy officials, electric utility representatives, owners of private energy engineering firms, representatives of energy efficiency non-governmental organizations, and industrial energy managers. Appendix A includes a list of the 15 delegation members and those who were invited, but unable to attend.

The itinerary for the group included a Sunday of organized sightseeing in Washington, D.C., a conference in Washington, a tour of the Southwire manufacturing facility in Carrollton, Georgia, participation in the Association of Energy Engineer's World Energy Engineering Congress in Atlanta, and a visit to Georgia Tech Manufacturing Research Center. Appendix B sets forth the group's itinerary. More information on the trip is described in the following sections.

WASHINGTON

Delegates were met at the airport on Saturday evening, October 24. On Sunday they enjoyed an afternoon of organized sightseeing (Capitol, Monuments, and the Air & Space Museum). Sunday evening the group gathered for an introductory meeting with Robert Archer.

On Monday, a one-day conference was held in Washington, D.C. at the National Press Club to introduce the Europeans to their counterparts in Washington. Attendance was by invitation only and approximately 40 people attended. Robert Archer moderated a program that included a good mix of government policy, NGO and company business presentations by both American and Europeans. Appendix C contains the Agenda for the National Press Club meeting and a list of the Washington meeting participants.

The Washington meeting provided a forum for the selected individuals from Eastern Europe to present ongoing energy efficiency activities in their countries. For example, Ivo Slavotinek, project manager of Prague's energy efficiency center, SEVEn, discussed the development, funding, goals and achievements of the energy efficiency centers in Eastern Europe. Mr. Geza Szabo, general director of the Buszesz Yeast and Alcohol Factory in Hungary made a presentation on the 30% energy savings that resulted from Buszesz' energy management program, initiated by RCG/Hagler, Bailly under the Emergency Energy Efficiency Project. A copy of the presentation is included as Appendix D. Mr. Virgil Muscatescu discussed energy policy options in Romania (see Appendix E).

The afternoon session included presentations from the U.S. energy efficiency sector. Gerry Decker provided the key-note luncheon speech entitled "Private Power and Efficiency: Cogeneration". (see Appendix F for a copy of the presentation). Representatives from UE Systems, Honeywell, Inc., Armstrong Machine Works and Bacharach, Inc. discussed products that were purchased under the Emergency Energy Project and their company's business interests in Eastern Europe. The manufacturers expressed concern about the level of demand for energy efficiency products, the ability to obtain hard currency payments, and finding the best local partners. Notwithstanding various comments regarding lack of financing, Christian Spassov, president of Ecotechproduct in Sofia, indicated that under his marketing agreement for Armstrong steam traps, he has been able to purchase products for cash in advance of shipment. The Ecotechproduct-Armstrong partnership seems to exemplify an ideal entry for many U.S. companies into the Eastern Europe market.

In the evening RCG/Hagler Bailly, Inc. sponsored a dinner reception for the delegation at Hagler Bailly's office in Arlington, VA.

GEORGIA

On Tuesday morning, October 27, the delegation flew to Atlanta and boarded a bus at the airport to visit the Southwire Corporation in Carrollton, Georgia. Southwire is the world's largest wire and cable manufacturer. The company is a fully integrated manufacturer with several energy intensive copper smelters in Georgia and elsewhere in the South. The company has won several awards for its energy management programs which have reduced energy cost by more than 50% through conservation, interruptible rates, self-generation, and automated control and monitoring systems. Southwire hosted a luncheon for the delegation where the group was briefed on the background and development of Southwire Corporation. The Senior Energy Engineer at Southwire conducted a tour of the cable and wire manufacturing facility and made a presentation on the automated control systems and the company's energy management program.

The delegation -- accompanied by AID's project officer, Robert Archer, and David Keith, Suzanne Goldstein Smith and Wendi Norris of RCG/Hagler, Bailly -- attended the 15th World Energy Engineering Congress at the Georgia World Congress Center in Atlanta. The WEEC, which is organized by the Association of Energy Engineers, represents the largest technical conference on energy efficiency in the United States. The program includes a large exhibition of U.S. energy efficiency and environmental technologies as well as approximately 160 technical presentations from energy experts on the latest developments and applications in energy engineering. A copy of the WEEC Program is included in Appendix G. Delegates participated in two-days of concurrent sessions of presentations.

On the second day of the conference RCG/Hagler, Bailly organized a working group luncheon in order to introduce the Eastern European delegation to several leading energy efficiency experts in the U.S. Al Thumann, Executive Director of the Association of Energy Engineers, provided the group with information on AEE chapters overseas. Chris Klein, Assistant to Senator John Glenn, discussed the legislative process behind passage of the National Energy Policy Act of 1992.

The delegation also visited the Georgia Institute of Technology Manufacturing Research Center. The Associate Director of the Center gave the group an overview of how academic research institutions in the United States coordinate with private industrial companies. This included a description of the center's sources of funding, the types of energy and environmental projects in which they are involved, and a tour of the award-winning facility and its laboratories.

The Atlanta portion of the trip also allowed RCG/Hagler, Bailly staff to network with the U.S. energy efficiency equipment exhibitors and determine the exhibitor's level of interest in doing business in Eastern Europe. In general, the level of interest was mixed. Some of the companies

are quite interested in increasing exports, including to Eastern Europe. Other companies were start-up companies with technologies not considered appropriate for Eastern Europe or small companies with limited marketing resources. In other cases the person manning the trade booth in Atlanta was not the right person to talk to about doing business in Europe. We developed about 25 company leads from attendance at this exhibit.

The European delegates found the trade exhibition to be an excellent way to learn about product availability and new energy efficient technologies. Some of the delegates made good contacts and may have subsequently pursued more business.

On the last day of the WEEC RCG/Hagler, Bailly sponsored a dinner for the delegation and several invited guests at a local restaurant and jazz club, Dante's Down the Hatch. Prior to the group's departure on October 31, RCG/Hagler, Bailly escorted the delegation to a pre-election rally for Bill Clinton and to Georgia Tech's traditional Rambling Reck Parade.

EVALUATION

The evaluation forms completed by the delegation members indicated that this program was well-organized, went smoothly, and met the objectives it set out to achieve. The delegation members were able to meet the individuals and companies they wanted. According to Ewaryst Hille, Head of Poland's FEWE, "For me it was the first opportunity to meet people who are preparing energy and environmental policy in US as well as representatives of US companies". While referring to the trade exhibition in Atlanta, Dan Ionitza, energy manager from Griro Manufacturing in Romania, stated "The trade exhibition made me think that I am participating at the energy top of the world." In addition, the individuals were able to compare and contrast the energy situations in each of their respective countries. Appendix H contains the 11 completed evaluation forms that were received.

The program also provided ample time for the individuals to conduct one-on-one informal meetings. Many of the Eastern Europeans established contacts with American businesspeople who are eager to work with them on installing low-cost energy efficiency equipment, implement performance contracting programs, advise on a variety of legal and regulatory issues and tap into the energy efficiency markets of Eastern Europe.

Subsequent to the trip to the U.S. AID/EUR/DR/EI sponsored three-year memberships for the fifteen delegation members as well as the three representatives who were unable to attend. An AEE membership application is included in Appendix I. As AEE members, the Eastern Europeans will be up to date on energy and environmental issues. They will receive energy journals and quarterly newsletters, including *Energy Engineering, Strategic Planning for Energy*

and Environment, and AEE Energy Insight. They will also be able to launch a local AEE chapter once they have a core group of ten members.

RCG/Hagler, Bailly continues to work with the delegation members by monitoring the progress of AEE chapters in the Eastern European countries. The energy efficiency market development programs in Romania, Hungary and Bulgaria promote continued contact with the 1992 delegation members. The current energy efficiency market development program includes a two-day Certified Energy Managers (CEM) course which concludes with a certification exam.

RECOMMENDATIONS FOR NEXT STEPS

1. **It is recommended that a second delegation from Eastern and Central Europe be invited to participate in a similar program in the fall of 1993,** including participation in the AEE Atlanta Conference and Trade Exhibition. The format for the 16th WEEC is similar to last year's conference and will include a session entitled "International Energy Opportunities". This session will be chaired by RCG/Hagler, Bailly Vice President, David Keith. Featured speakers include Jaroslaw Dybovski, from the Polish Power Grid, William Coe from Southern Electric International, Suzanne Goldstein Smith from Hagler Bailly and Ing. Salvador Herrera, from the Fund for Electric Energy Efficiency in Mexico. Appendix J contains the agenda for the 16th World Energy Engineering Congress.

2. **It is recommended that the delegation be invited to remain in the United States for a few more days (perhaps 10 days) to include more site visits and a visit to a third city.** Added to the itinerary could be a visit to an electric utility, a privately-operated power plant, or another industrial energy user. The group should remain in Washington, D.C. for more than one day in order to schedule smaller or individual meetings for the group.

3. **The 1993 delegation should include some of the energy managers who pass the CEM course, representatives from the Baltic republics, as well as new representatives from the same organizations that participated last year.**

4. **Planning for the 1993 trip should be combined with planning for follow-up delegation and conference activities to be held in Europe.** When this activity was started in the summer of 1992, it was recommended that the delegation to the United States be followed by similar delegations and conference activities held in Eastern and Central Europe. Recommendations at that time included sponsorship of a business or market development conference in Eastern Europe. Suggestions at that time included a trade show, an energy efficiency investment

promotion mission, or a technical/education seminar. It is recommended that the planning effort for the US delegation be focused on follow-on conference activities to be held in the late spring of 1994.

APPENDIX A

LIST OF INVITED DELEGATION MEMBERS

EASTERN EUROPEAN DELEGATION TO WASHINGTON AND WEEC CONGRESS
SEPTEMBER 1992

Mr. Ewaryst Hille
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Tel/Fax: (4288) 45-183

Invited (unable to attend)

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President
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APPENDIX B

OCTOBER 24-31 ITINERARY

Itinerary

Eastern and Central European Energy Efficiency Delegation

October 24 - 31, 1992

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Saturday, October 24, 1992

4:00pm - 9:00pm Arrivals at Dulles and National airports, Transportation to hotel provided.

Hotel Washington
15th and F St. NW
Washington, D.C.
telephone: (202) 638-5900
fax: (202) 638-4275

Sunday, October 25, 1992

1:00pm - 5:00pm Sightseeing tour of Washington, D.C. Meet at lobby of hotel.

5:30pm Group meeting with Bob Archer, USAID Rooftop Terrace, Hotel Washington Washington, D.C.

Monday, October 26, 1992

9:00am - 5:00pm Meeting on Energy Efficiency in Eastern and Central Europe

6:00pm - 8:00pm National Press Club, Main Lounge
529 14th Street, NW
Washington, D.C.

(See separate agenda)

Tuesday, October 27, 1992

7:45am Depart hotel for National airport Transportation provided.

9:10am Depart for Atlanta, Georgia

12:00pm - 3:30pm Tour of Southwire Company manufacturing facilities and centralized energy management center in Carrollton, Georgia (about 50 miles from Atlanta)

5:00pm Check in at Hotel

Atlanta Hilton
255 Courtland St.
Atlanta, Georgia 30303
telephone: (404) 659-2000
fax: (404) 222-2967

6:30pm Association of Energy Engineers Awards Banquet
Georgia World Congress Center

Wednesday, October 28, 1992
15th World Energy Engineering Congress Conference

8:45am - 11:10am Opening Session

11:30am - 2:00pm Lunch in Exhibit Hall

2:30pm - 5:10pm Concurrent Sessions
Trade Exhibits Open
10:00am - 4:00pm

6:30pm Evening free (Optional shopping)

Thursday, October 29, 1992

9:00am - 5:10pm Morning and afternoon concurrent sessions
Trade Exhibits Open
10:am - 4:00pm

12:00pm Group Working Lunch at Omni Hotel

5:00pm Tour of Georgia Dome Utility Installation

7:30pm Dinner hosted by RCG/Hagler, Bailly
Dante's Down the Hatch
Alabama and Pryor Streets
Atlanta Underground

Friday, October 30, 1992

9:00am - 11:40am Concurrent Sessions

12:20pm Luncheon (Speaker: Amory Lovins, Rocky Mountain Institute)

3:00pm Visit and tour of Georgia Institute of Technology Manufacturing Research Center

Evening Unscheduled

Saturday, October 31, 1992

9:00am Rambling Rec Parade at Georgia Tech Homecoming

1:00pm - 7:00pm Depart Atlanta

APPENDIX C

AGENDA FOR OCTOBER 26 MEETING AT NATIONAL PRESS CLUB

Chuck Hough
Honeywell, Inc.

Doug Bloss
Vice President
Armstrong Machine Works

Mujahid Iqbal
Adam Krezcko
ICF Resources, Inc.

Mark Hopkins
Alliance to Save Energy

Larry Good
Association of Energy Engineers
Washington, D.C. Chapter

Terry Singer
Executive Director
National Association of Energy Service Companies

Al Cook
Principal Consultant
RCG/Hagler, Bailly, Inc.

Bulgaria

Christian Spassov
Ecotech Products

G. Moumdjian
Technical University - Sofia
Thermal Energy Department

Krassimir Kanev
Director of Investments
National Electric Joint-Stock Co.

Czech and Slovak Republics

Ivo Slavotinek
SEVEn
The Energy Efficiency Center

Ján Puskailer
Industry Representative
Biotika Pharmaceutical

Karel Cermak
Energy Institute

Marian Rutsek
State Power Inspection

Hungary

András Morenth
Head of Department
Directorate-General for Energy Policy
Department of Energy Cooperation
Ministry of Industry and Trade

Geza Szabo
Director
BUSCESZ Yeast and Alcohol Factory

Poland

Ewaryst Hille
Polish Foundation for Energy Efficiency

Henryk Nawrot
Zaklady Azotowe Kedzierzyn

Jacek Brandt
Polish Power Grid Company

Romania

Virgil Muscatescu
General Director
Energy, Oil & Gas
Ministry of Industry

Mihai Georgescu
Director
INSTAPART

Dan Ionitza
Energy Manager
GRIRO Manufacturing Company

Agenda

Energy Efficiency in Eastern and Central Europe

National Press Club
Main Lounge
529 14th St., NW
Washington, D.C.

Monday,
October 26, 1992

MORNING SESSION

Energy Efficiency Activities in Central and Eastern Europe

9:00am - 9:20am
Welcoming Remarks
Dr. C. Ross Anthony, Director
USAID Bureau for Europe
Office of Development Resources

9:20am - 9:50am
"USAID Cooperation in Energy Efficiency"
Mr. Robert Archer, Deputy Chief
Energy and Infrastructure Division,
USAID Bureau for Europe

9:50am - 10:20am
"Realization of Industrial Energy Savings"
Mr. Geza Szabo, Director
BUSZESZ Yeast and Alcohol Factory
Budapest

Mr. András Morenth,
Head of Department
Directorate General for Energy Policy
Ministry of Industry and Trade

10:20am - 10:40am
Coffee Break

10:40am - 11:10am
"Development of Energy Efficiency Centers"
Mr. Ivo Slavotinek
SEVEn, Prague

Mr. Ewaryst Hille
FEWE, Warsaw

11:10am - 11:40am
"How to Build a Business Doing Energy Audits"
Dr. Christian Spassov
ECOTECH PRODUCTS, Sofia

11:40am - 12:10pm
"Role of Public and Private Support for Energy Efficiency"
Dr. Virgil Muscatescu,
General Director
Energy, Oil & Gas
Ministry of Industry, Bucharest

12:10pm - 1:45pm
Lunch
Speaker: Mr. Gerald Decker
Topic: Omni-Tech International
"Private Power and Efficiency: Cogeneration"

AFTERNOON SESSION

U.S. Organizations and Approaches to Energy Efficiency

2:00pm - 2:30pm
"National Energy Policy Act: Impact on Energy Efficiency"
To Be Determined

2:30pm - 3:00pm
"Role of Advocacy Groups in Energy Efficiency in the U.S."
Mr. Mark Hopkins,
Director Corporate Affairs
Alliance to Save Energy

3:00pm - 3:30pm
"Energy Service Companies and Performance Contracting"
Ms. Terry Singer,
Executive Director,
National Association of Energy Service Companies

3:30pm - 3:50pm
Afternoon Break

3:50pm - 4:30pm
Panel Discussion
"Perspectives on Energy Efficiency Business Opportunities in Eastern and Central Europe"
Terrence O'Hanlon, President,
UE Systems
Joe Vilardo, Dir. Industrial Sales,
Honeywell, Inc.
Doug Bloss, Vice President Sales,
Armstrong Machine Works
Daniel Chemsak, Export Manager,
Bacharach, Inc.

4:30pm - 5:00pm
Open Discussion
Moderator: Robert Archer,
Deputy Chief
Energy and Infrastructure Division,
USAID Bureau for Europe

6:00pm - 8:00pm
Cocktail Reception
Hosted by RCG/Hagler, Bailly, Inc.
Location: 1530 Wilson Blvd.
Suite 900
Arlington, VA

LIST OF PARTICIPANTS

United States

Robert Archer
Deputy Chief
Energy and Infrastructure Division
USAID Bureau for Europe

Len Rogers
USAID Bureau for Europe

Ron Bowes
Office of Technical Assistance

Paul Komor
Office of Technology Assessment

Dennis Eoff
Environmental Protection Agency

David Keith
Vice President
RCG/Hagler, Bailly, Inc.

Suzanne Goldstein Smith
Manager
RCG/Hagler, Bailly, Inc.

David Wolcott
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RCG/Hagler, Bailly, Inc.

Wendi Norris
Associate
RCG/Hagler, Bailly, Inc.

Frank Wang
Omni-Tech International

Gerald Decker
Omni-Tech International

Richard Cudahy
Director, International
Sycom Enterprises

Dan Chemsak
Export Manager
Bacharach, Inc.

Terrence O'Hanlon
President
UE Systems, Inc.

Joe Vilardo
Honeywell, Inc.

APPENDIX D

PRESENTATION BY GEZA SZABO
GENERAL DIRECTOR OF BUSZESZ YEAST AND ALCOHOL FACTORY
"RESULTS OF ENERGY EFFICIENCY AUDIT"

Ladies and Gentlemen.

First of all, I wish to introduce myself and my company. I came from Hungary. My name is Géza SZABÓ and I am the general director of the Budapest Distillery and Yeast Factory.

We have two major products: yeast and high quality ethyl alcohol of 96 % purity. We have our own combined cycle power plant that produces high pressure (40 bar) steam, to support our technological processes and to sell a part of it to external customers, in addition to the generation of electric power with the use of a back-pressure steam turbine.

The energy supply cycle and technological data of our major equipment are shown on the next diagram:

Figure 1.

Figure 2: Major equipment of energy supply and their age

MAJOR EQUIPMENT OF ENERGY SUPPLY AND THEIR AGE

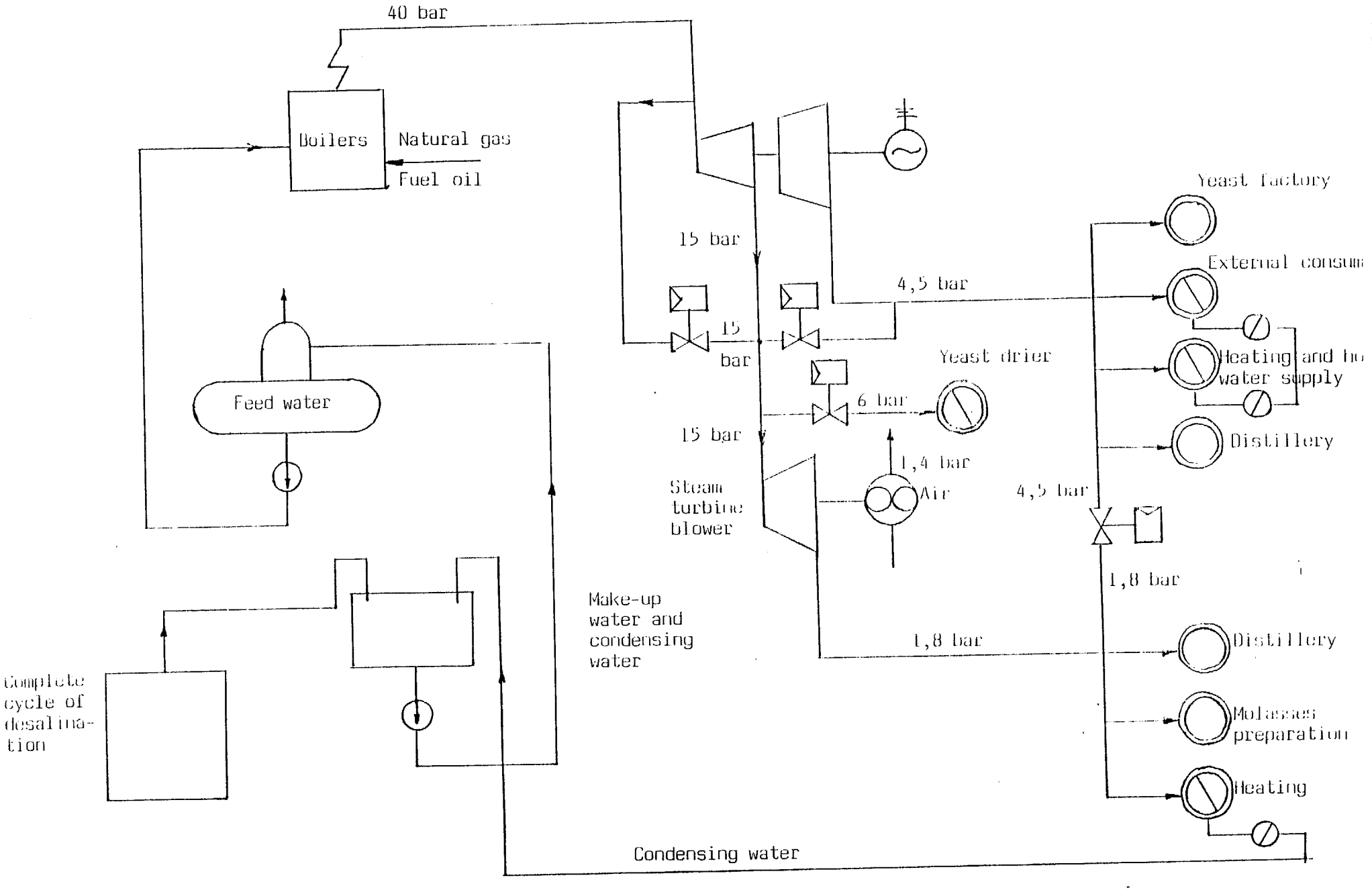
EQUIPMENT	Capacity	Year of manufacture
BW boiler #1	20 tons/hour	1959
BW boiler #2	20 tons/hour	1961
BW boiler #3	30 tons/hour	1960
Steam turbo generator, 4.5 MW	3.9 MW	1959
LÁNG blower, #2	380 kW	1961
LÁNG blower, #3	380 kW	1961

NOTE: Originally, we had coal-fired boilers. They were reconstructed for the use of natural gas and fuel oil in 1970.

In 1990, the BW boiler #3 was completely reconstructed, incl. replacement of refractory lining and the pipes.

The year of manufacture of these equipment allows anyone to conclude that our equipment are rather obsolete. In the past several years, a number of remarkable modernization and investment projects were implemented. Unfortunately, these were not accompanied by the simultaneous modernization of the energy supply system which was only maintained as to assure continued operation.

Figure 1: Schematic drawing of energy supply system (Budafok Yeast Factory)



In 1989 and 1990, we decided to reconstruct our energy supply system. In the meantime, however, considerable changes occured in our country's economy, substantially influencing our efforts and objectives. The demand for steam of our external customers decreased, partly because they introduced new products whose manufacture required less energy and partly because they began to rely on their own energy supply systems. Their efforts were encouraged by several runs of considerable increases of the price of energy (i.e. natural gas and electric power).

The proportion of energy costs within the total production costs and recent changes of the energy prices are shown in the next Table (Table 1):

Table 1: Trends of the share of energy costs from the total costs of production (%), reflecting the increase of natural gas price

YEAR	Increase of natural gas (%)	Total production cost, in USD million	Total energy cost, in USD million	Energy cost in % of total cost of prod.
1989	78.4	13.05	0.99	7.6
1990	100	15.0	1.84	12.2
1991	143	16.6	2.5o	14.9
1992	159	12.2	1.33	10.9

These figures show that the share of energy costs from the total cost of production became an increasingly important indicator of the efficiency of our production processes, i.e. our efficiency rate improved by 30 % in 2. years.

The above described circumstances and complexity of the problems prompted us to invite an external consultancy firm (Institute for Energy Management and Conservation, Hungary - EGI) to assess the efficiency of the existing energy supply system and to elaborate a new development concept. The period of such survey coincided with the term of USAID-Hungary programme whose implementation had been coordinated by EGI, as well.

Accordingly, in March of 1991, the survey of our company's energy management system was carried out through the joint efforts made by the experts of RCG/Hagler, Bailly, Inc. engineering firm, EGI and our company. Results of that survey were used to eleborate a new energy management and conservation programme, based on aspects and criteria determined by USAID experts.

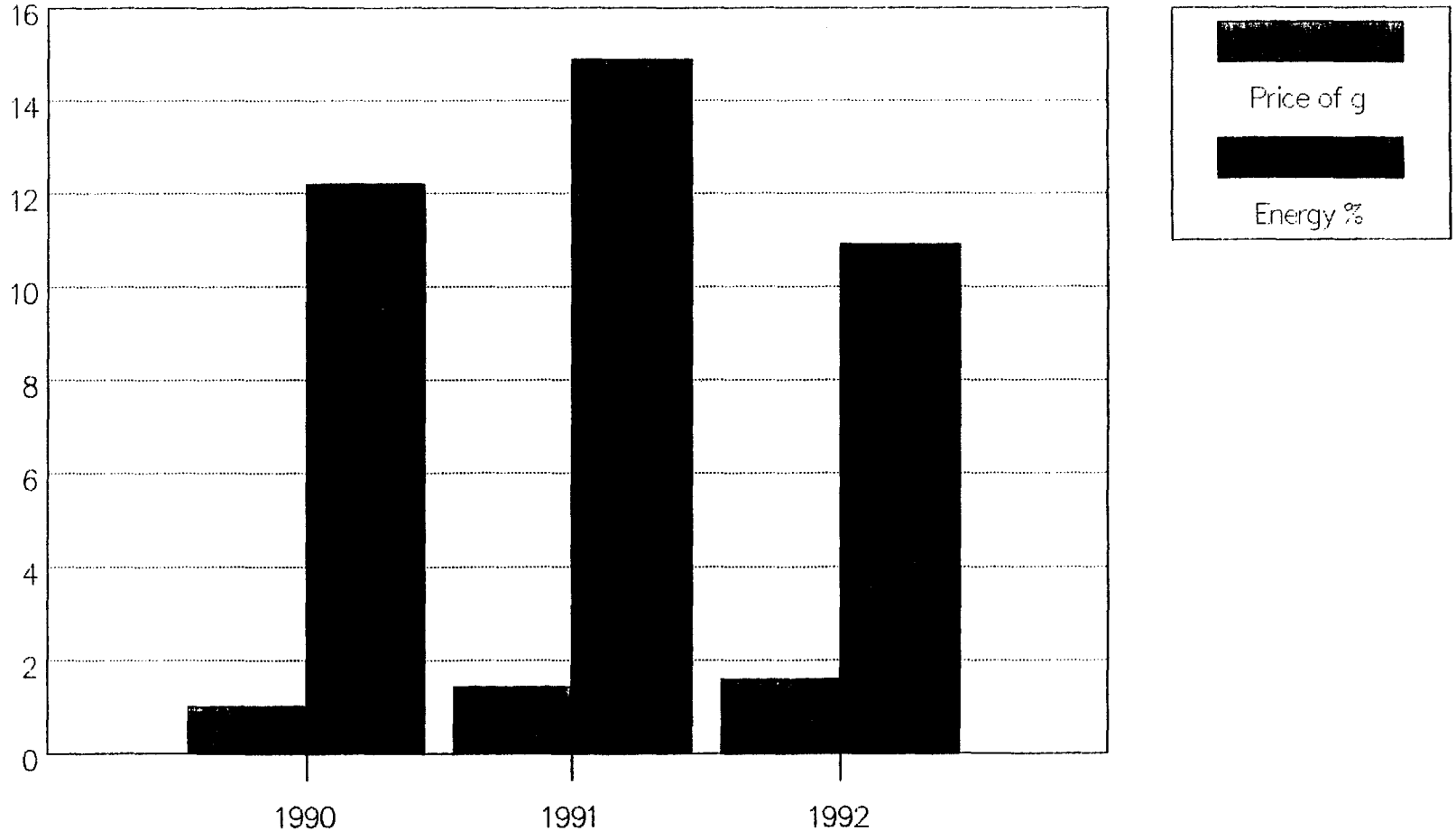
The programme proposal included three major categories:

1., Jobs requiring the taking of immediate actions
2., Projects which require both the taking of actions and the making of additional investments
3., Short and medium term project proposals

1., <u>Actions taken in relation to item 1:</u>

- operation of the power plant as a separate profit center
- improvement of the structure of energy management reports, introduction of a new energy accounting and evaluation system

ENERGY COST IN PERCENT OF TOTAL PRODUCTION COSTS



CHANGE OF ENERGY PRICES BETWEEN 1989 AND 1992

	1989	1990	1991	1992
Heat, natural gas, Ft/GJ	116	148	212	236
Flat rate, natural gas, Ft/MJ/year	124	155	250	287
Electric power, night rate, Ft/kWh	1.3	2.5	2.5	2.5
Electric power, daytime and peak rate, Ft/kWh	2.2	3.6	3.6	3.6
Consumption fee, Ft/kW/year	4104	7140	7140	7140
Auxiliary/reserve capacity fee, Ft/kW/year	237	468	468	468

- in the field of production organization:
  - -- introduction of continuous operation of the yeast plant
  - -- improved capacity utilization of the distillery, by means of expansion of the fermentation unit
  - -- survey/amendment of energy supply contracts.

Results of the actions:

- the pattern of energy consumption of the plant units and workshops became more even and uniform, thus reducing the peak demand (of electric power, water and natural gas)
- introduction of the new evaluation method of the daily energy consumption enabled our managers to take immediate actions when it was necessary
- the operation of the power plant as a separate profit center made possible to clearly establish the actual energy costs, broken down according to the individual products. This fact prompted the different plant units to introduce energy saving and conservation measures.

2., Actions concerning item 2

- installation of modern steam flow meters (USAID aid)
- installation of flue gas analyzer (USAID aid)
- introduction of EDP methods for the evaluation of the power plant´s operating data (computer, USAID aid)
- recycling/utilization of waste steam used to sterilize molasses (installation of heat exchanger, financed by our company)
- pre-heating of water used in the fermentor, with the use of waste heat of the distiller´s water cycle (installation of a heat exchanger, financed by our company)
- development of a new technical solution for the unloading of cold molasses from railroad cars (financed by our company)
- improved heating system for the office building (financed by our company)

In connection with the additional investments and the resulting cost savings, a summary of different technical measures is provided in the following table:

Table ..: Summary of technical measures

MEASURE	steam seaving GJ/year	USD/year	invested USD
recycling/utilization of waste steam used to sterilize molasses	3130	17225	5250
pre-heating of the distiller´s water cycle	8380	46087.5	9287.5
new technical solution for the unloading of cold molasses	9802	53912.5	38750
improved heating system for the office building	25%		5625

The following figures illustrate the method of calculation of the relevant complex indicators and the change of the specific values, in function of time.

CALCULATION METHOD AND TREND OF THE MAJOR TECHNICAL INDICATORS

$$\text{INDICATOR} = \frac{\text{heat content of natural gas} - 1.3(\text{steam sold} + \{5.2*(\text{power generation} - \text{own consumption})\})}{1/3\ \text{moist yeast} + \text{distilled alcohol} + 2/3\ \text{dehydrated alcohol} + 3/2\text{diredyeast}}$$

INDICATORS
(IN THE YEARS OF 1990, 1991 AND 1992, showing each quarter)

YEAR	1st quarter	2nd quarter	3rd quarter	4th quarter
1990	17.62	19.25	19.55	18.72
1991	21.51	16.05	14.04	14.82
1992	14.08	14.4o	11.67	--

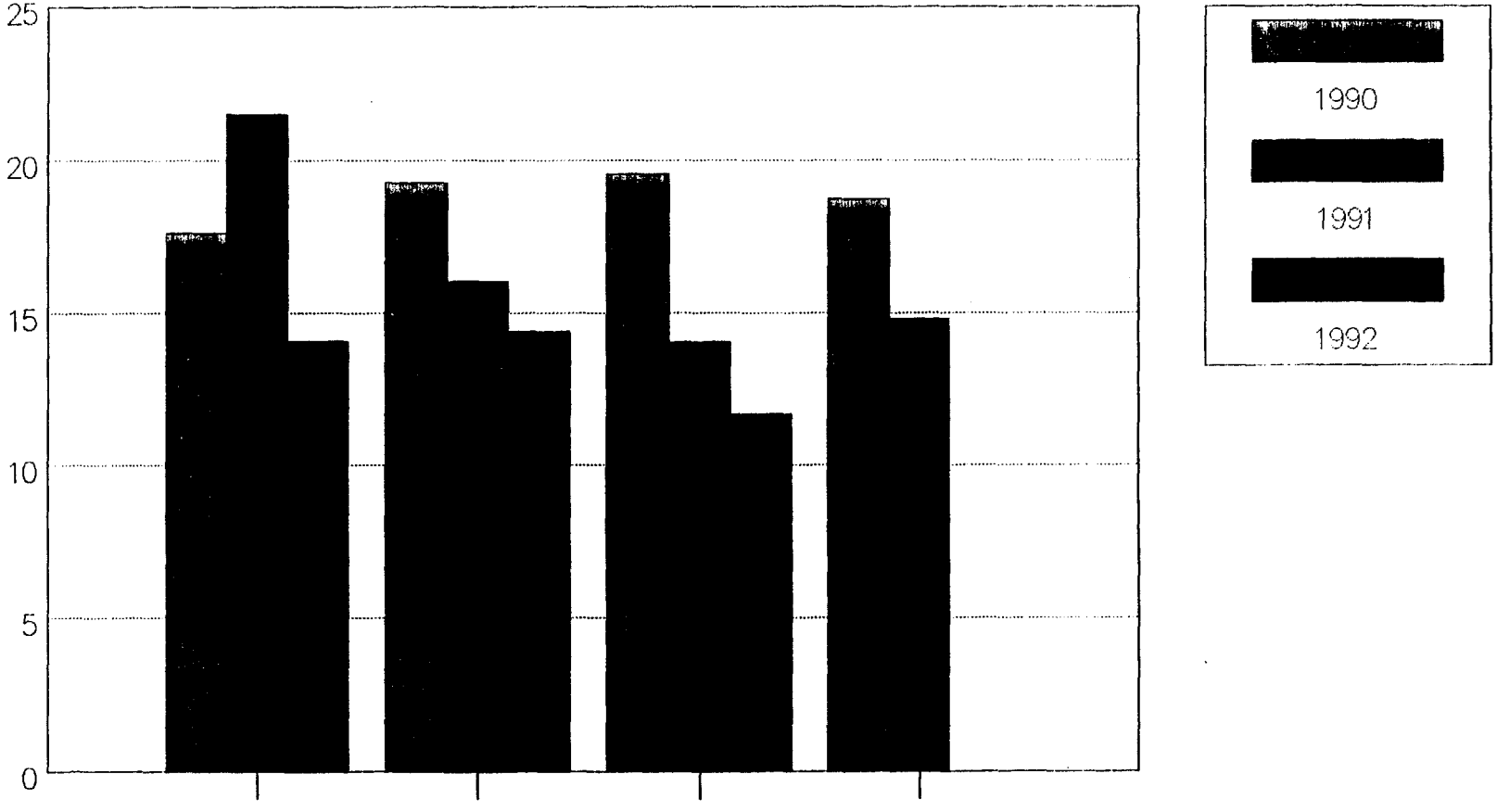
Table ..:

The above facts and figures justify that a deliberate and more efficient control of energy management and conservation has produced some quite satisfactory results.

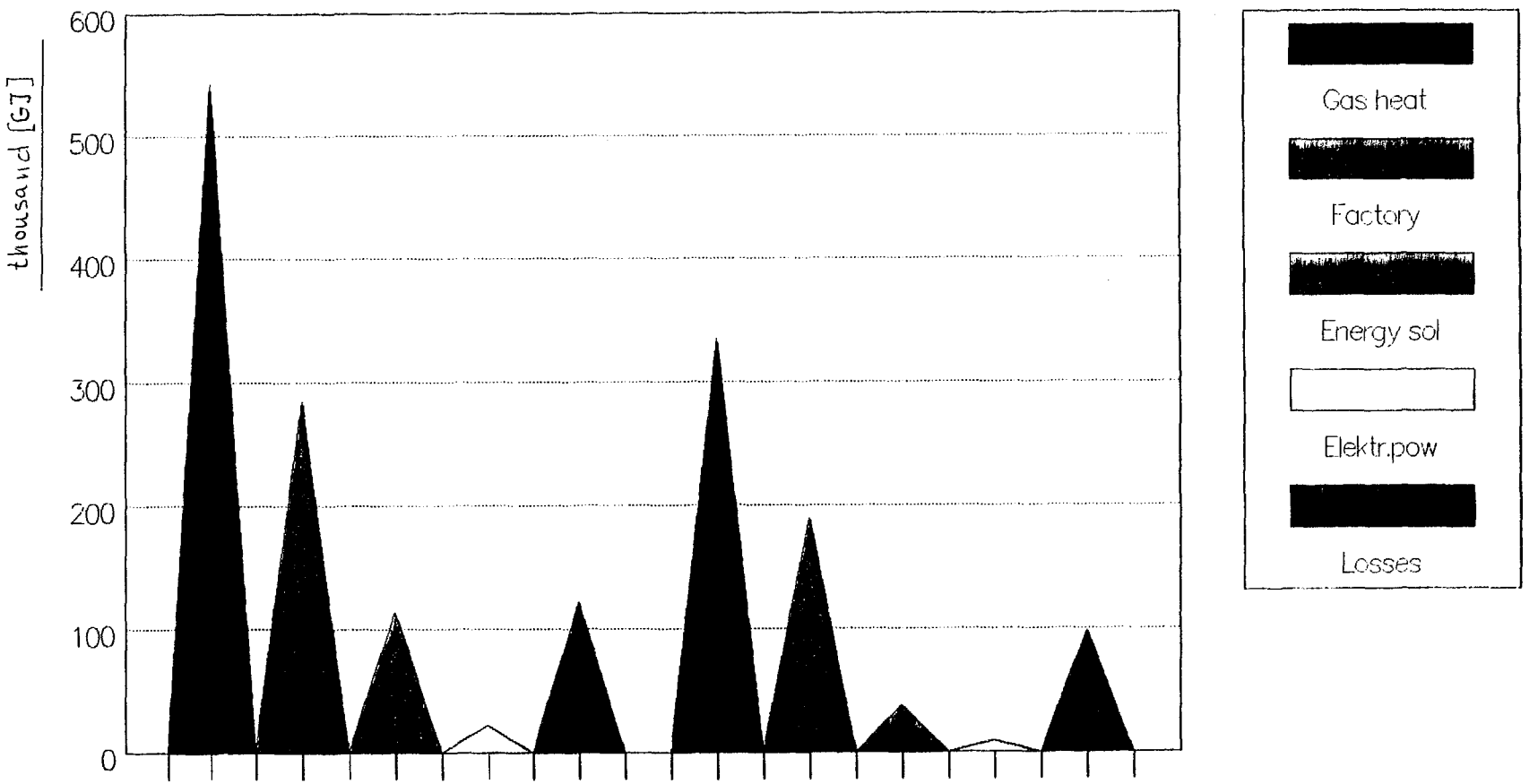
Let me show you the last foil as to provide an unchallengeable proof of the success of our efforts in the field of energy management and conservation. In order to assure an adequate ground for comparison, similar periods of two different years were selected, i.e. the first three quarters of 1990 and 1992, respectively. While the output of our company exceeded in 1992 that of the similar period in 1990, the total steam consumption decreased by nearly 30 percent. Since the yield ratios remained unchanged, the efficiency of the energy transformation cycle did not improve considerably. Accordingly, energy conservation was achieved through the previously mentioned improvement of the production processes.

In adherence to our attitude in energy management, the following measures have been taken in 1992 and are to be taken in 1993, respectively:

QUARTERLY CHANGE OF MAJOR INDICATORS IN THE PAST THREE YEARS



Comparison of heat energy consumption, in 1990 and 1992



MEASURES TAKEN IN 1992

- Automatic performance control of Boiler #3, to replace previous manual control
- Automatic water level and ~~flue gas control~~ pressure in the feed water tank and degassin tank, to replace previous manual control
- complete revamping of the phase-adjusting condenser unit
- improvement of unloading technology of cold molasses in the yeast plant.

PLANS FOR 1993

- Replacement of the blades of the 4.5 MW turbine, taking into account the current and future load factors
- installation of a computer aided system for the monitoring and, if necessary, limitation of electric power consumption
- frequency control of heavy duty electric motors, in proportion with the actual power requirements (air blowers, pumps)

LONG-TERM PERSPECTIVE

In connection with the reconstruction of the factory, modernisation of the energy system.

Finally, I wish to thank you for your attention and for the opportunity to speak of our achievements. Also, I wish to acknowledge the assistance provided by USAID and the Hagler and Balley team, particularly the efforts made by Mr. David Keith, and wish to express my sincere gratitude to everybody who contributed to the common success.

I thank for Your invitation

Sincerely

Fakir Fiza

Washington . 25.10.92

APPENDIX E

PRESENTATION BY DR. VIRGIL MUSATESCU
SECRETARY OF STATE, ROMANIAN MINISTRY OF INDUSTRY
"ROLE OF PUBLIC AND PRIVATE SUPPORT FOR ENERGY EFFICIENCY"

Role of Public and Private Support for Energy Efficiency

Dr. Virgil Musatescu

Romania, like other Central and Eastern European countries, faces many problems in the energy field. The inheritance of the former centralized economy is a developed but energy inefficient industry with a high energy intensity, a little consumption by the population and by the sector of services, and serious environmental problems. At the same time, the incentives to modernize and adapt the structure of the energy consuming sectors was lacking. The policies needed to lower national energy intensity were launched too late: almost a decade elapsed between the market economies and our economy in this respect. Additionally, these policies were targeted towards the reduction of population energy consumption instead of effective maintenance and management of the principal consumer: industry.

The measures introduced: some degree of market conditions in the energy sector (such as raising energy prices, changing and beginning a new legislation to remove the monopoly status of energy industries and to establish an attractive business environment which can interest foreign investment) have been accompanied by a severe economic recession with a decline in the GDP. In Romania, we have already reduced some of the energy intensive industry branches like metallurgy, fertilizers, construction materials and, as a result, the share of industry in final energy consumption has been decreasing in the last three years (from around 70% in 1989 to 55% in 1992 as a forecast). These are the structural changes. But we must also have technological changes. The effect is to have an improvement on energy efficiency of the consumers by raising energy efficiency, taking into account the socio-economic factors.

Therefore, usually, a certain number of reasons move us towards better energy efficiency. Generally, the main reason remains that it is cheaper to reduce the consumption instead of building a new generating unit and the impact upon the environment is smaller. But in Romania, we have enough installed capacity in our electricity generating system that we have no need for new power plants. Paradoxically, the equation between the supply and demand is unbalanced because of the shortage of hard currency for imported fuel. That means that energy efficiency is essential for decreasing the pressure on our hard currency balance. At the same time, taking into account that the structure of the electricity generation is around 45% on coal, 30% on hydrocarbons, 18% on hydro, the rest renewable and import, we may reduce the generation on coal and improve the environmental impact.

To understand these priorities better, we cooperated with a World Bank mission in the field of energy and we identified the main barriers existing - at the time (early 1991) - in the front of good energy efficiency. These barriers are (Table No. 2).

What we did to improve the situation?

1. About the technical barriers we didn't do too much. We had some national and international workshops and conferences in the field. We were and are in some programming under the umbrella of USAID for energy audits (supplying measurement devices for some representative companies) and a whole project concerning the framework of providing technological improvement. But we still need the know-how, new environmentally sound technologies, and monitoring, measurement and control facilities.

2. In the economic field, the main achievement is that the prices of energy are now mainly at the international level, except natural gas. The subsidies will be decreased to zero level until April 1993 even for the population.

3. The financial barriers are partially removed by capitalization of the banks and the partial liberalization of the rate of exchange of our domestic currency. But because of a high rate of inflation, the interest rate is high too, which means there are some compulsions for the borrowers also in the domain of energy investments. The lack of simple, accessible medium-term financing for energy efficiency remains.

4. I believe that the most important field is the establishment of institutional and management framework which can help the activities for energy efficiency. In this respect we founded a Romanian Agency for Conservation of Energy which deals with all problems of energy use not only in industry but also in the other economic branches. The principal role of this agency is to help by promoting regulations, by providing partial or whole financing for some demonstrative projects and to disseminate their results by informing the people about the possibility of conservation a.s.o.

Concerning the legislative framework, I want to emphasize the fact that we have an attractive law for foreign investors with the treatment of them as the national investors and the possibility of returning the profit.

What do we want to do in the future?

1. Primary, in our view, the structural changes in the whole economy but especially in the industry will reduce the energy demand. This effect on energy consumption is of greater magnitude than the various end-use efficiency measures. However, it is likely that structural changes will take several years to achieve an effect. This implies that in order to meet the increasing demand, especially in the household and commercial sector, end-use energy efficiency measures can help slow down growth rates or even lower national energy demand.

I must underline the fact that the introduction of market conditions which provide this structural change has some negative aspects such as: significant decline of national output, high inflation and increasing unemployment. At the same time, the loss of traditional markets in the East is another important difficulty.

2. Secondly, de-monopolization and privatization represent some obligatory steps toward a good framework. The item is very important and we now have some consulting companies which make some studies in this field.

3. Thirdly, the openness for all kinds of new technologies, this modernization being based upon attractive feasibility studies for many enterprises to demonstrate a least-cost development of these companies. We have got some foreign companies which established joint-ventures with Romanian partners and the result is that they came with some technology and money, also modernizing the technological process but indirectly they increased the energy efficiency. I must underline here that this process of modernizing is under development especially in the industry field but there are many other domains like households, transportation, agriculture, etc.

4. Fourthly, we need greater and more detailed information on the legislative/organizational, financial and technical aspects of energy conservation policy, including energy efficiency standards.

5. Last but not least, because of lack of financing, we must understand and learn, especially in the private sector for small and medium size enterprises, how to build and use appropriate financial schemes. At the same time, for the energy and environment projects how to attract private and international organizations funds (from IBRD, EBRD, USAID a.s.o.) especially in this sensitive sector with a lot of money needed for long term implementation.

What is the role of the government and the private companies in realizing the final task of an effective use of energy?

Right now we are organizing a framework for applying our privatization law: there will be two kinds of organizations which will deal with the subject of ownership; State Ownership Fund and Private Ownership Fund. They will provide the decisions concerning the economic policy, the strategy remaining at the level of the ministries which must organize also the legal framework for applying these strategies. In the field of energy efficiency and DSM, that means the defining of targets and of the tools, the promotion of adequate laws and regulations, the increase of competition in electricity generation and thermal energy; in other words, to develop the market conditions. Also the state will be involved in overall economic growth, regulation of prices, the fight against inflation and unemployment, etc.

What is the role of the private ownership in this respect?

A. To solve a problem of energy efficiency, you must have -- from the very beginning -- a good consultancy which is not connected to certain kinds of technology or a certain interest of a department or an autonomous utility. Even now the important consulting firms in Romania are depending on a certain branch of activity and they have a dominant position, without competition. That is why their incentive is very small to transfer new information. This role must be fulfilled by the other actors: private

consulting companies, local and foreign. They may work alone or by joint-ventures to implement appropriate technologies, to purchase, to install and to maintain energy efficient equipment.

B. But to use such equipment, one must be trained for it by an appropriate personnel who knows the equipment, how it works and especially, how it is to be maintained.

C. In Romania there exists a big potential market for measuring, monitoring and control devices. For example, we need electricity, heat and natural gas meters for industry, but especially for population. It is not possible for a state-owned company to fill this demand entirely and there is enough room for imported equipment or for equipment made in cooperation with foreign technology. I think that in a few years time, the market of Central and Eastern European countries will boom to a huge volume of demand for such equipment.

D. Our electricity utility and the Romanian Agency for Conservation of Energy are interested in a comprehensive program for DSM and energy efficiency. Who will implement this program, who will teach the industrial companies especially to have an integrated resource approach? Obviously, the private companies which have already done this kind of activity and possess the know-how.

E. The lack of financing, even for the short term investment, may be overcome by attracting some foreign funds, developing the role of agencies for conservation of energy existing in each country, establishing appropriate schemes for attracting money and returning them from the profit. The essential issue remains the payback period, but it depends on the ability of investors to pick up the most interesting projects. And I think that the appropriate moment is now when the market exists, but not so many competitors.

I hope that from this presentation you found out more about our situation in the energy efficiency field, about our needs and maybe how to cooperate with us for a mutual benefit.

APPENDIX F

PRESENTATION BY GERALD DECKER
"PRIVATE POWER AND EFFICIENCY: COGENERATION"

MEETING ON ENERGY EFFICIENCY IN EASTERN AND CENTRAL EUROPE

OCTOBER 26, 1992

GIVEN BY: GERALD L. DECKER

CHAIRMAN - DECKER ENERGY INTERNATIONAL, INC.

PRIVATE POWER AND EFFICIENCY: COGENERATION

Good afternoon, I am pleased to have this opportunity to speak to you on the subject of private power and efficiency and the important role that cogeneration plays in improving the fuel efficiency. I have spent over 40 years in this field covering almost every aspect of the business and it is this experience I want to share with you today. Last year, I had the privilege of working with some of you in Poland and I believe what I have to say is very pertinent to eastern and central Europe.

First, I would like to give you some background and history that leads us up to where we are today and then talk about how an independent power company like Decker Energy International operates in this environment and also explain the many risks that are involved.

"Cogeneration" is a new term for an old technology. The "co" in cogeneration refers to the coincident or simultaneous or sequential production of two or more useful forms of energy (most often electricity and thermal energy in the form of steam) in a single facility.

The term "cogeneration" originated during the formulation of the National Energy Act and other Federal legislation enacted in the 1970s in response to the energy crises which followed the OPEC oil price increases of 1973 and 1979.

The appeal of cogeneration lies in the fact that it uses fuels much more efficiently than if the cogenerated energy forms were produced separately.

The basic economic appeal of cogeneration, stimulated by regulatory incentives, led in recent years to a surge of action by

U.S. industry to build new cogeneration facilities. This in turn led to a number of corresponding reactions by other sectors of the economy.

Cogeneration's increased efficiency should, in principle, yield a decrease in environmental impacts, since less fuel is burned to produce a given amount of useful energy. But any energy conversion activity has some environmental effects, and cogeneration facilities must meet specific environmental standards.

Cogeneration affords almost a textbook example of how changing economic conditions can bring about a resurgence of an old technology. With the rapid changes occurring in eastern and central Europe, I believe a similar resurgence is going to happen.

Cogeneration has been around since the days when Thomas Edison invented the electric light bulb. As a matter of fact, his first power plant was a cogeneration facility. At the turn of the century cogeneration provided over half of the U.S. power through on-site industrial generation systems. Since then the prevailing trend, until recently, was a continuing drop in industrial generation of electricity consumed. A high percentage of industrial organizations continued to make their own steam, but this separation of steam and power generation eliminated much of the advantages of cogeneration. During the early decades of the 20th century, central utility plants became more efficient through economics of scale and improving steam-turbine technology, including high superheat and reheat concepts. Transmission lines reached out across the country and were linked in synchronized systems. As utility power became cheaper and more reliable, incentives to self-utility power became cheaper and more reliable, incentives to self-generate declined. By 1950, industrial cogeneration accounted for only about 15% of U.S. industrial electricity use and by 1980, of the 88 billion kilowatt hours of

energy used by industry, only about 5% was cogenerated.

The Dow Chemical Company - where I worked for 38 years - has cogenerated process steam and electricity continuously since 1910, and is now thought to be the largest cogenerator in the world. So there is well-established technology for cogeneration, as well as new-and-improved cogeneration equipment.

COGENERATION HISTORY OF DOW CHEMICAL

(1) Starting with founding of company in 1897 in Midland, Michigan, power was self generated, burning wood waste from local sawmills to produce steam to drive steam engines.
(2) In 1910, Dow moved to cogeneration, when steam was needed to concentrate brine for a new chlorine process developed by Herbert Dow.
(3) Great Western Electrochemical Corporation formed to utilize cheap, off-peak capacity available from Great Western Electric Company. Great Western Electrochemical Corporation was later bought by Dow and Great Western Electric later became Pacific Gas and Electric.
(4) In 1940, Dow opened its huge petrochemical complex in Freeport, Texas to take advantage of cheap natural gas, which was being flared. Cogeneration was employed from the beginning, with the electricity being used in the production of chlorine, caustic soda, and magnesium and the steam being used in these and other chemical processes. For many years, Dow had more generating capacity than the local utility, Houston Lighting and Power. Today this is the largest cogeneration facility in the world, with a capacity of 1300 MW.

The Freeport site has always had a high electro chemical component being one of the world's largest producers of chlorine

and magnesium, and consequently a high and steady base load electrical demand.

Going into the 1970s, Dow's Freeport mix of cogeneration units was located in 4 power plants at three production sites. These sites are all connected by high voltage transmission circuits and chemical process pipelines - so they are, effectively, one site - and are operated as one. Individual generating units varied in size from 5 MW - many of them being added to match process plant additions. The designs varied from low pressure gas fired boilers and steam turbines, typical of World WarII days - to the most recent General Electric Frame 7C - producing about 70 MW plus process steam.

In between were some of the first of the gas turbine models produced by the manufacturers in the intervening years. Steam was produced at 3 pressures by use of extraction and backpressure turbines. Installed cogeneration capacity was over 1,000 MW and 6,000,000 pounds per hour of process steam. All units were fired with fuel gas or by-products produced at the site.

This power and steam capability supplies Dow's adjacent chemical process plants - all part of the same site. Supplemental electricity, firm and interruptible, is purchased from the local utility - Houston Lighting and Power. When fuel gas in Texas began its climb from 25 cents per million BTU to its present range of 2 to 3 dollars, the energy intensive process plants along the Gulf coast rapidly reached some turning points and the power system described above became obsolete. This is an important point, when the fuel cost increases significantly, you need to analyze your energy system for opportunities to improve the economics.

Dow responded in several ways. First, was a formal, organized,

aggressive energy conservation program. BTUs to convert raw materials to product were reduced by 40% in ten years.

Dow's approach to energy management has been, first, to emphasize energy conservation and maximize the efficiency of electrical and heat energy use. This is followed by further reductions in energy use through cogeneration. Our evaluations led to the following conclusions:

A. Existing, obsolete on-site cogeneration facilities were no longer competitive and had to be replaced.
B. Cogeneration was the best avenue for remaining competitive in chemical production at the Texas location.
C. Gas turbine, combined cycle technology offered the best opportunity for technological and cost improvement.
D. Gas turbine technology is more adaptable to a range of fuels such as gasified coal, process off gas, oil as well as natural gas.

The first step in replacement of the obsolete facilities was the design and construction of the first phase of a new cogeneration facility - designated power 6 (one of four new facilities at the site). This phase of the overall plan included 3 G.E. Frame 7E gas turbines (ultimately 2 Westinghouse 501 D5's were added) - each exhausting into Dow-designed, heat recovery units. These unfired, recovery units use the turbine exhaust heat to produce steam at 1250 psi, 235 psi, and 30 psi. The high pressure steam flows are combined and piped to a 57 MW, single extraction, backpressure steam turbine and a 110 MW double extraction swing unit. While these units are fueled with natural gas today, they are designed for operation with synthetic gas when it becomes competitive.

Following the Power 6, G.E. based installation, Dow has modernized two of their existing power plants, and have added to Power 6 by use of Westinghouse equipment.

The overall results of this cogeneration project over the old equipment shut down and replaced amounts to a 30% savings of the pre-replacement fuel, and the availability of the generating units is in the 90+ percent range.

(5) As Dow built other chemical plants around the world, most of them employed cogeneration, and today the company is the world's largest cogenerator, with over 3000 MW of capacity.

COGENERATION: A MATURE TECHNOLOGY WITH AN EXCITING FUTURE

For such a mature technology, cogeneration has a surprisingly exciting future. This is a classic case of changing economic conditions giving new life to an old technology. The attractiveness of cogeneration centers on its greater efficiency in converting primary fuels into electricity and heat. When fuels were cheap, it was easy to ignore or pass over cogeneration. Since then, high energy prices, PURPA, and a lot of publicity have brought about a great resurgence of interest in cogeneration - and in its use in applications that were not considered feasible before.

This increased interest, in turn, has brought about the development of a cogeneration industry, composed of firms, such as DESTEC ENERGY, and new entrepreneurial firms, such as DECKER ENERGY INTERNATIONAL. These firms will design, build, and operate cogeneration plants, selling electricity and heat at a discount to customers. In effect, they are acting as non-regulated utilities - able to supply energy cheaper to specific customers because they can take advantage of the higher efficiency of cogeneration.

There are several basic reasons for the development of a cogeneration or independent power industry. At the head of the list is the very attractive economics of many applications for cogeneration. At today's high energy costs, it is common to find simple paybacks for cogeneration in the range of four years.

Secondly, the Public Utility Regulatory Policies Act of 1978 established an institutional framework allowing qualified non-utilities to cogenerate. Thirdly, many energy users do not want to own and operate cogeneration facilities themselves. They lack the necessary expertise in power generation and thus do not want to take the risks involved. Or they may lack the capital, or very likely may wish to put scarce capital into expanded production rather than cost saving projects. All of this creates a real need for third-party developers competent to implement cogeneration.

There are many factors necessary to make a cogeneration or independent power company successful. Technical expertise grounded in hands-on experience is one of the most important of these. The basic concepts of cogeneration are relatively simple, but the practice of cogeneration is complex - and difficult for those not soundly versed in the technology. All the various aspects of combustion, steam generation, electric generation and distribution must be integrated effectively into a system design for a particular application. Detailed engineering must fit this system into the given location, as well as meeting many other important considerations. Control systems must be designed to meet the objectives of the project. Construction must be managed properly for greatest efficiency and to meet schedules. A wide variety of technical problems may surface during the start-up and must be dealt with promptly. When all is running smoothly, there is still the matter of good maintenance and operating organizations and procedure to be put into place - so that the savings projected will actually be achieved.

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This is just on the technical side. We all know that there is much more to the story, if a company is to successful. Cogeneration companies are no exception to this rule. In fact - sometimes I think that there are more balls to keep in the air in this business than in many others. But that is possibly just the natural feeling of most business men about their own turf that they know so well. Nevertheless, many skills are required in addition to the technical, organizational and managerial expertise involved in the design, engineering, construction and operation of a cogeneration facility.

COST OF COGENERATION SYSTEMS

The capital costs, which may range from $300 to $1800 per kilowatt of capacity are probably the most important economic consideration for a potential developer of a cogeneration system. These costs vary with the technology selected and cogeneration configuration, which must be selected on the basis of process compatibility, and which varies by site.

The electrical output of similar steam-producing topping and bottoming cycle cogeneration systems varies significantly as it also does between gas-turbine and steam-turbine systems. The largest capital investments are usually for steam turbines followed by gas turbines and diesel systems.

REGULATION TO ENCOURAGE COGENERATION

One of the features of the Public Utility Regulatory Policies Act of 1978 (PURPA) was to encourage conservation of energy and efficient use of energy resources by public utilities, and to encourage the production of electric power by cogenerators and small power producers (those with 80 megawatts or less that use renewable or waste-energy sources as a primary fuel).

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Prior to PURPA, developers of cogeneration or small power production facilities faced three major regulatory and economic obstacles. First, utilities were not generally eager to purchase the electric power generated by these facilities. Second, some utilities charged discriminatory high rates for backup power required by cogenerators. Finally, a cogenerator or small power producer selling electric power risked being classified and regulated as a utility by the State and Federal regulations. Sections 201 and 210 of PURPA are designed to remove these obstacles and encourage the development of these facilities.

Under these sections, the Federal Energy Regulatory Commission (FERC) established rules to encourage production by cogenerators and small power producers so that energy resources would be used more efficiently. In addition, each State regulatory authority was required to implement such rules for each utility for which it has rate-making authority. Under the FERC rules, a cogeneration facility can be designated a "qualifying facility" (QF) if it can meet three qualification criteria. These criteria are based on specific ownership, operating, and efficiency standards. Under FERC's procedures, a facility may file an information report known as a "self qualifying notice" with FERC if it meets the requirements of the rules, or it may apply for certification as a qualifying facility. FERC determines the qualifying status of existing facilities, as well as planned or proposed facilities in advance of their construction or operation.

COGENERATION TECHNOLOGY

Cogeneration is not limited to a single process, but employs a number of technologies to produce electric and thermal energy. The technology selected depends on the requirement for process steam. Cogeneration technologies are classified as "topping-cycle" and "bottoming-cycle" systems, depending on whether electrical or

thermal energy is produced first. In a topping-cycle system, the energy input to the system is first transformed into electricity or shaft power and the waste heat is then used for thermal energy. That is, high-temperature, high-pressure steam from a boiler drives a turbine to generate electricity or shaft power, and the lower pressure steam exhausting from the turbine is used as a source of process heat. Topping-cycle systems are the most common and are used in residential, commercial, rural, and industrial applications.

In a bottoming-cycle facility high-temperature thermal energy is produced first for applications such as reheat furnaces, glass kilns, or aluminum metal furnaces. Heat is extracted from the hot exhaust stream and transferred through one or more mediums to drive a turbine. Bottoming-cycle systems can only be used in industrial processes that need very high-temperature heat so that it is economical to recover the waste heat. A good example is the steel plant at Ostrowiec in Poland.

Fossil-fired steam turbine systems are used in most industrial cogeneration processes. Gas-turbine systems, which use combustion gases to drive the turbine to produce electricity and recover heat from the exhaust gases on waste-heat boilers, are used in most of the remainder of the processes. Diesel engine based systems have limited applications as they provide less useable process heat per unit of electrical output than do gas turbine systems. The engine is cooled with water and the heated water is used for process steam, heat, or hot water application. Exhaust gases can be used in a similar manner. Diesel systems are attractive to small cogeneration applications that require the instantaneous supply of electricity (not allowing time for boiler warmup needed by some technologies), and where in general the electric power requirement is greater than the heat requirement.

INDEPENDENT POWER GENERATION INDUSTRY

THE INDEPENDENT SWITCH IS ON

According to the RCG/Hagler, Bailly database, there are 40,000 MW of independent power currently in place in the United States. This includes all facilities that are not 100 percent utility-owned and, therefore, not rate-based. This also takes into account not only fossil-fired facilities but also MSW plants, geothermal projects and other renewable energy projects. Fifty percent of new U.S. capacity additions in 1991 came from independent power producers. World-wide about 20% of new power additions are coming from independent power producers.

There are several other significant factors in the resurgence of cogeneration. One has been the development of third-party financing for cogeneration projects. Historically, a major obstacle to the implementation of cogeneration has been the high capital cost of the systems. Third-party financing represents a new capital source, which allows off-balance sheet financing for the energy user. It enables the end user to reduce energy costs, while conserving his scarce capital for other uses more central to the purposes of his organization, such as increasing production capacity.

Another important factor has been the deregulation of the natural gas industry starting in 1985. Contract carriage gas is now available at significantly lower prices, which obviously benefit the economics of gas-fired cogeneration systems.

What we are witnessing is a major restructuring of the electric industry. We are moving towards a competitive market in electricity, with many smaller generators and a diversity of supply.

Ultimately what this will mean is lower-cost power to consumers. Much of the new generating capacity in the U.S. can and should be generated by alternative energy projects, if it is not stymied by utilities who are afraid of competition.

Now I would like to describe cogeneration and independent power from a developer's perspective. First, let me define what a developer is. Basically, he takes a project from concept to commercial operation. This is a beguilingly simple job that looks very easy on the surface. For example, we know of one developer who started in 1982 and expected to complete two projects in six months. Three years later his projects were not complete and he came to us for help.

Basically, the developer organizes the dozen or so principal elements of power projects. These elements include: contracts for the sale of the output, both electrical and thermal energy; fuel supply contracts for a primary fuel and a back-up source if necessary control of a site for the plant, which could either be adjacent to a steam user or a greenfield site; selection of an appropriate technology for the project, which is both efficient and reliable; procuring equipment for the project; signing contracts for engineering and construction; obtaining permits; arranging for operation and maintenance; securing financing; and lining up insurance.

Each element above is individually complex, and most companies in this business specialize in only one or two. Combining the dozen or so together makes the entire process close to unmanageable because each element has an interactive affect on the others. As a matter of fact, the development process has been compared to a Rubrik's Cube where each element might be one face of the cube. As you know, changing one face affects the four adjacent sides in the cube. The effect occurs in the development

process: when one element is changed, it affects many others. For example, let's assume that the development of a project is nearly complete, but an engineer finds a way to add a few percent to the overall efficiency through a new technology, which would be worth a million dollars a year. However, to implement that change, several other elements are affected. The power contract must be changed because the extra output needs to be sold; performance warranties from the equipment manufacturers or the contractor will need to be modified; new permits may need to be applied for; the operating agreements will need to be adjusted; the insurance on the project will change because the risk has potentially increased; and financing could become more difficult because bankers hate new technology and financing for the project will be postponed until all of the other elements that have been modified are resolved. Thus, one change affects at least six other elements in the project and the million dollar savings might delay the project by six months. This makes you ask the question: Is it really worthwhile? In that six month time, something else could change, and you would have to go through further delays and possibly never complete the project. You could make the same type statements about the other elements involved in a project as well.

The complexity of the development process is further brought out by the number of parties who are involved in developing a cogeneration project. The steam user and several departments within the steam user's organization will be involved. You must deal with the engineering department and possibly an engineering consultant to the steam user, and also his financial and legal departments. You must deal with the electric utility on several agreements: backup power, purchase of excess power, and an interconnection agreement. There will be one or more fuel suppliers that need to be dealt with. There will be a land owner for the project site. There are equipment suppliers selling

turbines, boilers, environmental controls, and so on. There will be an engineering firm doing detailed engineering for the project. There will be a construction contractor who will build the plant and also play a key role in the project financing. There will be a multitude of Federal, State and local regulators, including the Federal Energy Regulatory Commission, the state public service Commission, the state environmental agency and local authorities. There will be an operator for the project and a maintenance organization. Insurance will be required. Financiers of several types will be involved, including investment bankers, commercial bankers and institutions, who will arrange construction loans, permanent loans, and equity. And, last but not least, there will be a whole slew of lawyers: for the end user, the utility, contractors, banks, etc. As a matter of fact, in one project we are doing, there are 17 different parties involved.

The result is that the development process is highly complex, requiring many diverse skills and an ability to understand and integrate all of the elements. The development period for a project is lengthy, taking as long as two to three years to complete. Also, the development process is costly because of the long gestation time, the complexity, and the many parties involved. The whole process represents a very high risk in dollars, which must be invested before there is any assurance of return.

As you might guess, the development process is centered around financing. As developers typically do not have deep pockets, they are unable to rely on a general corporate credit to finance a project. They must resort to what is called project financing, where the banks and investors are repaid for project revenues only without recourse back to the developer. Project financing has many advantages but it is difficult to arrange and more expensive.

There are two perspectives on project financing. The developer's perspective is that he wants to maximize the upside profitability

of the project, whereas the financier wants to minimize the downside risk, making sure that even in the worst case he will get his money back. In project financing, as in many other things the Golden Rule applies: the banks have the gold, so we, the developer, follow their rules. Thus, to successfully finance a project, we must minimize the risk. To make a project work, the risk must be reduced below some threshold level, and the lower the risk can become, the lower will be the financing payments.

There are many types of risk in cogeneration projects, and I will go over downside risk of each one. This is essentially a negative process, looking at what can go wrong, but it is the best way to analyze any project to insure it can be financed. During the construction phase of the project, there are a variety of risks. Included here are cost overruns with the worst possible result being that the project becomes uneconomical because of too high a capital cost or the cost of the project exceeding the bank's credit limit. Also, in this phase there is the risk of delays, which can result in cost overruns and the postponement of tax benefits into the following year. There is also a risk that the completed plant will fail to meet the performance specifications established for it. The worst possible result here is that the project will be uneconomical.

Once the plant is placed into commercial operation, there is a new set of risks. The reliability may be lower than expected, resulting in a loss of revenue or potentially some type of penalty for poor performance in the power sales contract. The efficiency of the plant may be less than design, resulting in higher than expected operating costs. Or, the operating and maintenance costs may be higher than expected.

There are also energy price risks, where electric rates or fuel costs deviate from projected values used when the plant was financed.

This risk has a very high probability in today's wild energy markets, where fuel costs especially can go up or down. The electric rate could be lower than expected for the project, resulting in a loss of revenue. The fuel cost could be higher than expected, resulting in higher operating costs. The differential between the power rate and the fuel cost could narrow resulting in a profit squeeze, since the profits from a cogeneration project are directly related to this differential.

There is the risk of a fuel supply interruption, which can result from an interruptible gas contract, a coal mine strike, or a rail strike. The result of this is that the plant cannot operate because it has no fuel to burn, resulting in a loss of revenue.

There are also customer-related risks, especially for the steam user, but also for the electric utility. The creditworthiness of the customer is an important issue both for the customer's overall company and for the individual plant where you would be selling the steam. If the individual plant were closed or the company went bankrupt, there would be no market for the output of the plant. There is risk in the amount of energy that the customer purchases, if the customer implements conservation measures where he will need less steam, or if business is bad in his industry, his production level could fall resulting in less need for steam. The result of this is lower than expected revenues and lower profits for the project. In analyzing any customer related risks it is important to look at the long-term viability of the customer's industry and see whether it is likely to be around ten years from now.

In addition to the risks I have already mentioned, there are a variety of others, such as fluctuations in interest rates which can result in higher than expected financing costs. There is the risk of tax law changes, which seems to happen about every year or

two any more, which in the worst case could result in the unavailability of financing. There also are the more traditional types of risks such as acts of God, like fire, flood, etc.

Without ways to minimize these many risks, project financing would be impossible. So how do you go about minimizing risk in a cogeneration project? The best way is to secure longterm contracts which transfer the risk to another party. For example, the risk of construction cost overruns can be minimized through fixed price construction contracts. The risk of poor equipment performance can be minimized through warranties from the equipment vendor and the risk of fire, flood, and so on can be addressed with insurance. The principle here is to transfer the risk to the party that has the most control over it. In the examples I just mentioned, the construction contractor has the most control over the installed cost of the system so he accepts this risk by guaranteeing the price in a fixed price contract. The equipment vendor has the most control over equipment performance, so he provides performance warranties. The insurance company has an insurance market to spread out the risk of acts of God over many projects.

As a model for discussion, I will define here an ideal low risk project and I want to emphasize that this is an ideal theoretical example that will never be achieved in practice but it tells you what to work towards in developing a project. The construction contract should be fixed price lump sum turnkey contract with guaranteed completion by a specific date. It should have performance warranties on things such as capacity, heat rate and reliability and if the contractor fails to meet any of the criteria, the project would be terminated and the contractor would pay liquidated damages including principle and interest on the construction loan. Equipment vendors would provide commercially proven technology at a fixed price with performance

guarantees on efficiency, reliability, emissions, maintenance costs, and so on.

The steam sales contract would be with a creditworthy company in a prosperous industry at its most cost competitive facility. It would include some type of take-or-pay provisions where he guarantees certain minimum payments to the project. The price of the steam would escalate with the escalation of the cogeneration system's operating costs. A power sales contract would have rates fixed in advance or tied to the cogeneration system's fuel cost. At worst, it should have some type of floor energy price and fixed capacity payments that insure some type of minimum revenue to the project. In addition, there should be minimal reliability requirements necessary to earn the capacity credit, and no regulatory out clause to insulate the electric utility from future regulatory law changes. The fuel supply contract should be for a guaranteed supply, if an economical back-up source is not available, and the price should be fixed in advance as much as possible. This is difficult, but possible to accomplish for gas-fired systems and can certainly be done for coal and wood-fired projects.

The operating and maintenance contracts should be for fixed prices during the term of the financing. Insurance should be used to cover risks that can't be addressed elsewhere, including traditional programs such as workers' compensation, liability, builder's risk, property insurance, and boiler and machinery insurance. Also included should be such non-traditional coverages required for third-party financed projects such as expanded builder's risk, force majeure and systems performance insurance.

The principle here is to try to fix as many things as possible in advance and eliminate as much uncertainty as possible. Elements that can be fixed include the capital cost, the electric rate, fuel

cost, and the operating and maintenance cost. Where things can't be fixed, floor prices should be established, in which the worst case still makes it possible to meet the debt service for the project. Examples here would be to set a minimum electric rate, a minimum steam price, or a worst case equipment performance.

No project will ever completely meet these low risk criteria, but the closer that it comes, the more likely it is to be financed, and the lower the financing cost.

In our experience as an independent power developer, we have learned a number of lessons. Number one is that you must be flexible. The long development time for a project allows much time for change and things will change. You must be able to adapt quickly to new conditions. Second, you must have patience. The development process takes longer than it should. We have seen delays for a whole variety of reasons such as: mergers of the customer's company, changes in steam demand due to conservation, the end-user giving us bad data, the customer's engineering consultant not liking cogeneration. It will take a minimum of one year to develop a project to the point of financing unless you have some type of inside contact. Third, you need to have deep [pockets to be a developer. The long development period plus the complexity involved costs a lot of money, which is invested at a very high level of risk. There is no assurance of any return until many dollars have been spent. Fourth, the development process requires many diverse skills, and you need to have exceptional people who understand all of the elements of the project and know how to integrate them. Fifth, you must focus on the best opportunities and prioritize ruthlessly. In the hundreds of potential projects we have seen, all of them looked easy at the beginning, but almost all of them had hidden pitfalls waiting to be discovered. You must be very disciplined to focus only on the best projects and cut off further work as soon as

any type of project stopper is encountered. Sixth, we feel that those who will be most successful in this business will be the best deal makers: those with the ability to creatively structure the best deal for all parties involved. Successful people in the cogeneration and independent power development business will not necessarily be the best engineers or the best financiers. Large companies can be success but they will require an ability to move quickly and an unusual amount of flexibility. We feel that there will always be a role for the small, entrepreneurial developer, who can uncover opportunities that no one else would ever find.

In summary, the electric business is still in the midst of great change. There are some very strong utilities and still some that are weak. PURPA has essentially deregulated the generation of electricity, resulting in a change in the traditional roles of electric producers and consumers.

Where there is turmoil, there is opportunity. In the U.S. in the last decade there have been a number of deregulation examples including airlines, trucking, telephone and natural gas. Each of these has represented a great business opportunity and alternative energy is no exception. However, to realize the full potential of alternative energy, creative entrepreneurs are required. And, to be a successful developer of alternative energy projects, you must be a creative deal maker, have staying power, and understand the complexity of the development process. From the consumer's point of view competition will drive a least cost approach and assure increased energy efficiency, which will help the environment.

APPENDIX G

PROGRAM FOR 15TH WORLD ENERGY ENGINEERING CONGRESS

October 28-30, 1992

Georgia World Congress Center
Atlanta, Georgia

Presented by:

aee 15th Anniversary 1977-1992

DSMs Ci EEMI

Cosponsored by: • The Alliance to Save Energy • AT&T • Electric Power Research Institute • *Environmental Protection* Magazine • Georgia Office of Energy Resources • National Registry of Environmental Professionals • Rocky Mountain Institute • U.S. Department Of Energy: Office of Institutional Conservation Programs • U.S. Department Of Energy:State Energy Programs Division • U.S. Environmental Protection Agency: Green Lights Program

15th World Energy Engineering Congress

1992 World Environmental Engineering Congress

WEEC®

Welcome –

The year 1992 marks the 15th anniversary of the Association of Energy Engineers and World Energy Engineering Congress — the most comprehensive conference and exposition to date. We have added special features this year such as the reception on Tuesday evening, October 27 and luncheon in the exhibit hall on Wednesday, October 28. For the next 3½ days, the top experts in the energy and environmental fields will be presenting technical papers on the latest developments and applications. Since the sessions run concurrently, we suggest that you review this program as well as the bound proceedings. You are invited to attend any session of either of the two concurrent conference programs. Please feel free to move to the speaker or session of greatest interest to you. Again, welcome to the 15th WEEC.

- 15th WORLD ENERGY ENGINEERING CONGRESS
- 1992 WORLD ENVIRONMENTAL ENGINEERING CONGRESS

Your participation and support of the 15th WEEC are greatly appreciated!

PROGRAM

SPECIAL EVENTS

AEE AWARDS BANQUET AND RECEPTION

TUESDAY, OCTOBER 27
Georgia World Congress Center
Zell Miller Conference Center
Reception 6:30 PM
Awards Banquet 7:30 PM
Reception sponsored by Johnson Controls, Inc.

WEDNESDAY, OCTOBER 28
Opening Ceremonies, Special Presentations by: **Dr. Calvin Kent,** Energy Administrator, U.S. Department of Energy; **Ronald J. Burns,** Chairman & CEO, Enron Gas Pipeline Group; and **Charles E. Bayless,** Chairman, President & CEO, Tucson Electric Power Company.
8:45 -11:10 AM - Auditorium
East Concourse

WEDNESDAY, OCTOBER 28
Luncheon in Exhibit Hall - 11:30 AM

THURSDAY, OCTOBER 29
Guest Tour 10:00 AM - 4:00 PM
(See back page for details)

FRIDAY, OCTOBER 30
Keynote Luncheon, guest speaker, **Amory B. Lovins,** Director of Research, Rocky Mountain Institute
12:30 PM - Zell Miller Conference Center

CONTINUING EDUCATION SEMINARS

TUESDAY, October 27, 10:00 AM - 5:00 PM

#420 SLASHING YOUR FACILITY'S UTILITY BILL WITHOUT INVESTING ONE CENT UP FRONT – **Room 269**

#421 STRUCTURING LIGHTING RETROFIT PROJECTS FOR SUCCESS – **Room 268**

#422 OPTIMIZING CHILLED WATER SYSTEMS – **Room 267**

#423 BUILDING AUTOMATION SYSTEMS & NETWORKING: DISTRIBUTED DDC, PROTOCOLS & FRONT ENDS – **Room 265**

#424 DSM IMPLEMENTATION – **Room 264**

#425 BUILDING ENERGY MANAGEMENT WORKSHOP – **Room 263**

#426 COMMISSIONING THERMAL ENERGY STORAGE AND BUILDING SYSTEMS – **Room 262**

#427 HVAC CONTROLS – **Room 261**

(Separate Registration)

REGISTRATION HOURS

Tuesday:	8:00 -10:00 AM (Seminars Only)
	11:00 AM - 5:00 PM
Wednesday:	7:00 AM - 5:00 PM
Thursday:	8:00 AM - 5:00 PM
Friday:	8:00 AM - 12:30 PM

EXPOSITION - HALL D

Be sure to allow time to examine the latest in energy efficient and pollution control products on display the following hours:
Wednesday & Thursday – 10:00 AM - 5:00 PM
Friday – 9:00 AM - 12:30 PM

(To expedite your requests to WEEC exhibitors for information to be mailed to your company, please use your ENERGY EXPRESS CARD.)

SPEAKER / PRESS

Room 262

INDUSTRIAL TECHNOLOGY EXPOSITION - ATLANTA – HALL E

As an attendee of the 15th WEEC you are invited to visit the ITE exhibits at no extra charge. This is your opportunity to visit two premier shows:

Wednesday & Thursday –	**10:00AM - 5:00 PM**
Friday –	**10:00AM -1:00 PM**

THE WEEK AT-A-GLANCE

15th WORLD ENERGY ENGINEERING CONGRESS

	A B	C	D	E	F	G	H	I	J
WEDNESDAY / 2:30 PM – 5:10 PM		Demand-Side Management & Power Quality	Utility Rebates & Incentives	Cogeneration & IPP Projects	Energy Management Applications	Energy Accounting Analysis	Energy Conservation in Federal Buildings I	Fuel Supply Purchasing	Thermal Energy Storage Applications
THURSDAY / 9:00 AM – 11:40 AM		Demand-Side Management--Utility Perspective	DSM & Energy Management	Financing & Regulatory Cogeneration & IPP Issues	Electrical Optimization	Retrofit Opportunities for Lighting	Energy Conservation in Federal Buildings II	Alternative Energy's Role in DSM	HVAC Optimization & Energy Opportunities I
THURSDAY / 2:30 PM – 5:10 PM		Lessons Learned From DSM	DSM from Legislation to Application	Power Generation Technologies	Process & Energy Analysis	New Lighting Efficiency Products	DOD Energy Utilization	Energy Management I	Building Automation & Facility Management
FRIDAY / 9:00 AM – 11:40 AM		DSM Programs	Potential of Performance Contracting in DSM	Energy Education/ Power Generation & Environment	New Electrification Technologies/ Building Energy Management	New Lighting Technologies	Direct Digital Controls	Energy Management II	HVAC Optimization & Energy Opportunities II

CONGRESS SCHEDULE

TUESDAY, OCTOBER 27, 1992

Continuing Education Seminars
10:00 AM - 5:00 PM
(See page 2 for details)

AEE BANQUET and RECEPTION
Reception sponsored by
Johnson Controls, Inc.: 6:30 PM
Dinner: 7:30 PM
Georgia World Congress Center
Zell Miller Conference Center

Press Releases - Room 262

Some papers not included in the proceedings are available at the registration desk.

Numbers by sessions indicate the chapter in proceedings.

WEDNESDAY, OCTOBER 28, 1992

Keynote Opening Ceremonies
8:45-11:10 AM Auditorium

Chair: MaryAnne Lauderdale, P.E.
President-Elect of AEE and Group Manager, Energy Investment, Inc., Sunnyvale, CA

8:45-9:15 AM **United States Army Ground Forces Command Band & Color Guard.** Ft. McPherson, GA

9:15-9:20 AM **Welcome**
Al Thumann, P.E., CEM, Executive Director, Association of Energy Engineers, Atlanta, GA

9:20-10:00 AM **National Energy Security Issues and Legislation**
Dr. Calvin Kent, Energy Administrator, U.S. Department of Energy, Washington, DC

10:00-10:40 AM **An Overview of the Natural Gas Industry**
Ronald J. Burns, Chairman and CEO, Enron Gas Pipeline Group, Houston ,TX

10:40-11:10 AM **The Future of the Electric Utility Industry**
Charles E. Bayless, President & CEO, Tucson Electric Power Company, Tucson, AZ

Wednesday Afternoon

Environmental Sessions

A
IMPROVING INDOOR AIR QUALITY I
Chair: H.E. "BARNEY" BURROUGHS, P.E., Consultant, Building Wellness Consultancy, Alpharetta, GA

ROOM 161

• *2:30–3:10 p.m.*
A Holistic Approach to Improving Indoor Environmental Quality: A Case Study (#1)
DONALD A. KINSER, P.E., President, Environmental Design International, Ltd., Marietta, GA

• *3:10–3:50 p.m.*
The Usage of Filtration As Fulfillment of Acceptable Indoor Air and Optimal Energy Management (#2)
H.E. BURROUGHS, P.E., Consultant

• *3:50–4:30 p.m.*
Microbial Contaminants, Human Allergies, Building Deterioration: Remedial Requirements (#3)
WALLACE W. RHODES, Enact, Inc., Smyrna, GA

• *4:30–5:10 p.m.*
HVAC Design Guidelines for Effective Indoor Air Quality (#4)
EVANS J. LIZARDOS, President, Lizardos Engineering Associates, P.C., Albertson, L.I., NY

B
ENERGY MANAGEMENT IN THE NINETIES: GROWING ENVIRONMENTAL RSPONSIBILITIES
Chair: VIRGINIA HINES, Editor-in-Chief, *Energy User News*, Radnor, PA

ROOM 162

• *2:30–5:10 p.m.*
Panel Discussion

TOM LOWENBURG, Director of Energy Management, 3M Corporation, St. Paul, MN

O.G. TOWNER, Sr. Mechanical Engineer, USPS-MOTSC, Santa Ana, CA

LARRY ROWLAND, Manager, Energy Conservation, Colonial Williamsburg Foundation, Williamsburg, VA

LINDSAY AUDIN, Manager, Energy Conservation, Columbia University, New York, NY

GEORGE R. OWENS, The Rouse Company, Columbia, MD

Energy Engineering Sessions

C
DEMAND-SIDE MANAGEMENT & POWER QUALITY
Chair: RON SMITH, Staff Engineer, Energy Section, General Motors Corporation, Detroit, MI

ROOM 260

• *2:30–3:10 p.m.*
The Common Denominator between DSM and Power Quality (#22)
GREG PORTER, Manager, Market Planning, PSI Energy, Plainfield, IN

• *3:10–3:50 p.m.*
The Likely Market for Electricity Saving ASD Devices (#23)
Dr. F. TOM SPARROW, State Utility Forecasting Group, Purdue University, West Lafayette, IN

• *3:50–4:30 p.m.*
Adjustable Speed Drives: Industrial and Commercial Applications (#24)
JAMES N. POOLE, VP of Advanced Technology, CRS-Sirrine Engineers, Inc., Raleigh, NC

• *4:30–5:10 p.m.*
Customer Value - The Missing Link (#25)
A. ROBERT PIERCE, Jr., Manager, Marketing Services, Detroit Edison Company, Detroit, MI

D
UTILITY REBATES & INCENTIVES
Chair: LARRY BARRETT, President, Barrett Consulting Associates, Inc., Colorado Springs, CO

ROOM 261

• *2:30–3:10 p.m.*
DSM - The Iowa Experience (#26)
DAVID J. LEVY, Director, Energy Services, Iowa-Illinois Gas and Electric Company, Rock Island, IL

• *3:10–3:50 p.m.*
Direct Incentives through Pricing
JEFFERSON G. ZEANAH, Consultant, Atlanta, GA

• *3:50–4:30 p.m.*
Demand-Side Management Bidding - Lessons Learned (#27)
KELLY TRIPLETT, DSM Sr. Specialist, Public Service of Colorado, Denver, CO

• *4:30–5:10 p.m.*
Demand-Side Management Process Evaluations: The Management Perspective (#28)
GEORGE PERRAULT, Perrault Consulting, Simpsonville, SC

E
COGENERATION & IPP PROJECTS
Chair: DAVID SEADER, President, Development Services, Inc., New York, N

ROOM 263

• *2:30–3:10 p.m.*
Cogeneration and Thermal Storage
J.L.Block, Director of Thermal Storage Technologies, Burr Engineers, Inc., Houston, TX

• *3:10–3:50 p.m.*
Meeting Changing Conditions at the Rhode Island Medical Center Cogeneration Plant (#39)
DONALD P. GALAMAGA, Executive Director, PAUL BOWEN, Associate Directo Division of Mental Health, Retardation & Hospitals, Cranston, RI

• *3:50–4:30 p.m.*
Feasibility Study of Wood-Fired Cogeneration at a Wood Products Industrial Park, Belington, WV (#40)
S.K. VASENDA, Assistant Extension Specialist-Wood Energy Appalachian Hardwo Center, Division of Forestry West Virginia University, Morgantown, WV

• *4:30–5:10 p.m.*
Natural Gas Procuremen for Cogeneration & IPP Projects
JOSEPH KUBACKI, Jr., Director - Energy Projects, Strategic Energy Ltd., Pittsburgh, PA

EXHIBIT HOURS 10:00 AM – 5:00 PM

TOUR OF GEORGIA DOME MECHANICAL EQUIPMENT

Meet 5:15 PM at
Registration Desk – Hall D
Hosted by EnviroTech and Heery, Int.
(Limited to 100)

15th WEEC PROCEEDINGS

To purchase extra copies of the proceedings, stop at the registration desk after 11:00 AM on Friday.

– October 28, 1992

F N Y MANAGEMENT APPLICATIONS Chair: MARYANNE AUDERDALE, P.E., Group Manager, Energy Investment, Inc., Sunnyvale, CA	G ENERGY ACCOUNTING ANALYSIS Chair: JOHN P. KLIMCHAK, CEM, Consultant, Louisville, KY	H ENERGY CONSERVATION IN FEDERAL BUILDINGS I Chair: DOUGLAS DECKER, P.E., Business Development Manager, Johnson Controls, Inc., Systems & Services Division, Milwaukee, WI	I FUEL SUPPLY PURCHASING Chair: LEONARD PARENT, Publisher, *The Gas Price Report*, Houston, TX	J THERMAL ENERGY STORAGE APPLICATIONS Chair: RAJ GOPAL, Ph.D., P.E., Manager, Research & Development, Anco Consulting Group, Milwaukee, WI
OOM 264	**ROOM 265**	**ROOM 267**	**ROOM 268**	**ROOM 269**
2:30–3:10 p.m. **Simple In-Plant echnique for Quantifying eaks in Compressed Air ystems (#48)** ICHARD J. JENDRUCKO, h.D., Department of ngineering Science and lechanics, University of ennessee, Knoxville, TN	• *2:30–3:10 p.m.* **Metering Revisited - Innovative Concepts for Electrical Monitoring and Reporting Systems (#52)** WAYNE L. STEBBINS, Electrical Staff Manager, Hoechst Celanese Corporation, Rock Hill, SC	• *2:30–3:10 p.m.* **Energy Leadership in the Federal Government** DOUGLAS DECKER	• *2:30–3:10 p.m.* **Natural Gas Futures: An Overview** THOMAS J. SAAL, Energy Specialist, Futures Resource Center, Coconut Grove, FL	• *2:30–3:10 p.m.* **Centralizing Rooftops with TES: Saves Retrofit Money and Energy(#106)** CALVIN D. MAC CRACKEN, Calmac Manufacturing Corporation, Englewood, NJ
3:10–3:50 p.m. **ystems Approach in nergy Management (#49)** . DUTTA-CHOUDHURY, nergy Coordinator, ouisiana Army mmunition Plant, hreveport, LA	• *3:10–3:50 p.m.* **A Method for Evaluating Annual Energy Use for Large Multifacility Complexes (#53)** PAUL F. HUTCHINS, Ph.D., P.E., Director, Energy Programs, Reynolds, Smith and Hills, Inc., Jacksonville, FL	• *3:10–3:50 p.m.* **New Directions in Federal Energy Management (#81)** MARK GINSBERG, Director/ Federal Energy Management Programs, U.S. Department of Energy, Washington, DC	• *3:10–3:50 p.m.* **Now That Everything Is Changed, What Should You Do Differently?** WILLIAM F. HEDERMAN, R.J. Rudden Associates, Arlington, VA	• *3:10–3:50 p.m.* **The Design Aspects of Ice Storage (#107)** RANDALL L. LIECHTY, P.E., Vice President, R.J. Miller Associates, Inc., Brookfield, WI
3:50–4:30 p.m. **Multi-Family Building nergy Monitoring and nalysis, Heating Plant and omestic Hot Water Sizing riteria Development (#50)** REDRIC S. GOLDNER, EM, Principal, Energy anagement Research ssociates, Brooklyn, NY	• *3:50–4:30 p.m.* **Quantification of Variables That Affect Energy Consumption (#54)** CARLOS S. WARREN, Ph.D., P.E., VP & Director, Energy & Environmental Services, Reynolds, Smith and Hills, Inc., Jacksonville, FL	• *3:50–4:30 p.m.* **The Role of the Government Energy Efficiency Act in the National Energy Act of 1992 (#82)** LARRY GOOD, President, National Capital Chapter - AEE, Washington, DC	• *3:50–4:30 p.m.* **Order 636: Implementation and Overview** KENNETH E. RANDOLPH, Senior VP & General Counsel, Natural Gas Clearinghouse, Houston, TX	• *3:50–4:30 p.m.* **Case Study of a Cost-Effective Emergency Cooling System Using Thermal Storage** CHRISTOPHER M. LANDRY, Manager, Thermal Storage Division, Turbo Refrigerating Company, Denton, TX
• *4:30–5:10 p.m.* **The Museum of New Mexico and Energy Management (#51)** RIAN K. JOHNSON, P.E., nergy Engineer, Energy onservation and anagement Division, nergy, Minerals and atural Resources epartment, Santa Fe, NM	• *4:30–5:10 p.m.* **Performance Ratio - A Better Design Tool (#55)** RICHARD BENTLY, Tupper Lake, NY	• *4:30–5:10 p.m.* **Practical Energy Conservation in Federal Facilities** STEVEN F. BRUNNER, P.E., Partner, Newcomb & Boyd Consulting Engineers, Atlanta, GA	• *4:30–5:10 p.m.* **Panel Discussion**	• *4:30–5:10 p.m.* **Case Study of a Combined Thermal Energy Storage (TES) and Gas Engine Driven Chiller System to Replace 500-Ton Chiller (#108)** KLAUS SCHIESS, P.E., CEM, President, KSEngineers, La Jolla, CA

LUNCHEON IN EXHIBIT HALL

WEDNESDAY, OCTOBER 28
GEORGIA WORLD CONGRESS CENTER

LUNCHEON: 11:30 AM

Luncheon provided to conference attendees registered for full three-day conference.

Sponsored by
MAMAC Systems, Inc., and MagneTek

Thursday Morning

Environmental Sessions		Energy Engineering Sessions		
A **CFC REPLACEMENT** Chair: CARL SALAS, P.E., Vice President, Salas O'Brien Engineers, San Jose, CA	**B** **THE CLEAN AIR ACT** Chair: REGI HYRE, Oklahoma State University, Industrial Engineering & Management, Stillwater, OK	**C** **DEMAND-SIDE MANAGEMENT - UTILITY PERSPECTIVE** Chair: THOMAS MLOT, Facilities Specialist, Virginia Power, Glen Allen, VA	**D** **DSM & ENERGY MANAGEMENT** Chair: KEVIN CRESS, CEM, Program Coordinator, New England Power Service Company, Westboro, MA	**E** **FINANCING & REGULATORY COGENERATION & IPP ISSUES** Chair: HARRY TAPLIN, P.E., CEM, President, BTU Consultants, Thousand Oaks, CA
ROOM 161	**ROOM 162**	**ROOM 260**	**ROOM 261**	**ROOM 263**
• *9:00–9:40 a.m.* **Practical Considerations Regarding Recycle/ Recovery Equipment** JAMES T. HAND, Supervisor, Aerojet Propulsion Division, Sacramento, CA	• *9:00–9:40 a.m.* **Clean Air Act Amendments of 1990 (#7)** CARL MOZINGO, Consultant, Broken Arrow, OK	• *9:00–9:40 a.m.* **Marketing Customer Energy Efficiency Products - A Utility Perspective** EDWARD B. FISCHLER, Manager Power Marketing, Georgia Power, Atlanta, GA	• *9:00–9:40 a.m.* **PCB Ballast Disposal (#56)** MITCHELL DONG, FulCircle Ballast Recyclers, Cambridge, MA	• *9:00–9:40 a.m.* **The Evolution of the Competitive Bidding Process (#41)** WAYNE J. OLIVER, VP, R JOHN DINGLE, Consultant Reed Consulting Group, Lexington, MA
• *9:40–10:20 a.m.* **Leak Monitoring for CFCs, HCFCs and HFCs: Recent Developments (#5)** THOMAS SORENSON, General Manager, Thermal Gas Systems, Roswell, GA	• *9:40–10:20 a.m.* **Clean Air Act Review II** REGI HYRE, Oklahoma State University, Industrial Engineering & Management, Stillwater, OK	• *9:40–10:20 a.m.* **Demand-Side Management: The Perspective of a Combination Utility (#29)** CRISTINA PADLAN PACKARD, DSM Analyst, Baltimore Gas & Electric Company, Baltimore, MD	• *9:40–10:20 a.m.* **The Economics of Supplying the Supplementary Heat in a Closed Loop Water Source Heat Pump System (#57)** VINCENT E. BARKUS, Senior Engineer, Mktg., J.B. SINGH, Senior Engineer, Mktg., Pennsylvania Power & Light Company, Allentown, PA	• *9:40–10:20 a.m.* **Financing Power Facilities in the Competitive Bidding Environment (#42)** ALAN L. HILLS, Managing Director, Cogeneration Finance Incorporated, Mill Valley, CA
• *10:20–11:00 a.m.* **Handling of CFCs - On-Site Recycling Versus Off-Site Reclamation (#6)** SEATON GRAS, Global Ozone Solutions, Inc., Nashua, NH	• *10:20–11:00 a.m.* **Energy Conservation Impact on the Clean Air Act** Dr. BARNEY L. CAPEHART, Department of Industrial & Systems Engineering, University of Florida, College of Engineering, Gainesville, FL	• *10:20–11:00 a.m.* **Demand-Side Management at Virginia Power: A Wheel with a Good Rim** MARY C. DOSWELL, Director, Demand-Side Analysis, Virginia Power, Richmond, VA	• *10:20–11:00 a.m.* **Leading-Edge Operating Strategies for Chilled Water Thermal Storage** DONALD P. FIORINO, P.E., Facility Engineer, Texas Instruments, Inc., Dallas, TX	• *10:20–11:00 a.m.* **Retail Wheeling & Competition in the Electric Industry (#43)** DERICK O. DAHLEN, Principal, Dahlen, Berg & Co., Minneapolis, MN
• *11:00–11:40 a.m.* **CFCs, Stratospheric Ozone and Cooling Alternatives** CLYDE K. SCHAFER, P.E.,CEM, Northern Illinois Gas, Aurora, IL	• *11:00–11:40 a.m.* **Balancing the Need for Electricity with Clean Air (#8)** CHRISTOPHER KANE, P.E., Partner, Lyon and McManus Washington, DC	• *11:00–11:40 a.m.* **Virginia Power Energy Conservation Program - R&D of Building Controls Systems** THOMAS MLOT	• *11:00–11:40 a.m.* **Improving Manufacturing Energy Efficiency: The Energy Analysis & Diagnostic Center at the University of Florida (#58)** SUMIT RAY, NASER A. ALTIBI, BARNEY L. CAPEHART, Department of Industrial & Systems Engineering, University of Florida, College of Engineering, Gainesville, FL	• *11:00–11:40 a.m.* **Northern States Power Company's Open Transmission Tariff from Customer's Perspective (#44)** KARL E. MARIETTA, Associate, Dahlen, Berg & Co., Minneapolis, MN

GUEST PROGRAM 10:00 AM - 4:00 PM

Meet Thursday, October 29 in Room 275.
Coffee & rolls will be available at 9:00 AM. Tour will leave at 10:00 AM.
Retrace the steps of "Miss Daisy" as you take a nostalgic drive through one of the oldest and loveliest residential areas in Atlanta, then enjoy lunch "on your own" in the quaint village of Stone Mountain. Finally, visit the Carter Presidential Center and Library.

TICKETS ON SALE AT REGISTRATION DESK

Exhib
10:00 A

– October 29, 1992

F ELECTRICAL OPTIMIZATION Chair: Konstantin K. Lobodovsky, Pacific Gas & Electric Company, San Francisco, CA	G RETROFIT OPPORTUNITIES FOR LIGHTING Chair: JOHN FETTERS, CEM, Sr. Engineer/EM Lighting Consultant, AT&T Network Systems-Columbus Works, Columbus, OH	H ENERGY CONSERVATION IN FEDERAL BUILDINGS II Chair: JAMES WOODS, CEM, General Service Administration Office, Washington, DC	I ALTERNATIVE ENERGY'S ROLE IN DSM Chair: ROBERT L. SEARS, P.E., CEM, Dir./Program Development, Arizona State University, College of Engineering & Applied Sciences - Center for Energy Systems Research, Tempe, AZ	J HVAC OPTIMIZATION & ENERGY OPPORTUNITIES I Chair: GEORGE KRITZLER, CEM, Senior Engineer, Consolidated Edison Company of New York, Inc., New York, NY
ROOM 264	**ROOM 265**	**ROOM 267**	**ROOM 268**	**ROOM 269**
• *9:00–9:40 a.m.* **Harmonics and Energy Management (#78)** MARK ANDRESEN, Senior Applications Engineer, Basic Measuring Instruments, Foster City, CA	• *9:00–9:40 a.m.* **Structuring Lighting Retrofit Projects for Success (#71)** JOHN FETTERS	• *9:00–9:40 a.m.* **Energy Conservation in the Federal Sector (#83)** MARK GINSBERG, Director, Federal Energy Management Program, U.S. Department of Energy, Washington, DC	• *9:00–9:40 a.m.* **Review of Renewables As a Demand-Side Management Tool** SCOTT SKLAR, Executive Director, Solar Energy Industries Association, Washington, DC	• *9:00–9:40 a.m.* **Applications of Heatpipes for HVAC Dehumidification at Walt Disney World** PAUL J. ALLEN, P.E., Chief, Energy Management, Walt Disney World, Lake Buena Vista, FL
• *9:40–10:20 a.m.* **Two-Speed Step Drives: A Variable Speed Drive Is a Terrible Thing to Waste, When All You Want to Do Is Save Some Kilowatt Hours (#79)** DAVID K. TILSON, P.E., President, STEVEN L. BRAXTON, Tillson Engineering Laboratory, Jamestown, NC	• *9:40–10:20 a.m.* **Providing a Lighting Retrofit Program for Multiple Locations (#72)** STEVE BORESOW, Energy Manager, AT&T, Kansas City, MO	• *9:40–10:20 a.m.* **Energy Resource Management in the Department of Defense** MILLARD E. CARR, P.E., Assistant for Energy Policy, Office of the Secretary of Defense, Washington, DC	• *9:40–10:20 a.m.* **Solar Water Heating: The Making of a Simple Standard Appliance (#103)** DAVID BLOCK, Executive Director, Florida Solar Energy Center, Cape Canaveral, FL	• *9:40–10:20 a.m.* **Desiccant Wheel and Heat Pipes Dehumidification Technologies (#91)** YOUSSEF A.M. ELGENDY, Georgia Institute of Technology, Atlanta, GA
• *10:20–11:00 a.m.* **Motor Management & Effective Solutions** KONSTANTIN LOBODOVSKY	• *10:20–11:00 a.m.* **Benefits of Energy Efficient Lighting - Part II** NICOLAAS C. BLEEKER, Philips Lighting Company, Somerset, NJ	• *10:20–11:00 a.m.* **Implementing Energy Conservation in the Federal Sector (#84)** THOMAS H. WALKER, Assistant Commissioner, General Services Administration, Washington, DC	• *10:20–11:00 a.m.* **Photovoltaics As a Demand-Side Management Option (#104)** HOWARD WENGER, Program Manager, R&D, Pacific Gas & Electric Company, San Francisco, CA	• *10:20–11:00 a.m.* **Comparative Study of a Conventional Electric Chiller System Versus Cool Storage with Conventional Air Distribution Or Cool Storage with Cool Air Distribution (#92)** J.B. SINGH, PAULA R. BRAMBLE, Pennsylvania Power & Light Company, Allentown, PA
• *11:00–11:40 a.m.* **Panel Discussion**	• *11:00–11:40 a.m.* **Performance Comparison of Direct and Indirect Lighting Systems (#73)** TERRY CLARK, President, Finelite, Inc., Sunnyvale, CA	• *11:00–11:40 a.m.* **Lighting Technology Specifications for Relighting Federal Buildings (#85)** CHARLES PURCELL, Senior Program Manager, Battelle Pacific Northwest Laboratory, Washington, DC	• *11:00–11:40 a.m.* **Environmental Externalities and Alternative Energy Choices (#105)** LARRY J. WILLIAMS, Ph.D., Manager, Energy Analysis Dept., Integrated Energy Systems Division, Electric Power Research Institute, Palo Alto, CA	• *11:00–11:40 a.m.* **Comparison of Electric Versus Gas-Fired Cooling Options (#93)** T.B. SZKLENSKI, Senior Engineer/Mktg., J.B. SINGH, Senior Engineer/Mktg., Pennsylvania Power & Light Company, Allentown, PA

THURSDAY AM / POSTER SESSION 8:00-9:00 AM — Room 264

Hours: 5:00 PM

POSTER SESSION ***Speakers will present their papers in an informal one-on-one poster session prior to conference.***

Turn Out Those Lights: Here Comes the Energy Patrol
WILLIAM B. HARDIN, Springs Industries, Laurel Hill, NC

Hot Gas Defrosting Analysis of a Flat Plate Cooler (#102)
Dr. S.A. SHERIF, Department of Mechanical Engineering, University of Florida, Gainesville, FL

Low Level Heat Recovery in a Petroleum Refinery
V. VENKATESAN, Senior Process Engineer, Refineria Isla (Curazao) SA, Emmasted, Curacao, Neth. Antilles

Utility Cost Control and Analysis Program
JOHN R. GREENE, National Sales Manager, Utility Concepts, Inc., Charlotte, NC

Automatic Tube Cleaning Systems for Condensers and Heat Exchangers
KAVEH SOMEAH, President, WSA Engineered Systems, Milwaukee, WI

Thursday Afternoon

Environmental Sessions

A
ALTERNATIVE FUELS VEHICLES
Chair: PATRICIA ROSE, Energy Conservation Specialist, U.S. Department of Energy, State Energy Programs, Washington, DC

B
MUNICIPAL SOLID WASTE
Chair: ELIZABETH HAGEN, P.E., CEM, Geomet Technologies, Inc., Germantown, MD

Energy Engineering Sessions

C
LESSONS LEARNED FROM DSM
Chair: KIM L. BERRY, CEM, Marketing Field Director, Georgia Power, Atlanta, GA

D
DSM - FROM LEGISLATION TO APPLICATION
Chair: WILLIAM H. MASHBURN, P.E., Professor, Mechanical Engineering Department, Virginia Polytechnic Institute, Blacksburg, VA

E
POWER GENERATION TECHNOLOGIES
Chair: RICHARD P COOPER, Lead Energy Auditor, Western Energy Management, Sacramento CA

ROOM 161	ROOM 162	ROOM 260	ROOM 261	ROOM 263
• *2:30–3:10 p.m.* **California's Experience with Alternative Fuel Vehicles (#9)** CINDY SULLIVAN, Project Manager, Technology Advancement, South Coast Air Quality Management District, Diamond Bar, CA	• *2:30–3:10 p.m.* **Technical Overview on FW-CFB Boiler Technology - Burning Refuse Derived Fuel (#11)** JOHN T. TANG, Director/ Fluidized Bed Engineering, Foster Wheeler Energy Corporation, Clinton, NJ	• *2:30–3:10 p.m.* **The Energy Efficiency Partnership - Kraft General Foods and Boston Edison Company (#30)** JOSEPH C. CROWLEY, Operations Mgr., Kraft General Foods - Frozen Products, Framingham, MA and JOHN P. DONOGHUE, Mgr., Load Mgmt. Div., Boston Edison Co., Boston, MA	• *2:30–3:10 p.m.* **Lighting Improvements - A DSM Strategy That Works (#34)** THOMAS D. MULL, P.E., CEM, President, Carolina Consulting Group, Garner, NC	• *2:30–3:10 p.m.* **Hot Dry Rock: A New Energy Source for Clear Power (#45)** DAVID V. DUCHANE, Program Manager, Energy Environmental Technology Division, Los Alamos National Laboratory, Los Alamos, NM
• *3:10–3:50 p.m.* **Alternative Fuels Demonstrations** STEVE GOGUEN, Fuels Utilization Data and Analysis Division, U.S. Department of Energy, Washington, DC	• *3:10–3:50 p.m.* **AT&T Network Systems "Methane Gas Supply Project" (#12)** STEVE TEETS, AT&T, Columbus, OH	• *3:10–3:50 p.m.* **DSM/Federal Efficiency Partnership Program at Fort Lewis, WA (#31)** GRAHAM B. PARKER, Program Manager, Energy Systems Mod. Office, Battelle Pacific Northwest Laboratories, Richland, WA	• *3:10–3:50 p.m.* **DSM Research and Tailored Technology Transfer (#35)** RICHARD HACKNER, Senior Project Manager, Wisconsin Center for Demand-Side Research, Madison, WI	• *3:10–3:50 p.m.* **Application of Fluidized Bed Combustion for Use of Low Grade and Waste Fuel-Fired Power Plants (#46)** DOUGLAS A. WERT, Vice President, Ahlstrom Development Corporation San Diego, CA
• *3:50–4:30 p.m.* **CNG/Diesel Buses for Texas School Districts (#10)** JAMES ARMSTRONG, P.E., CEM, CERS, President, Tejas Engineering & Management Services, Inc., Helotes, TX	• *3:50–4:30 p.m.* **Pyrolysis of Automotive Shredder Residue for the Production of Fuel-Grade Gas (#13)** LAURA L. SHARP, Research Engineer-Mild Gasification, and ROBERT O. NESS, Jr., Energy & Environmental Research Center, Grand Forks, ND	• *3:50–4:30 p.m.* **The Trials and Tribulations of Designing a Data Base at Boston Edison - Fitting Square Pegs into Round Holes (#32)** JOSEPH F. PINO, Jr., Application Project Mgr., Boston, Edison, Boston, MA and ANDREW J. BATES, President, Amber Consolidated, Inc., Cambridge, MA	• *3:50–4:30 p.m.* **DSM From the Customer's Perspective** GARY BUNCE, AHP Systems, Longwood, FL	• *3:50–4:30 p.m.* **Impact of APS-Pacificor Power Exchange on Transmission System in the Southwest** PREM K. BAHL, Electrica Engineer-Utilities Division Arizona Corporation Commission, Phoenix, AZ
• *4:30–5:10 p.m.* **Getting the Fuel to the Vehicle** DENNIS A. SMITH, Director of Energy Services, Atlanta Gas Light, Atlanta, GA	• *4:30–5:10 p.m.* **Clean Burning Fuel from Landfill Gas** ARTHUR E. ROWLEY, Manager of Marketing, Fuel Resources Development Co., Denver, CO	• *4:30–5:10 p.m.* **Acquiring Energy Savings in Manufactured Housing (#33)** DON DAVEY, P.E., Map Program Manager, Bonneville Power Administration (DOE), Portland, OR	• *4:30–5:10 p.m.* **Demand-Side Management: The Stakeholders and the Stakes** MARSHA P. RYAN, Manager, DSM Programs, American Electric Power Services Corp., Columbus, OH	• *4:30–5:10 p.m.* **Analysis of Technologic & Economics for Geothermal Energy Utilization of Electric Power Plant (#47)** CHEN HAIJIE, P.E., Seni Engineer, Shanghai Chin Energy Research Society China Chemical Engineer Shanghai, China

Concession and Lounge
(Rear of Exhibit Hall)

EXHIBIT HOURS 10:00 AM – 5:00 PM

— October 29, 1992

F CESS & ENERGY ANALYSIS Chair: WALTER P. SMITH, Jr., Manager, Energy Conservation Technologies, BASF Fibers, Enka, NC	G NEW LIGHTING EFFICIENCY PRODUCTS Chair: MICHAEL SIMINOVITCH, Staff Scientist, Lawrence Berkeley Laboratory, University of California, Berkeley, CA	H DOD ENERGY UTILIZATION Chair: FRED L. BEASON, P.E., Mechanical Engineer, Systems Engineering, Air Force Engineering Services Center, Tyndall AFB, FL	I ENERGY MANAGEMENT I Chair: TIMOTHY B. JANOS, CEM, President, Energy Management Specialists, Inc., Cleveland, OH	J BUILDING AUTOMATION & FACILITY MANAGEMENT Chair: ALAN STEWART, P.E., Senior Engineering Consultant, Honeywell, Inc., Atlanta, GA
ROOM 264	**ROOM 265**	**ROOM 267**	**ROOM 268**	**ROOM 269**
• *2:30–3:10 p.m.* **Process Energy Reduction (#59)** WALTER E. LOWTHIAN, VP of Process & Environmental, Dean Oliver Associates, Inc., Duluth, GA	• *2:30–3:10 p.m.* **New Efficient Lighting Products and Security Lighting: Are They Compatible? (#74)** R. ARNOLD TUCKER, P.E., CEM, Regional Lighting Engineer, GTE Electrical Products, Atlanta, GA	• *2:30–3:10 p.m.* **Measured Energy Savings from Using a Night Setback Thermostat Control (#87)** RICHARD F. SZYDLOWSKI, Senior Research Engineer, Battelle Pacific Nortwest Laboratories, Richland, WA	• *2:30–3:10 p.m.* **Supermarket Energy Conservation** AL SOKIRANSKI, Ph.D., CEM, Manager of Energy, First National Supermarkets, Maple Heights, OH	• *2:30–3:10 p.m.* **EMCS Upgrade to 3rd Generation Not an Easy Task (#94)** CHARLES E. NEAL, Chief Systems Management Department of the Air Force, Sheppard Air Force Base, TX
• *3:10–3:50 p.m.* **Wastewater Treatment Technologies to Satisfy 1990's Energy Conservation/Pollution Prevention Goals (#60)** LARRY W. KEITH, Director of Environmental Engineering & Development, Anheuser-Busch, Inc., St. Louis, MO	• *3:10–3:50 p.m.* **T-8 Retrofits for Improved Lighting and Energy Efficiency (#75)** MEL HEIS, CEM, Fountain Square Management Company, Cincinnati, OH	• *3:10–3:50 p.m.* **A DOD Approach to Demand-Side Management Participation** Lt. Col. BRUCE J. BARNARD, Chief, Utility Litigation Team, General Litigation Division, Air Force Legal Services Agency and THOMAS GILDERSLEEVE, Utility Engineer, Systems Engineering, HQ Air Force Civil Engineering Support Agency, Tyndall AFB, FL	• *3:10–3:50 p.m.* **25 Things You Can Do Right Now to Save Big Bucks at Your Facility** JOHN P. PUSKAR, P.E., CCP, C.E.C. Consultants, Inc., Partia, OH	• *3:10–3:50 p.m.* **Documenting the Success of Energy Management Cost Reduction Initiatives (#95)** ALAN STEWART
• *3:50–4:30 p.m.* **CAD Active Flowsheets for Process Energy Analysis (#61)** PAUL H. WILSON, P.E., Manager of Process, Dean Oliver Associates, Inc., Duluth, GA	• *3:50–4:30 p.m.* **Increasing Efficacy and Light Output of Standard Recessed Troffers with a "Spot Cooler" System** EVAN PERT, Lawrence Berkeley Laboratory, University of California, Berkeley, CA	• *3:50–4:30 p.m.* **Energy Service Contracting in DOD (#88)** DOUGLAS E. DAHLE, P.E., Shared Savings Program Manager, U.S. Navy-Naval Facilities Engineering Command, Alexandria, VA	• *3:50–4:30 p.m.* **Control of Energy Use via Computerized Facility Energy Management System in a Heavy Industrial Plant (#64)** STEPHEN S. BAGSTAD, P.E., Energy Control Supervisor, Alcoa Aluminum Co. of America, Cleveland, OH	• *3:50–4:30 p.m.* **The Art of Performing a "Walk-Through" Energy Audit (#96)** RICHARD R. VAILLENCOURT, P.E., Project Manager, Energy Investment, Inc., Glastonbury, CT
• *4:30–5:10 p.m.* **Exergy Analysis & Thermoeconomics in Search of Cost Effective Solutions (#62) (#63)** ROBERT CRANE, Ph.D., (Part 1) **Exergy Analysis**, Dept. of Mechanical Aerospace Engineering, University of Tennessee, Knoxville, TN and GEORGE TSATSAROXIS, Ph.D., (Part 2) **Thermoeconomics**, Prof Mechanical Engineer, Tennessee Technological University, Cookeville, TN	• *4:30–5:10 p.m.* **Technology Transfer - Lighting System Research Group** CHIN ZHANG, Lawrence Berkeley Laboratory, University of California, Berkeley, CA	• *4:30–5:10 p.m.* **DOD Model Low Energy Installation Program (#89)** DONALD FOURNIER, Principal Investigator, U.S. Army Construction Engineering Research Lab, Champaign, IL	• *4:30–5:10 p.m.* **Industrial Gas Purchasing Opportunities for the Nineties** BRIAN N. HEATH, Chairman, Heath Petra Resources, Inc., Charlotte, NC	• *4:30–5:10 p.m.* **Meaningful Documentation Methods for Direct Digital Building Control Systems** HARRIS BYNUM, Int., Automation Engineering Support, Honeywell, Inc., Atlanta, GA • *5:10–5:50 p.m.* **Open Protocols** BILL BROWN, Manager, Environmental Control Systems, Purdue University, W. Lafayette, IN

MEET YOUR COLLEAGUES

EXHIBIT HALL — HAPPY HOUR
Wed. & Thurs. 1:00 - 5:00 PM (Cash Bar)

Friday Morning/Afternoon

Sachs 202/637-2200

Environmental Sessions

A
IMPROVING INDOOR AIR QUALITY II
Chair: JERRY A. TAYLOR, "AIA", P.E., CEM, President, Jerry A. Taylor, Environmental, Lexington, KY

B
ENVIRONMENTAL MANAGEMENT
Chair: STEPHEN A. BOOSA, CEM, ICI, INC., Louisville, KY

Energy Engineering Sessions

C
DSM PROGRAMS
Chair: MARTIN A. MOZZO, Jr., P.E., CEM, Project Manager, Kenetech Energy Management, Inc., Pearl River, NY

D
POTENTIAL OF PERFORMANCE CONTRACTING IN DSM
Chair: SHIRLEY HANSEN, Ph.D., President, Hansen Associates, Inc., Annapolis, MD

E1
ENERGY EDUCATION
Chair: EDWARD MICELI, CEM, Miceli Engineering, Marietta, GA

ROOM 161	ROOM 162	ROOM 260	ROOM 261	ROOM 263
• *9:00–9:40 a.m.* **Contribution of Waterborne Radon to Indoor Air (#14)** ARUN K. DEB, Ph.D., P.E., Vice President, Roy F. Weston, Inc., West Chester, PA	• *9:00–9:40 a.m.* **Managing the Environmental Impacts of Utility Lighting Programs** KEVIN CRESS, CEM, Program Coordinator, New England Power Service Company, Westboro, MA	• *9:00–9:40 a.m.* **DSM – Key Issues for the 1990's** DILIP LIMAYE, Synergic Resources Corporation, Bala Cynwyd, PA	• *9:00–9:40 a.m.* **Energy Performance Contracting and Demand-Side Management** DAVID R. WOLCOTT, Manager, RCG/Hagler Bailly, Inc., Arlington, VA	• *9:00–9:40 a.m.* **Energy Education – A Multidisciplinary Approac (#65)** HAMEED G. NEZHAD, Ph.D., Director, Energy Institute, Moorhead State University, Moorhead, MN
• *9:40–10:20 a.m.* **Reducing Energy Consumption While Improving IAQ Using Sensors and Improved Filtration (#15)** MEL HEIS, P.E., CEM, Building Operations Manager, Fountain Square Management Co., Cincinnati, OH	• *9:40–10:20 a.m.* **Quantifying Environmental Externalities (#19)** JOHN C. DALTON, Managing Consultant, Reed Consulting Group, Lexington, MA	• *9:40–10:20 a.m.* **PS&G's Standard Pricing Offer: The Price Is Right, ... So Come On Down!! (#36)** CHARLES COCCARO, Public Service Electric & Gas Company, Newark, NJ	• *9:40–10:20 a.m.* **The Initial DSM Bidding Program in New York: Results and Lessons Learned** JIM GALLAGHER, Chief of Planning & Evaluation, New York Department of Public Service, Albany, NY	• *9:40–10:20 a.m.* **Energy & Environmental Technology Transfer from Colleges and Universities to Commercial, Industrial & Institutional Facilities** JACK FLYNN, CEM, Director of Communication, Energy Engineering Institute, San Diego State University, San Diego, CA
• *10:20–11:00 a.m.* **Worker Exposure to Toxic Combustion Gases from Forced Draft Boilers (#16)** JOSHUA McKENNA, Industrial Hygienist/Project Manager, Certified Engineering & Testing Company, Inc., Weymouth, MA	• *10:20–11:00 a.m.* **Converting Wastes into Energy (#20)** S. RAM SHRIVASTAVA, P.E., President & CEO, Larsen International, Inc., Rochester, NY	• *10:20–11:00 a.m.* **DSM – An Energy Services Company's Perspective for the 90's (#37)** MARTIN A. MOZZO, Jr., P.E., CEM	• *10:20–11:00 a.m.* **DSM Bidding – What Field Are We Leveling Anyway? (#38)** CHRIS SIEBENS, Manager, Marketing Programs & Support, Jersey Central Power & Light, Morristown, NJ	**E2 POWER GENERATION & ENVIRONMENT** • *10:20–11:00 a.m.* **Economic and Environmental Benefits o Computerized Control an On-Line Performance Monitoring of Fossil Fuel-Fired Powerplants: A Cas Study** Dr. HALIL GUVEN, Directo Energy Engineering Institute, San Diego State University, San Diego, CA
• *11:00–11:40 a.m.* **Recognition, Evaluation and Control of Indoor Air Pollution (#17)** J. BRICE CHASTAIN, MSPH, CIH, Senior Program Manager, Life Cycle Engineering, Inc., Charleston, SC	• *11:00–11:40 a.m.* **Metrological Analysis of China's Energy and Economic Increasing Rate and Study of the Countermeasures** WEI PINGZHONG, CAO SHUQING, The Central Coal Mining Research Institute, Hepingli, Beijing, The Peoples Republic of China	• *11:00–11:40 a.m.* **Implementation of an Industrial DSM Program** OTTMAR HEDEMUS, Utility Engineer, Hoffmann-LaRoche, Nutley, NJ	• *11:00–11:40 a.m.* **Value Added: The ESCO Role in DSM** THOMAS K. DREESEN, CES/Way, Houston, TX	• *11:00–11:40 a.m.* **Air Toxics Aspects of Clean Coal Projects** YVONNE WEBER, Ph.D., Senior Environmental Protection Specialist, Office of Environment, Safety & Health, and JERRY PELL, Ph.D., Senior Environment Scientist, Clean Coal Technology Program, U.S. Dept. of Energy, Washingt DC

KEYNOTE LUNCHEON: Friday, October 30, 12:30 – Zell Miller Conference Center

1992 Hall of Fame Awards
1992 EPA Radon Competition Awards
Chair: GEORGE KRITZLER, CEM, Senior Engineer, Consolidated Edison Company of New York, Inc.

"Advanced Electric Efficiency: New Frontiers"
AMORY B. LOVINS, Director of Research, Rocky Mountain Institute

Exhibit Hours: 9:00 AM - 12:30 PM

– October 30, 1992

1 EV ECTRIFICATION ECHNOLOGIES hair: WALTER JOHNSON, E., CEM, North Carolina ate University Industrial xtension Service, Raleigh, C	G NEW LIGHTING TECHNOLOGIES Chair: JON HAVILAND, P.E., CEM, Criterium Haviland Engineers, Norco, CA	H DIRECT DIGITAL CONTROLS Chair: JOHN J. McGOWAN, CEM, Honeywell, Inc., Abuquerque, NM	I ENERGY MANAGEMENT II Chair: FRANK SANTANGELO, P.E., CEM, Consultant, Manning, SC	J HVAC OPTIMIZATION AND ENERGY OPPORTUNITIES II Chair: VERLE A. WILLIAMS, P.E., CEM, President, Verle A. Williams, Associates, Inc., San Diego, CA
OOM 264	**ROOM 265**	**ROOM 267**	**ROOM 268**	**ROOM 269**
9:00–9:40 a.m. **dustrial Process ectrification Projects om the Textile & urniture Trade** ALTER JOHNSON	• *9:00–9:40 a.m.* **New Lighting Options: What Users Will Find – And What They Still Need (#76)** LINDSAY AUDIN, Manager, Energy Conservation, Columbia University, Ossining, NY	• *9:00–9:40 a.m.* **Monitoring & Controlling Large Computers & Support Systems (#97)** JOHN P. CILIA, Advisory Engineer, IBM Corporation, Poughkeepsie, NY	• *9:00–9:40 a.m.* **Optimization of a Dual-Fuel Heating System Utilizing an EMS to Maintain Persistence of Measures (#67)** JACK S. WOLPERT, Ph.D., CEM, President, E Cube, Inc., Boulder, CO	• *9:00–9:40 a.m.* **Maximizing the Benefits from Energy Simulation Analysis in the Commercial Buildings Sector: Lessons Learned from an "Energy Flagship" Project Design** NORMAN WEAVER, Director, Energy Design Efficiency Projects, ERG International, Golden, CO
9:40–10:20 a.m. **ternatives to ogeneration: The Direct pplication of Steam urbines (#80)** . CURTIS PHILIPS, dustrial Program Manager, orth Carolina Energy vision, Raleigh, NC	• *9:40–10:20 a.m.* **Lessons Learned from Designing and Implementing a High Efficiency Lighting Program** DAVID GOLDFARB, Georgia Power Company, Atlanta, GA	• *9:40–10:20 a.m.* **Using Networked DDC As a Management Tool** DAN AGNE, Manager, DDC & Facility Management/ System Sales Support, Johnson Controls, Inc., Milwaukee, WI	• *9:40–10:20 a.m.* **Load Factor Optimization of Fire-Tube Boilers (#68)** VINCENT BORTONE, Assistant Director, The University of Kansas-Center for Research, Inc., Energy Analysis and Diagnostic Center, Lawrence, KS	• *9:40–10:20 a.m.* **Cost Justification of Chiller Replacement (#99)** A. RONALD BAUMER, P.E., President, Environmental Control Engineering, Inc., Beaumont, TX
2 BUILDING ENERGY MANAGEMENT *10:20–11:00 a.m.* **ood Management Can educe Utility Costs 30% ith Existing Equipment Existing Buildings** ILLIAM A. HOLMES, E., CEM, President, oimes Energy Services, c., Columbus, IN	• *10:20–11:00 a.m.* **Comparison of Decision Results for Commercial Lighting Retrofits Using Life Cycle Cost Analysis Versus Simplified Techniques** T. KENNETH SPAIN, P.E., CEM, IDEAS Project Manager, The University of Alabama in Huntsville, Huntsville, AL	• *10:20–11:00 a.m.* **Networking Building Automation Systems** HARSHA DABHOLKAR, Systems Engineer, Systems Department, Honeywell, Inc., Arlington Heights, IL	• *10:20–11:00 a.m.* **Rate Intervention – An Energy Pricing Strategy Alternative (#69)** STEPHEN M. MacNISH, Site Energy Coordinator, IBM Corporation, Poughkeepsie, NY	• *10:20–11:00 a.m.* **Cooling Towers – The Neglected Resource (#100)** ROBERT BURGER, President, Burger Associates, Inc., Dallas, TX
11:00–11:40 a.m. **he Economics of Window election: An Incremental pproach (#66)** ILLIAM T. DIXON, III, oject Manager, Citizens onservation Corporation, oston, MA	• *11:00–11:40 a.m.* **Gearing Lighting Retrofit Projects to the End User (#77)** M. SCOTT GOULD, CEM, Energy Engineer, Stanford University - Engineering Services, Stanford, CA	• *11:00–11:40 a.m.* **New Generation EMCS: Smarter, Faster, More Flexible, and More Options (#98)** KENT SILVERIA, EMCS Engineer, CUH2A, Inc., Princeton, NJ	• *11:00–11:40 a.m.* **Vibration Diagnostic Analysis As Part of Energy Audit and Energy Management Application (#70)** Dr. CHU-CHEN, (C.C.) CHEN, P.E., Chairman, Mechanical Engr., Southern University Center for Energy & Environmental Studies, Baton Rouge, LA and SONYA D. DAVIS, Dept. of Natural Resources, State of Louisiana	• *11:00–11:40 a.m.* **Back to the Future: Reinventing Centralized HVAC (#101)** STEVEN J. CLARK, P.E., CEM, Owner, Energy Engineering, Whitehall, MT, and KEITH BASS, Montana Power Co., Butte, MT and SHERMAN BROWN, Trane Montana, Great Falls, MT

2:30 - 4:30 PM ENERGY MANAGEMENT ROUNDTABLE Room 262

TABLE 1
Cogeneration & IPP Projects, WALTER JOHNSTON, North Carolina State University

TABLE 2
Indoor Air Quality, EVANS LIZARDOS, P.E., CEM, Lizardos Engineering Associates, P.C.

TABLE 3
Energy Management, BILL BROWN, Purdue University

TABLE 4
Lighting Applications, JOHN FETTERS, AT&T Network Systems

TABLE 5
DSM Programs, KIM BERRY, CEM, Georgia Power Corporation

15th WEEC TECHNICAL STEERING COMMITTEE

Appreciation is given to the following individuals for their help in developing the program:

Richard Aspenson
Consultant

Karlin J. Canfield
Naval Civil Engineering Lab

Keith Davidson
Gas Research Institute

Gerald Decker
Decker Energy

Shirley Hansen, Ph.D.
Hansen Associates, Inc.

Jon R. Haviland, P.E. CEM
Criterium-Haviland Engineering

MaryAnne Lauderdale, P.E.
Energy Investment, Inc.

Konstantin K. Lobodovsky
Pacific Gas & Electric Company

Dilip Limaye
Synergic Research Corporation

William H. Mashburn, P.E.
Virginia Polytechnic Institute

Malcom Maze
Abbott Laboratories

Harvey Morris
Independent Power Producers

Martin A. Mozzo, Jr. P.E.
Kenetech Energy Management

Patricia Rose
U.S. Department of Energy

Frank Santangelo, P.E., CEM
Consultant

Ron Smith
General Motors

Walter P. Smith, Jr.
BASF Fibers

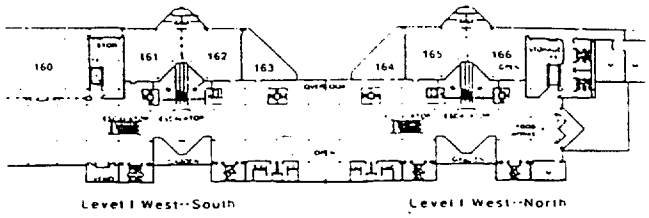
Albert Thumann, P.E., CEM
Association of Energy Engineers

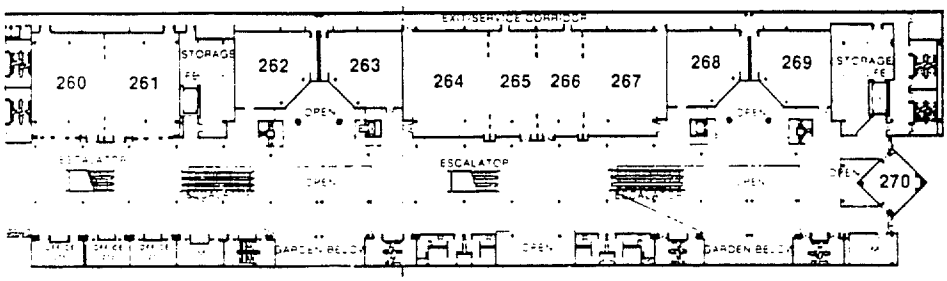
Wayne C. Turner, Ph.D., P.E., CEM
Oklahoma State University

MEETING ROOMS

***Please Note - Opening Session Auditorium/ East Concourse**

Speakers Room - 262
Press Room - 262
Registration & Expo - Hall D
Meeting Rooms - Floors 2 & 3 West Concourse
Keynote Luncheon - Zell Miller Conference Center





CALL FOR PAPERS

You are cordially invited to submit a one-page abstract to be considered for our 16th WEEC, October 26-28, 1993 at the Georgia World Congress Center, Atlanta, Georgia. Abstracts should include title of paper, a one-page summary, presenter's name, company address, and biography. The theme for the 1993 Congress is **ENERGY & ENVIRONMENTAL OPPORTUNITIES TO THE YEAR 2000.** Please submit abstracts by February 15th to:

Marilyn Jackson, Program Manager
16th WEEC
4025 Pleasantdale Road, Suite 420
Atlanta, GA 30340

Thank you for your participation in this year's Congress. We hope to see you next year at the 16th WEEC, Georgia World Congress Center, Atlanta, October 26-28, 1993.

BAGGAGE AREA

A baggage area will be provided on Friday in Room 360 from 7:00 AM - 5:00 PM.

APPENDIX H

EVALUATION FORMS COMPLETED BY DELEGATION MEMBERS

Prague 4. 2. 1993

Dear Suzanne,

Prior to answering individual questions of your questionnaire of November 17, 1992 kindly let me remind you that in the sphere of organizing energy conferences and seminars with international participation, I personally have got enough experience. That's why I know that every such an undertaking is different from other one and can't be planned to be the same as the other ones. I know that the organiser must set himself heavy possible aims and only then - following the development of the situation - as allowed to climb down but never below the limit he himself stated as the guaranted minimum. The most important however is money that he has at disposal. We had in the ČSFR in the last 35 years always little of them.
From the view of this my knowledge let me highly appreciate all the course of my visit in U.S. - wherever it was. (It is true yet that the exceedingly developed network of public service that you can use without any problem - hotels, cars, congress halls, business cetnres etc. - makes your situation easier.)
In our condititons, organizing such an undertaking would present engagement of a considerably higher number of organizors and more manual work. But even so we managed to organize a whole range of similar undertakings.

Kindly evaluate my responses in questionnaire in respect to my above information.

In every case I would like you to know that I highly esteem that I had honour to get acquainted with you, Vendi Norris, David Keith and of course Robert Arche and other your collaborators. I look forward to meeting you sometimes again. Would you travel to our country, please don't forget to visit me.

Please sorry, that I am so late.

Sincerely
Karel Černý

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME Karel Čermák
TITLE Ing.
ADDRESS Vinohradská 8, 120 00 Praha 2
TEL 220443 or 2353954
FAX 2353870
TELEX

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

Good (impression). The milieu of the prestige club is important for such an international undertaking.

What changes would you recommend in the types of speakers selected?

Would you make any changes in the number of speakers included in the program?

Were you able to meet the individuals and companies that you wanted?

Yes. Armstrong, H+B, information systems, propagation of energy savings, education and training and DSM.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

Lessons from the field of state energy policy and privatization. According to my opinion, lecturers need more information about the real environment in the Middle and Eastern Europe.

What was your overall impression of the trade exhibition?

Good level. Comparing to similar European undertakings, there was more high-quality advertizing material.

Were you able to meet the individuals and companies that you wanted?

Yes. In the field of information systems, promotion of energy savings, education and DSM.

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

Incomparable price relation in our country and in U.S.. It changes the philosophy in EE by its consequences.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

Yes. In the field as 5. It is necessary to have enough financial funds of non-investment character. The effect would be quick.

3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?

We have been having a similar method of optimalization of production and of energy consumption in the Czech Republic already for a whole range of years, so that I know the presented system.

What is your evaluation of the visit to Georgia Institute of Technology?

Changes of students in U.S. are considerably bigger than in our country. It is connected with how rich is the society.

4. Other

What was the *most* informative part of the trip?

The federal energy policy of the U. S. Government and the ways of financing the world congress.

What was the *least* informative part of the trip?

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Directors of region departments of the State Energy Inspectorate of the Czech Republic (8) and teh Head Office in Prague have got the information about the world congress and lectures preceeding at disposal. Totally appr. 120 persons will get the information.

Do you have any additional comments or recommendations?

Yes. That the U. S. are not so far from the Czech Republic.

POLISH FOUNDATION FOR ENERGY EFFICIENCY

Fundacja na rzecz Efektywnego Wykorzystania Energii

To: Suzanne Smith
Manager RCG/Hagler, Bailly, Inc.

Fax: 703 351 0342

From: Ewaryst Hille
V-director FEWE

Fax: 48 (22) 27 32 71

Once again thanks for your hosting and guardianship. It was a great pleasure to visit you in the United States.

Attached I send you post visit evaluation form. I apologize for delay.

Best regards and Merry Christmas,

EHille

1992.12.21.

ul. Górskiego 7 • 00-033 Warszawa • Tel#+48 (22) 273-271 / Fax#+48 (22) 273-271 (11)

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME Ewaryst Hille
TITLE Head of Warsaw Division of FEWE
ADDRESS ul. Smolieńska 7, 00-033 Warsaw Poland
TEL (+48 22) 273 271
FAX (+48 22) 273 271
TELEX

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

I think so to collect people in the same place and in the same time is the best way for knowledge dissemination and exchange the new contacts. For me it was the first opportunity to meet people who are preparing energy and environmental policy in US as well as representatives of US companies managements.

What changes would you recommend in the types of speakers selected?

No changes.

Would you make any changes in the number of speakers included in the program?

No.

Were you able to meet the individuals and companies that you wanted?

It was able for me meet representants of ICF Resources and RCG / Hagler & Bailly, Inc.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

Adequate

What was your overall impression of the trade exhibition?
It was a very interesting especially from number of various appliances point of view for the same needs. It express me power of the internet.

Were you able to meet the individuals and companies that you wanted?
Before Congress I hadn't any special expectation to meet individuals. I was rather waiting for possibility of survey American industry offers as well as DSM programs.

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

No because I hadn't industry contacts before.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

No.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?
- cheap residential appliances because of weak market power of Polish society
- building construction technologies as well as space heating installation and equipment for them.

3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
It was interesting trip from technical point of view but from further cooperation rather no because of lacks of Southwire Company interest of Europe market

What is your evaluation of the visit to Georgia Institute of Technology?
It was also very interesting trip. It gives me knowledge about US Students education quality especially for economical issues as well as US Institute have about technology quality.

4. Other

What was the *most* informative part of the trip?
Congress lectures

What was the *least* informative part of the trip?
Southwire company trip.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
Yes, there are many such individuals from industry, administrative bodies as well as from science and technical institutes. Proposition attached below next point.

Do you have any additional comments or recommendations?
I would like to stress very high professional level of support we get from RCG/Hagler & Bailly Inc. both in the results and hosting fields.

1. Mgr inż. Jan Zimny - KRUPIŃSKI Mine, Suszec
tel. 48(46) 345111
2. Mgr inż. Zofia Grajewska - Polish Oil & Gas Co., Warszawa
ul. Krucza 6/14; tel 48(22) 326916
fax 290856, telex 813416
3. Mgr inż. Marian Stradecki - Ostrowiec Świętokrzyski Foundry.

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GRIRO S.A.

Calea Griviţei 355 – 357, Bucureşti, 78311, ROMANIA

Către ▶	RCG/HAGLER ,BAILLY,INC. ~~ARLINGTON~~	Data ▶	december,22nd,1992
În atenţia ▶	MS.SUZANNE SMITH	Ref. ▶	
Fax nr. ▶	703/351 0342	Nr. pag. ▶	4 din
Emitent ▶	GRIRO SA -DAN IONITA	Fax ▶ Telex ▶ Telefon ▶	0663548 11250 GHIRO R (90) 654090 (90) 655090

PHONE : 401-6664090/6665090

Ref. ▶ FAX : 401-6663548

DEAR MS.SUZANNE SMITH

PLEASE FIND HEREWITH THE COMPLETED FORM REQUESTED AND PLEASE EXCUSE THE DELAY IN ANSWERING BACK,BUT I WAS OUT OF THE OFFICE FOR A PERIOD.

I TAKE THIS OPPORTUNITY TO THANK YOU ONCE AGAIN FOR YOUR FULL COOPERATION AND TO WISH YOU ALL MERRY CHRISTMAS AND A HAPPY NEW YEAR FULL OF SUCCESSES.

VERY BEST REGARDS,

DAN IONITA
ENERGY MANAGER
GRIRO BUCHAREST

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME DAN IONITA
TITLE ENERGY MANAGER
ADDRESS GRIRO MANUFACTURING CO.-355-357 CALEA GRIVITEI ,BUCHAREST ROMANIA
TEL 401- 6654090/6655090
FAX 401- 6663548
TELEX 11250

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

This was my first contact with american businessmen as well as with specialists in energy field and I was really overwhelmed with the interest shown for the problems of my country and especially with the direct and comprehensive way of discussing the matters. I was also impressed of the place itself and the welcome granted to me.

What changes would you recommend in the types of speakers selected?

I should have been very glad to be able to present my own speach about achieving the programm in Romania.

Would you make any changes in the number of speakers included in the program?

Considering the time afforded for the meeting, I think that the number of speakers was just right.

Were you able to meet the individuals and companies that you wanted?

I consider that I had possibility to meet persons and specialised companies in the field that I am dealing with.

3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?

The visit to Southwire company highly impressed me taking note of the way of energy administration by computer and of the posibility of fast action in the process of energy consumption. It was also a great surprise for me to find out that the machines and equipments are not very new but are very well maintained, I have noticed no waste of water, steam etc;

What is your evaluation of the visit to Georgia Institute of Technology?

The visit to Georgia Institute of Technology gave me posibility to know about the students life in America, to be informed about their facilities; it was one of the top moments of my visit.

4. Other

What was the *most* informative part of the trip?

I consider the most informative part of the visit was World Energy Engineering Congress (Atlanta)

What was the *least* informative part of the trip?

None.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Among the individuals who might benefit from the programm I could mention Mr. Stroe Serban-mechanic manager at GRIRO SA and Mr. Radu Balan-technical manager at GRIRO SA.

Do you have any additional comments or recommendations?

Finally I would like to thank to everybody who organized and supported this visit. For myself it was a full success and I hope that the programm directed by RCN HAGLER-BAILLY to continue in Romania because it is a big need of changes also in the energy field.

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2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

The prevailing impression of the World Energy Engineering Congress in Atlanta was the ampleness of the event. I think that the information presented were adequate.

What was your overall impression of the trade exhibition?

The trade exhibition made me think that I am participating at the energy top in the world.

Were you able to meet the individuals and companies that you wanted?

Generally, I could say that I had opportunity to meet both individuals and companies which were very interesting. Moreover, I should have liked to get information regarding gas and fuel burners for energy boilers.

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

At the National Press Club I've met Mr. Terrence J. O'Hanlon, from whom I have received by mail all kind of leaflet regarding ultra sound equipments and also I try to correspond with Mr. Douglas V. Bloss from Messrs. Armstrong International for achieving in Romania a company similar with Ecotech Products Armstrong from Bulgaria.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

I think that the main problems regarding energy efficiency were addressed but the subject should study more thoroughly the specific of the romanian economy.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

In Romania, a special attention should be given to energy management, cogeneration and saving energy.

The most important problems are those regarding energy structure and energy accounting. Drawing up real audits might lead to immediate steps of optimizing energy consumption.

8 TRIADITSA STREET
1040 SOFIA, BULGARIA
EUROPE

28.02.1993

MS. SUZANNE SMITH
MANAGER
RCG/HAGLER. BAILLY. INC.
1530 WILSON BOULEVARD, SUITE 900
ARLINGTON, VA 22209

DEAR SUZANNE:

RE: POST - VISIT EVALUATION FORM

ENCLOSED PLEASE FIND A COMPLETED POST - VISIT EVALUATION FORM.
I DO APOLOGIZE FOR NOT SENDING IT ON TIME.
LOOKING FORWARD TO MEETING YOU IN SOFIA IN THE NEAR FUTURE.

YOURS SINCERELY:

KRASSIMIR KANEV,
CORPORATE FINANCE

P.S. I CHERISH WONDERFUL MEMORIES OF MY STAY IN USA. NOT ONLY WAS IT OF GREAT HELP. YOU, WENDI AND DAVID TURNED IT INTO A REAL PLEASURE.

ENCL.

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME KRASSIMIR DIMITROV KANEV
TITLE HEAD OF DEPARTMENT CORPORATE FINANCE, NEK
ADDRESS 8 TRIADITSA STR., 1040 SOFIA, BULGARIA, EUROPE
TEL +359 2 874773
FAX +359 2 872550
TELEX 22707

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

EXCELLENT

What changes would you recommend in the types of speakers selected?

NONE

Would you make any changes in the number of speakers included in the program?

NO

Were you able to meet the individuals and companies that you wanted?

YES, WITHIN THE TIME LIMITS

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3. Tours of m... acturing and resea... facilities

What is your evaluation of the ... the Southwire company?

INTERESTING, USEFUL PRACTICAL INFORMATION

What is your evaluation of the visit to Georgia Institute of Technology?

EXCITING

4. Other

What was the *most* informative part of the trip? ALL OF IT

What was the *least* informative part of the trip? NO SUCH PART

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

PROGRAM WAS WELL DESIGNED. ANYBODY WOULD BENEFIT, THOUGH ONLY A FEW MOST! COMMUNICATION WOULD BE THE PROBLEM.

Do you have any additional comments or recommendations? NO

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World Energy Engineering Congress (Atlanta, G

Was what your overall impression c technical information presented at the conference? For e le, was it adequate, too complex or too basic?

MOSTLY ADEQUATE, THOUGH SOME OF IT WAS TOO BASIC

What was your overall impression of the trade exhibition? GOOD

Were you able to meet the individuals and companies that you wanted?

YES, THANKS TO MY HOSTS

Have you had an opportunity to follow up with any contacts made in the United States? Please explain. YES. I MET SOME PEOPLE ON MY NEXT VISIT TO WASHIGTON in JANUARY

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

NONE I CAN THINK OF.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

ENERGY AUDITS AND NO-COST OR LOW-COST MEASURES (SIMPLE APPLIANCES AS STEAM-TRAPS ETC.) THE COUNTRY IS IN A DEEP RECESSION.

EMS — Energetické merania a služby
P.O.BOX 135, Partizánska 94, 974 01 Banská Bystrica 1

RCG/Hagler, Baily, Inc.
Mr. David Keith
1530 Wilson Boulevard
Suite 900
Arlington, VA 22209-2406
U.S.A.

Naša značka :EMS/270/92 Banská Bystrica, November 17.1992

Evaluation of Business Trip

Dear David,

I am very pleased to write you this letter in order to evaluate the contribution of my business trip for me and our company. I appriciate very much USAID's and your invitation to come to the USA. I have visited your Country for the first time and this trip gave me unforgetable experiences.

The trip was organized very well and meticulously with a valuable and useful program. I guess that during these eight days we could see and learn as much as possible. From professional view the great contribution was that I had possibility to meet many representatives of American companies, institutions, many specialists of energy efficiency, energy savings as well as people who find out business oportunities in Eastern and Central Europe. Our private company EMES-Energy Measurements and Services is involved in both services and trade. During my discussions with mentioned representatives I proposed collaboration with them and I was very glad that it was accepted in several cases. I have had very important negotiations with Mr.Terence J.O'Hanlon from UE Systems, Mr. Richard D. Cudahy from Sycom, Mr. Douglas V.Bloss from Armstrong, Daniel J.Chemsak from Bacharach, Mr. Errol L.Beswick from Allen Murray Corp., Robert C.Erickson and many others. I am going to meet some of them in Prague this year begining of December during Energy Efficiency Business Week and I will continue to discuss more details about our collaboration.

I was very excited by 15th WEEC organization and its professional level. This event impressed me very much. I am sorry I could not be presented at more lectures unfortunately held the same time. I am also sorry that exhibit hours were clashing with Congress hours. So when I would have liked to see exhibition I could not be presented at lectures. The great and useful experiences for me were the excursions to Southwire

Company, tour of Georgia Dome mechanical equipment as well as Georgia institute of technology. I also appreciate very much the social program you have prepared for us: Sightseeing tour of Washington D.C., Group meeting with Bob Archer, Cocktail Reception hosted by RCG/Hagler, Bailly, Inc., Group working lunch at Omni Hotel, Dinner hosted by RCG at Dante s Down the Hatch, trip to University city and my visit of Bob Clinton s presidential campaign in Atlanta.

Thank you very much for all. I am sending my special thanks to Bob Archer from USAID who has prepared this project. Thank you very much indeed to you David, to Susan and Wendi. Thanks to all people who praticipated our trip and took care of us.
I do believe in our future mutual cooperation. Wishing all the best.

Sincerely

Marian Rutšek

Telefón, fax: 088/45193 | IČO: 17841597 | Bankové spojenie: VUB B.Bystrica | Číslo účtu: 446 043-312/0200

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME: Marian Rutšek

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TEL: + 42 88 45183

FAX: + 42 88 45183

TELEX: -

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

I appreciated very much this meeting because we have been learned of energy situation in other Eastern European Countries and met American Representatives who would like to come to our market.

What changes would you recommend in the types of speakers selected?

I think the speakers were selected very prudently. I could not make any changes.

Would you make any changes in the number of speakers included in the program?

For whole day Seminar it was sufficient number of speakers. Although the program was very busy I liked it very much.

Were you able to meet the individuals and companies that you wanted?

Generaly yes. I met and spoke with many people about possible future collaboration and some of these discussions were very useful.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

Regarding technical information they are very important for my work. Altough I have proceedings book I was sorry that many interesting lectures were performed at the same time.

What was your overall impression of the trade exhibition?

I was excited of great number of exhibitors, from various fields of Energy Engineering and Environment as well as industry.

Were you able to meet the individuals and companies that you wanted?

Yes, I was , I contact some of them for future collaboration. For example Allen Murray Corp., Water Technology of Pensacola, Inc., Magnetizer L.E. Smith and Associates and other.

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Mr.Terence O'Hanlon from UE Systems and Mr. Richard D.Cudahy contacted me after my arrival home. We would like collaborate with their companies.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

Almost all topics were discussed, I think that heat recovery systems from technological processes and from aircondition in industry were mentioned very few.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

In my opinion Energy efficiency in buildings, cogeneration, heat recovery in industry and the most important Growing market for ESCO through Shared energy savings methods.

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3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
Southwire made a great impression for me. I could see American factory with its organization and energy conservation project in function.

What is your evaluation of the visit to Georgia Institute of Technology?
I appriciate the idea research institute is placed in the university area. It is a great if students can participate the most advanced technology during their study.

4. Other

What was the *most* informative part of the trip?
I would rather say: everything. I appriciate all our meetings and discussions, lectures, exhibitions, excursions, as well as social program and your hospitality.

What was the *least* informative part of the trip?
My come back home after 8 day's exciting experiences in your nice Country.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
There are very many people who would appriciate this type of program. For example individuals from private sector (advisors, cosultants, representatives of energy service companies), from industry and utilities (energy managers)

Do you have any additional comments or recommendations?
It would be nice to prepare some training courses fo young people after their finishing of University studies or for auditors and energy managers.

Note: The informal evaluation of my business trip was posted several days ago to Mr. David Keith.

Thank you very much for all.

Best regards

Marian R u t š e k

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To SUSAN SMITH	From IVO SLAVOTINEK
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Dept.	Phone # +42-2-256 104
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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

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TELEX:

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

Some of the Eastern Europe presentations were too general, Romania, for example, while others were quite detailed - Hungary. The time allotted for Q and A was MUCH TOO SHORT!! It also would have been nice to have the speakers draw some conclusions at the end of their presentations, and perhaps make suggestions as to what steps should be taken.

What changes would you recommend in the types of speakers selected?

- Choose speakers who will give short, concise speeches that provoke discussion, not long, technical presentations.
- Bring in more banking and financing people, who can provide examples of practical application of methodologies concerning project management.

Would you make any changes in the number of speakers included in the program?

The number of speakers was appropriate, but some of the presentations were simply too long.

Were you able to meet the individuals and companies that you wanted?

Not all of them. I would suggest that more time be allowed for informal meetings in future.

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2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

For me, it was not a question of the complexity of the information (I understand most of the concepts), but the presentation of the material was often too difficult for a non-native English speaker.

What was your overall impression of the trade exhibition?

The exhibition was well-organized, and the people participating in it were dynamic and aggressive. I made many good contacts.

Were you able to meet the individuals and companies that you wanted?

Yes

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Yes. We are organizing a conference right now, and I pursued many of the contacts as potential participants. I was also able to meet several people dealing with Performance Contracting that may prove valuable in future.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

More attention was payed to efficiency in homes and buildings than industry. For the CSFR, industry is a more critical problem, so I would have liked to hear more about things like process efficiency, etc.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

Performance contracting, financing and energy management were the most worthwhile topics for the CSFR. We have great technical expertise, the problem is bringing this expertise to the market.

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3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
The company itself was not that interesting, but I was impressed with the organization and general management.

What is your evaluation of the visit to Georgia Institute of Technology?
The introductory meeting was O.K., but I personally do not like these types of excursions.

4. Other

What was the *most* informative part of the trip?
The INFORMAL meetings.

What was the *least* informative part of the trip?

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
Members of Association of Energy Managers

Do you have any additional comments or recommendations?

Apologize the late response of the questionnaire. I was really busy couple of last weeks organizing Business week.

Thanks for nice time in States. Hope see you soon.

Ivo Hommel

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E C O T E C H P R O D U C T S

66 str.Dimitar Manov, Sofia Tel / Fax (2)54-72-06
1408 Bulgaria Tel / Fax (2)54-12-67

December 30, 1992

Ms Suzanne Smith
Manager
RCG/Hagler,Bailly, Inc
1530 Wilson Boulevard, Suite 900
Arlington, VA 22209-2406
USA

Dear Ms Smith,

Sorry to send you with some late to Post-Visit Evaluation Form, but we try unsuccessfully to do that by fax before.

We see your advertisement in the newspaper and we probably will apply to it.

Meanwhile we established some contacts with your representative here in Bulgaria.

Thank you one's again to gave us the opportunity to participated to the World Energy Engineering Congress in Atlanta.

Best regards,

Christian Spassov

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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

NAME Christian SPASSOV

TITLE ECOTECHPRODUCT - President

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TELEX

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

Very well organized in a good atmosphere

What changes would you recommend in the types of speakers selected?

No changes every thing was very interessting

Would you make any changes in the number of speakers included in the program?

No it was a very optimal number of speakers

Were you able to meet the individuals and companies that you wanted?

Yes

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

It was very adequate

What was your overall impression of the trade exhibition?

It was a rich one, with a good possibility to make knowledge with new technologies in this field

Were you able to meet the individuals and companies that you wanted?

Yes, very useful contacts we had

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Yes in the field of the trade and professional contacts

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

No

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

Everything concerning the low cost investments

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3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?

very intresating

What is your evaluation of the visit to Georgia Institute of Technology?

Very useful

4. Other

What was the *most* informative part of the trip?

The WEEC with the trade exhibition most useful

What was the *least* informative part of the trip?

It is difficult to say.For us, was really informative everything

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Sure it must be. We,ll find names

Do you have any additional comments or recommendations?

No

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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

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TELEX

1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

Both presentations and meetings were rich of valuable information.

What changes would you recommend in the types of speakers selected?

I do not recommend any change unless the scope of the program is specified by closer objectives

Would you make any changes in the number of speakers included in the program?

Less speaker, more discussion may be considered

Were you able to meet the individuals and companies that you wanted?

Yes, thank you.

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2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

Great diversity, much more information than time and capacity

What was your overall impression of the trade exhibition?

That was not matching in quality level with the Congress

Were you able to meet the individuals and companies that you wanted?

Yes, thank you

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Yes, the whole trip was an exellent opportunity for co-ordination incl. old and new contacts

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

Role and daily work of Regulatory Commissions (Bodies) in different states. Co-egzistence of companies and regulators. Data backfitting to commercial regulation.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

ESCOs, because the need for improvement is urging, but lack of appropriate funding hampers even starting-up efficiency improvement in many cases

3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
It recalled kind memories of my earlier work of building design and technology operation. My daily job is different to-day, sorry.

What is your evaluation of the visit to Georgia Institute of Technology?
R&D is in a very bad shape in Hungary to-day. All informations collected are of extreme importance

4. Other

What was the *most* informative part of the trip?
Conference in Washington, presentations at WEEC, discussions at GeorgiaTech, Jazz music at Dante's under the Hatch

What was the *least* informative part of the trip?
The first meeting on Sunday ~~meeting~~ evening in Washington

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
Young energy engineers who implement efficiency programs effectively. No names before bidding

Do you have any additional comments or recommendations?
I wish to express all of my gratitude for invitation and kind regards to the organizers. As far as recommendations are concerned please don't miss the World Series next time.

Kędzierzyn-Koźle, November 30, 1992

RCG/HAGLER, BAILLY, Inc.

1530 Wilson Boulevard Suite 900

Arlington, VA USA

Ms. Suzanne Smith

Fax (703) 351 0342

Dear Ms. Smith:

I would like thank you for very well organization the visit in USA, your patronage and the cordiality.

Unfortunately, after the visit I was ill (bronchitis) by about 3 weeks.

I received at that time only first and half of second page yours evaluation form send by fax. This form send by mail I received 27 november.

The complete form is enclosed.

Best regards

Nawrot

Henryk Nawrot

Chief Power Engineer

Zakłady Azotowe "Kędzierzyn"

Poland

GŁÓWNY ENERGETYK

Nawrot

mgr inż. Henryk Nawrot

EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-TRIP EVALUATION FORM

NAME NAWROT Henryk
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1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

The very useful meeting for presentation of energy management and energy saving in different country in Europe and for presentation of the policy and possibilities in USA

What changes would you recommend in the types of speakers selected?

I would recommend preparation of questionnaire on the subject of problems interesting for participants. Depending of the results choose the speakers.
It is difficult preparing a priori problems useful for all participants.

Would you make any changes in the number of speakers included in the program?

No. The program of session was well scheduled. 2.5 h of work with 1.5 h of break 30 min for each speaker

Were you able to meet the individuals and companies that you wanted?

Yes. I cooperated with Mr Decker and Mr Henry from Armstrong Company in the projekt of USAID in Poland in 1991-92.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

Very extensive conference, impossible to personally participate in all sessions. High technical level of technical information. The scope of conference include about all problems of energy management

What was your overall impression of the trade exhibition?

In my opinion in the trade exhibition was presented very modern devices, materials and technology. The information and explanations was easy to obtain

Were you able to meet the individuals and companies that you wanted?

I had at present not enough contact with american company. In the course of trade exhibition I collected information from about 20 exhibitors

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Yes. Particulary for the gas turbine, energy meters, lubricant conditioners, variable-speed drives, water cleaning.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

I don't opinion. I participed only in about 10% of conferences (14 from 150 during the WEEC).

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

1. The improvement of the utilization of electricity, variable-speed drive, lighting
2. The improvement efficiency of district heating
3. The improvement of efficiency of steam boilers.
4. The utilization of gas turbines.

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3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
Very modern company, interesting organization and relationships between the management and workers.

What is your evaluation of the visit to Georgia Institute of Technology?
The interesting example of the profitable cooperation between the science and industry

4. Other

What was the *most* informative part of the trip?
1) World Energy Engineering Congress and Trade Exhibition
2) The conference Energy Efficiency in Eastern and Central Europe

What was the *least* informative part of the trip?
Tour of Southwire Company. The scope of energy management is smaller than in my company

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
I prepared information about visit for
- The management of my company
- The Association of Chemical's Industry Engineers

Do you have any additional comments or recommendations?
Very well organization of visit.
Friendly relationships between the staff of RCG/Hagler Bailly and participants.
Thank you

H. [illegible]

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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

KF-1154/92.
'92.11.24.

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

HAGLER/BAILLY Suzanne Smith Manager Fax: 703 351 0342

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1- Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

It seemed to be well-organized and well-prepared. I succeed to get a valuable impression about the energy situation and energy-related problems in the countries of Eastern-Europe.

What changes would you recommend in the types of speakers selected?

I would have liked more speakers from the practise.

Would you make any changes in the number of speakers included in the program?

I would not make any changes.

Were you able to meet the individuals and companies that you wanted?

I had no plans to meet specific individuals or companies. However, the meeting provided a good opportunity to meet people who may be important for me in the future.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

The technical information presented during the conference seemed rather much for an individual. Hopefully, reading the written materials will help.

What was your overall impression of the trade exhibition?

It was interesting, well-organized.

Were you able to meet the individuals and companies that you wanted?

In connention with alcohol industry sewage treatment problems I have been in contact with Mr. David Stephenson

Have you had an opportunity to follow up with any contacts made in the United States? Please explain.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

I could collect all the information what was of major interest for me.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

For example: cogeneration, high-efficiency, automatically controlled compressors. Because: efficient use of energy is very important in Hungary. Cogeneration can be an effective tool to achieve that.

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3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
I liked the trip very much. I could learn much, especially in the management field.

What is your evaluation of the visit to Georgia Institute of Technology?
I liked very much the good coordination between research and implementation.

4. Other

What was the *most* informative part of the trip?
Everything was of great informative value for me as this was the first opportunity for me to see the US from inside.

What was the *least* informative part of the trip?

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
It would be good to provide similar opportunities for many young Hungarian individuals.

Do you have any additional comments or recommendations?

I would like to use this opportunity, too to express my thanks to those who contributed to the organization of this interesting trip.

Sincerely

Szabó Géza

BIOTIKA akciová spoločnosť 976 13 Slovenská Ľupča, ČSFR

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TELEFAX

AN / TO : RCG/HAGLER, BAILLY, Inc.	Fax Nr. / Fax No. : 001-703-351-0342
zH / ATT : Mrs. Suzanne GOLDSTEIN SMITH	
von Abt. / from dept. : RVT-Ing. PUSKAILER	Seiten / Pages : 3
Betr. / Re :	Datum / Date : 12. 1. 1993

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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY DELEGATION

OCTOBER 24 - 31, 1992

POST-VISIT EVALUATION FORM

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1. Washington, D.C. portion

What were your overall impressions of the scheduled meetings at the National Press Club in Washington, D.C.?

Very Good, me, as a BIOTIKA, Slovenské Ľupča worker, I appreciate very high the possibility to participate on the meetings at the National Press Club (so known and important teritory) as so the possibility to meet to people from RCG/ Hagler Bailly, Inc. at their own residence.

What changes would you recommend in the types of speakers selected?

As a industry worker I propose that at the similar meetings should participate the workers from different companies which realized the most succesfull projects relating to energy efficiency in U.S.A. We know the technical equipment but our first interest are methods, accesses and experiences.

Would you make any changes in the number of speakers included in the program?

The meetings were very exacting (not only by the reason that my English is not so good), but the number of speaker can be higher. Sure, that it is not possible to make it in one day.

Were you able to meet the individuals and companies that you wanted?

Yes, in the first place NAESCO, SYCOM, ASE woekwrs.

2. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the technical information presented at the conference? For example, was it adequate, too complex or too basic?

The topics were different, the majority was adequate, the Congres Catalog is very good. I was surprised by relatively modest participation at the environmental sesions.

What was your overall impression of the trade exhibition?

Though it was exhibition by the congres it was a good exhibition. I was surprised by the number of companies exhibiting the lighting equipment. Very good idea is the exhibition of professional literature.

Were you able to meet the individuals and companies that you wanted?

Yes, I have had several meetings.

Have you had an opportunity to follow up with any contacts made in the United States? Please expain.

Yes, I met several people from companies which Biotika has equipment from - Controlotron, Ladis and Gyr, Johnson Controls etc. I met some people who worked for the USAID Emergency Energy Program for Eastern and Central Europe.

Were there any topics relating to energy efficiency that you feel were not addressed? Please specify.

It is very difficult to specity it. The Congres was very big and not enough time (10 sessions, 2 exhibitions). I don't know.

In your opinion, what energy efficiency aplications that you discussed while in the United States would achieve the greatest results in your country? Why?

The technical applications are not so important. The most important is the change of thinking, the change of acces to energy use. It will be useful in my country. The efforts in energy saving must be the backround of activities. Not only in professional life, in the daily life of all the people. It is clear that it is a neverending effort but here it is really a lack of culture. You know good. I think so, that you in RCG/Hagler, Bailly, Inc. can compare the results in our countries and in the U. S. A., I mean.

3. Tours of manufacturing and research facilities.

What is your evaluation of the trip to the Southwire company?
Thank you for the possibility to visit an american plant. The first part - the discussion with Mr.Smith was more interesting.

What is your evaluation of the visit to Georgia Institute of Technology?
Very nice to have the opportunity to be on the teritory of this significant university.For me personaly as for control systems engineer it was as a dream.

4. Other

What was the *most* informative part of the trip?
Whole the trip was a flood of informations for me. To today I have problems to assort it and to pass it to my collegues and friends.

What was the *least* informative part of the trip?
The departure.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?
Yes, many. I reccomend two people from Biotika:
Mrs. Elena Kostivierová, responsible for environmet development,
Mr. Ivan Knapko, working on energy manegement.

Do you have any additional comments or recommendations?
Many thanks for all the people who prepared my trip, from USAID and RCG/Hagler, Bailly,Inc. Especially to Suzanne Goldstein Smith, Wendi Norris, Robert Archer and David Keith. You prepared for me a very rich program for these eight days, equilibred in the professional informations, social events and country knowledge. Thank you for your personal efforts and accompaniyng and I hope that I will have once the opportunity make something similar for you in my country.
Maybe one reccomendation. I know that the costs for this trip were very high. I mean that the accomodation in hotels can be more modest, for us is preferable to can be there one or two days longer.
You can by sure that from my numerous trips to foreign countries this one is the best to today.
Thank you.

APPENDIX I

AEE MEMBERSHIP APPLICATION

ABOUT MEMBERSHIP

APPLICATION INSIDE

AN OPEN LETTER

Association of Energy Engineers

Dear Professional:

Energy and the environment are the major forces shaping every aspect of the economy in the 1990s. As a professional, you need to be kept abreast of new technologies, changing regulatory patterns, and key issues which will impact on your organization's profitability.

The Association of Energy Engineers (AEE) offers a multi-faceted continuing education program designed to give you the competitive edge in the 1990s. Through AEE divisions, the Cogeneration Institute, the Environmental Engineers & Managers Institute, and the Demand-Side Management Society, professionals can participate in specialized areas of interest. Founded in 1977 as a nonprofit professional society, AEE's network of 8,000 members in 52 countries with 40 chapters around the world provides a forum for the exchange of information.

AEE publications are second to none. Members receive two journals—*Energy Engineering*, first published in 1904, and the new quarterly publication, *Strategic Planning for Energy and the Environment*. They also receive *AEE Energy Insight*, a quarterly newsletter. These publications represent a retail value of $198 free with their membership.

Periodically AEE publishes salary and marketing surveys to help members round out their professional careers.

Details of AEE programs are described inside this brochure. We welcome you to join the leaders in the industry and be part of the Association of the Energy Engineers.

Sincerely,

Alma McFarland

ALMA McFARLAND
Membership Director

aee CI aee EEMI DSMs

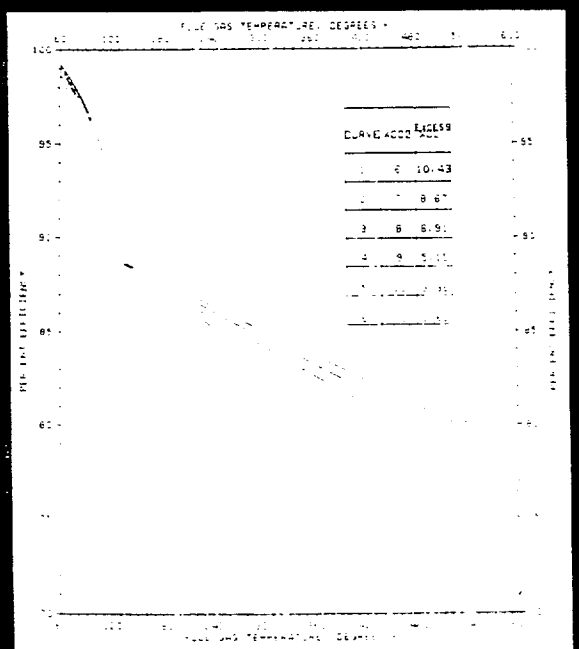

Fig. 1. Combustion Efficiency as a Function of Flue Gas Temperature

Salary Survey Released by AEE

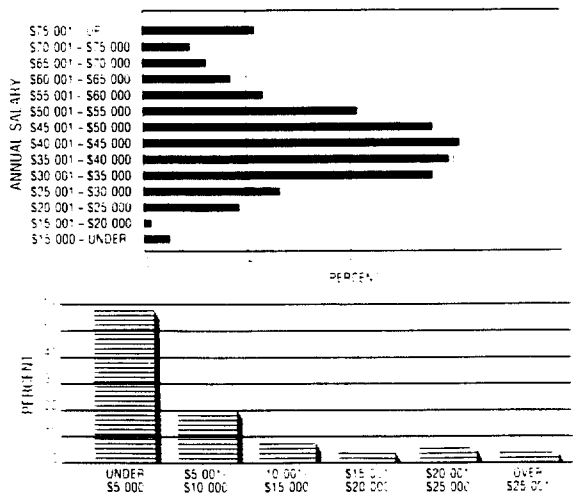

Table 4. Merit Function Rankings

	Merit Function	*Overall Rankings*
Variable Volume	0.[illegible]	1
Constant Volume Reheat	0.63	2
Auxiliary Air	0.25	5
Two Fan VAV Double Duct	0.52	3
Constant Volume Individual Fans	0.49	4

EMS System Opinion Survey

Results of a survey on EMS system performance is illustrated in Figure 3 (left). Company plans to buy an EMS system within the next 12 months is illustrated by Figure 4 (right).

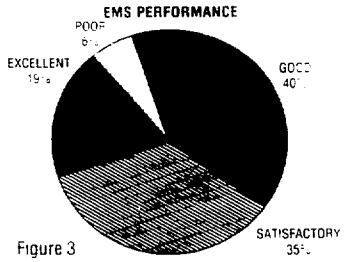

Figure 3

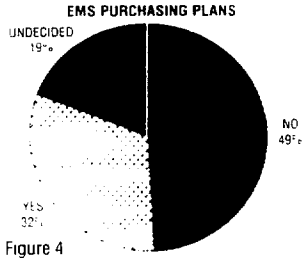

Figure 4

Employment Referral Service

POSITION WANTED–Send a brief description (fifty words or less) of your experience and position required with payment to address below. Member rate: $25; non-member rate: $50. A box number will be assigned. Responses from prospective employers will be forwarded directly to you.

POSITION AVAILABLE–Send brief description (fifty words or less) of position along with company name and address and payment of $200 to address below. In order to maintain confidentiality, resumes should be sent directly to the company by the applicant—not to AEE. AEE will act solely as referral agent.

POSITION AVAILABLE–The Engineering & Consulting Division of American Technical Services, Inc., is recruiting: DCS Start-up Engineers, I&C Engineers, BSEE's, BSME's, Applications Engineers–Fossil Power & Chemical, Project Managers for our home office in Atlanta. Qualified applicants please forward resumes to: Recruiting Dept., ATSG, 4600 North Royal Atlanta Dr., Tucker, GA 30085.

AEE REFERRAL SERVICE

4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340

NUMEROUS BENEFITS

As a member, you have access to other professionals with similar interests, benefit from participation in Association activities, and stay totally informed on vital happenings that affect the industries we serve.

With a 15-year track record of excellence in service to its membership of energy and environmental engineering professionals, AEE is dedicated to remaining in the forefront of a rapidly changing network of industries. In its service to business and industry, the Association readily accepts its responsibility to function as a resource in all areas of concern to our membership.

As members grasp for new solutions to the ever-present energy problems, they know they can count on their Association to provide practical direction and reasonable solutions to questions on energy management strategies and contingency planning, as well as viable alternatives for dealing with fuel price increases in a positive way.

AEE offers its members much more, too. Subscriptions to a number of publications are included in your membership, as are AEE industry survey results, participation in local chapters, access to certification programs, eligibility for awards programs, and a diversity of educational opportunities to improve your professional knowledge and standing. Many of the benefits of membership are enumerated on these pages and await your decision to participate.

AEE PUBLICATIONS

As a member of AEE, *you automatically receive FREE subscriptions to a number of excellent publications—valued at $198*—which include *Energy Engineering*, *Strategic Planning for Energy and the Environment*, and *AEE Energy Insight*, a valuable newsletter. Division members receive additional publications, but one fact of membership is clear: the publications you receive in themselves justify your investment in Association membership.

AEE-CONDUCTED SURVEYS AND EXECUTIVE SUMMARIES

Each year AEE surveys the industry and publishes details on where the industry is heading. To be prepared to meet the challenges of the 1990s, professionals must be able to understand market trends and new factors that will have an impact on their work. Obviously, these surveys and Executive Summaries can help you anticipate the direction of industry to benefit your company and career.

AEE DIVISIONS & COUNCILS

To meet the growing needs of professionals in specialized areas of business, industry, and government, AEE's divisions and councils provide additional programs:

The Cogeneration Institute (
More than 2,200 professionals resenting all segments of the co eration and independent powe dustry have joined the Cogener Institute (CI), a division of AEI members receive all AEE publica plus *The Cogeneration Journal Diesel & Gas Turbine World* CI members also receive Exec Summaries dealing with sub such as transmission access, pr financing, and competitive bidd

The Environmental Engine & Managers Institute
EEMI, a division of AEE, publi the quarterly newsletter, *Envi mental News*, and sponsors AEE vironmental conferences and sh Subjects addressed by EEMI inc underground storage tank leak door air quality, CFCs and ozon pletion, "Energy Policy and Greenhouse Effect," hazardous terial, and water pollution. Mem receive *Environmental Protec* published nine times per year

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DSMs

:mand-Side
:a ement Society

SMS, a division of AEE, sponsors the w magazine, *DSM Quarterly*, distributed to all members. In addition, SMS sponsors sessions on demand-de management at AEE programs.

ational Energy Policy Council

e NEPC develops "white papers" critical issues affecting the industry. Distribution is made to government and industry leaders.

nergy Management rofessionals Council

e EMPC provides input into EE's programs and presents the anual "Energy Managers Hall of ame Award."

nergy Management & Control ystems Council

ne EMCS Council addresses important issues affecting EMCS developments and applications.

he Construction Council

nstruction Council sponsors ontinuing education programs to elp contractors apply the latest methodologies for efficient installation.

AEE CHAPTERS

ith 40 local chapters, members ave the opportunity for networking ith other professionals on regional ssues. They also have exposure to speakers of prominence who address their chapter. In addition, the local chapter program affords them the chance to develop leadership skills in existing chapters or in establishing new ones.

AEE EDUCATIONAL PROGRAMS

Conferences/Seminars

AEE has developed numerous energy conferences and seminars to help meet the continuing education needs of its members, and, in most cases, CEUs are awarded. Programs are scheduled throughout the country to encourage maximum participation. Members enjoy special discounts for these programs.

AEE CONVENTIONS

AEE conventions are held four times each year. Each conference and show features the leading experts in the industry as well as a multi-dimensional expo

Fall Convention/Atlanta

The World Energy Engineering Congress, now in its 14th year, is the Association's flagship event, featuring 160 presentations and 300 exhibits. The obvious benefit of having the World Environmental Engineering Congress held concurrently makes this the year's most significant "must attend" event in your continuing education program.

Spring Convention/California.

GLOBALCON is AEE's major annual West Coast conference and show. Five important events are encompassed by the GLOBALCON show:

- HVAC & Building Systems Congress
- Lighting Efficiency Congress
- Power Generation & DSM Congress
- Environmental Management Congress
- Alternate Energy Congress

Spring Convention/Northeast

The Cogeneration and Independent Power Congress is the flagship event of the Cogeneration Institute. Other programs include Natural Gas Purchasing, the HVAC Controls & Energy Conservation Congress, and the Air Quality Congress.

Summer Convention/Midwest

The International Energy & Environmental Congress (IEEC) is AEE's major energy management and DSM event held in the Midwest. Four key events are included in IEEC: Facilities & HVAC Congress, Power Generation Congress, Pollution Control Technologies Congress, and Energy Management & DSM Congress.

AEE AWARDS PROGRAM

AEE gives special recognition to individuals who have demonstrated outstanding contributions to the profession and service to the Association on the local, regional, and national levels.

AEE SCHOLARSHIPS

Undergraduate scholarship assistance is provided through the Foundation of the Association of Energy Engineers, a nonprofit organization dedicated to furthering education in energy engineering and management. Tax-deductible gifts to the Foundation help further this important program.

AEE SPECIAL DISCOUNTS

Special discounts are available to AEE members who participate in seminars or conferences, and who purchase energy books through the Association. Group rates also apply to Hertz car rentals.

AEE CERTIFICATION PROGRAMS

Certified Energy Manager Program (CEM)

AEE developed a voluntary, innovative program for energy managers which has certified over 1200 professionals.

Certified Cogeneration Professional Program (CCP)

AEE initiated the Certified Cogeneration Professional Program to award recognition to those qualified professionals involved in the cogeneration field.

Certified EMS Contractor Program (CEMSCP)

The purpose of the Certified EMS Contractor Program is to improve the practice of EMS installation by awarding special recognition to qualified contractors.

Certified Lighting Efficiency Professional Program (CLEP)

The CLEP Program awards recognition to lighting professionals involved in efficiency improvement and state-of-the-art design.

Applying for membership is quick, easy, and very rewarding. Use the inc

INDIVIDUAL MEMBER APPLICATION

This checklist helps us learn about your interests and background...

Primary area of interest *(select one box only)*:

- ☐ 01 Energy Conservation Consultants
- ☐ 02 Plant Energy Conservation
- ☐ 03 Product Designers Energy Conservation
- ☐ 04 Solar Engineering
- ☐ 05 Wind Power Engineering
- ☐ 06 Engineering and Construction
- ☐ 07 Building Energy Conservation
- ☐ 08 Energy Engineers in Government
- ☐ 09 Energy Managers
- ☐ 10 Energy Utility
- ☐ 11 Transportation Systems
- ☐ 12 Energy Education
- ☐ 13 Computer Programs for Energy Analysis
- ☐ 14 Synthetic Fuels
- ☐ 15 EMS Contractors
- ☐ 17 Cogeneration
- ☐ 19 Energy Management & Controls
- ☐ 20 Environmental
- ☐ 21 Waste-to-Energy
- ☐ 22 HVAC

Discipline which most closely describes your area of expertise *(select one box only)*:

- ☐ 17 HVAC
- ☐ 18 Environmental Engineer
- ☐ 19 Legal
- ☐ 20 Electrical Engineer
- ☐ 21 Chemical Engineer
- ☐ 22 Mechanical Engineer
- ☐ 23 Architectural Engineer
- ☐ 24 Civil/Structural Engineer
- ☐ 25 Business Administration
- ☐ 26 Other *(please specify)*: _____

Your field of employment *(select one box only)*:

- ☐ 29 R&D/Educators
- ☐ 30 Energy User
- ☐ 31 Equipment Manufacturer
- ☐ 32 Energy Services (consultants, architects, or contractors)
- ☐ 33 Energy Supplier (utility companies)
- ☐ 34 State, Local, or Federal Government Agency
- ☐ 35 Other *(please specify)*: _____

Indicate the title that most closely describes your professional function *(select one box only)*:

- ☐ 36 Environmental Manager
- ☐ 37 Maintenance Manager
- ☐ Industrial Hygienist/Safety
- ☐ 38 Attorney
- ☐ 39 Investment Banker
- ☐ 40 Corporate Energy Director
- ☐ 41 Plant Engineer, Plant Manager, or Plant Energy Coordinator
- ☐ 42 Building Engineer, Building Manager, or Building Energy Coordinator
- ☐ 43 Consultant
- ☐ 44 Engineer or Specialist
- ☐ 45 Utility Manager
- ☐ 46 Government Administrator
- ☐ 47 Contractor
- ☐ 48 Architect
- ☐ 49 Marketing or Sales Manager
- ☐ 50 Educator
- ☐ 51 R&D Manager
- ☐ 52 Other *(please specify)*: _____

PLEASE TYPE OR PRINT ALL INFORMATION

I wish to become a member of the Association of Energy Engineers in the member classification I have checked. My check in the appropriate amount is enclosed. *(Membership cannot be processed unless check is included with application form.)*

Classification	*Annual Dues*
☐ SENIOR MEMBER A graduate of an engineering college or university or a registered Professional Engineer or Architect with six years experience in energy engineering or energy management	$95.00
☐ MEMBER An individual with an engineering, architectural, business, or law degree or a registered Professional Engineer or Architect. *(Persons who are qualified by experience or related degree may petition in writing for full membership consideration.)*	$95.00
☐ AFFILIATE MEMBER A person interested in the objectives of the Association who does not meet the above criteria to be a full member.	$95.00
☐ STUDENT MEMBER An individual who is a *full-time* matriculated student. *(Send evidence of full-time student status.)*	$15.00
☐ RETIRED MEMBER An individual retired full-time who is no longer involved in any career activity	$15.00
☐ In addition please enroll me in the **Cogeneration Institute of AEE**	$20.00
☐ In addition please enroll me in the **Environmental Engineers & Managers Institute of AEE**	$20.00
☐ In addition please enroll me in the **Demand-Side Management Society of AEE**	$20.00

Select method of payment

☐ **CHECK ENCLOSED** (U.S. funds payable to the Association of Energy Engineers)

☐ **CHARGE TO MY CREDIT CARD**

☐ American Express ☐ VISA ☐ MasterCard

CARD NO. _____ AMOUNT ENCLOSED ☐

Expiration Date _____ Signature _____

Name _____
FIRST MIDDLE INITIAL LAST

Title _____

Company Name _____

Company Address _____

City/State/Zip _____ Phone ( ) _____

Home Address _____

City/State/Zip _____

Check one box to show where AEE mail should be sent: ☐ Company ☐ Home

If you are a registered Professional Architect or Engineer, please indicate state(s) and registration number(s):

State _____ No. _____ State _____ No. _____ State _____ No. _____

Experience in energy field _____ years.

EDUCATION

College _____ Degree _____ Field _____ Year _____

College _____ Degree _____ Field _____ Year _____

I certify that the statements in this application are correct and I agree, if elected, that I will be governed by the Constitution and Bylaws of the Association as long as I continue as a member. I furthermore agree to promote the purposes of the Association so far as shall be in my power.

_____
APPLICANT'S SIGNATURE DATE

If sponsored by a member, please have member sign

_____
PRINTED NAME SIGNATURE

(FOR OFFICE USE — PLEASE DO NOT WRITE HERE)

Amount Paid _____ Date Paid _____

Per. Ck. No. _____ Co. Ck. No. _____

Process Date _____ By _____

	Code

FGH

Return to: Association of Energy Engineers, 4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340 / **Phone: (404) 447-5083 / 24-Hour FAX: (404) 446-3969**

ual and/or corporate forms below and make the move to AEE today!

CORPORATE SUSTAINING MEMBER APPLICATION

Why corporate membership in AEE is such a good business decision...

The Association of Energy Engineers invites you to join the select ranks of energy innovators that comprises our distinguished corporate membership.

AEE's present roster of sustaining corporate members is impressive, not only in the quality of each member company, but also in the dedication to professional excellence that is implied by membership in the Association.

Your corporate membership is a clear statement of your commitment to the positive development of the energy profession. And as a corporate member, you are entitled to designate three delegates from your organization to receive all AEE publications and member benefits. (Additional delegates may be enrolled at a very modest additional fee per individual.)

However, your initial corporate membership entitles *any* member of your company to take advantage of the special member fees when they participate in any of our continuing education programs.

Corporate members also receive a special $200 discount on the corporate registration fee for the annual World Energy Engineering Congress.

Corporate members also receive recognition in several ways, including special listing in the *AEE Energy Insight* and in the *Proceedings* of the World Energy Engineering Congress. In addition, corporate members receive special "Executive Summaries" based on opinion marketing surveys of AEE members.

The benefits of corporate membership are significant. You can increase your organization's recognition in the energy field while giving your staff a competitive edge by keeping them "up front" in the fast-changing world of energy and the environment.

It all starts when we receive your completed application and payment of the modest fee that really amounts to an investment in your company's business future.

PLEASE TYPE OR PRINT ALL INFORMATION

Our organization wishes to become a sustaining member of the Association of Energy Engineers in the corporate classification. Our check in the appropriate amount is enclosed. *(Membership cannot be processed unless check is included with application form.)*

Company Name _____

Company Address _____

City State Zip _____

Telephone ( ) _____

Applicant's Name _____
PRINTED NAME SIGNATURE

CORPORATE MEMBERSHIP DELEGATES

Primary Delegate _____
LAST FIRST

Primary Delegate's Title _____

Second Delegate _____
LAST FIRST

Second Delegate's Title _____

Third Delegate _____
LAST FIRST

Third Delegate's Title _____

Enrollment Classifications	*Annual Dues*
☐ SUSTAINING CORPORATE MEMBERSHIP FEE *(Includes participation of three delegates designated by the corporate member above)*	$595.00
☐ In addition please enroll our company in the Cogeneration Institute	$100.00
☐ In addition please enroll our company in the Environmental Engineers & Managers Institute	$100.00
☐ In addition please enroll our company in the Demand-Side Management Society	$100.00
☐ ADDITIONAL DELEGATES may be designated for an annual fee per delegate of:	$65.00

Select method of payment:

☐ **CHECK ENCLOSED** (U.S. funds payable to the Association of Energy Engineers)

☐ **CHARGE TO MY CREDIT CARD**

☐ American Express ☐ VISA ☐ MasterCard

AMOUNT ENCLOSED

CARD #

EXPIRATION DATE SIGNATURE

Remember, in order to process your membership, check must accompany this application. Please make checks payable to the Association of Energy Engineers in U.S. dollars.

Please select the ONE field that best describes your company:

☐ 30 Energy User

☐ 31 Equipment Manufacturer

☐ 32 Energy Services (consultants, architects, contractors)

☐ 33 Energy Supplier (utility company)

☐ 34 State, Local, or Federal Government Agency

☐ 36 Other *(please specify)* _____

(FOR OFFICE USE — PLEASE DO NOT WRITE HERE)

Code

Amount Paid _____ Date Paid _____

Per Ck # _____ Co. Ck # _____

Process Date _____

FGH

Return to: Association of Energy Engineers, 4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340 **Phone: (404) 447-5083 / 24-Hour FAX: (404) 446-3969**

AEE AND YOU

APPLICATION INSIDE

ASSOCIATION OF ENERGY ENGINEERS
4025 Pleasantdale Road, Suite 420, Atlanta, GA 30340

Non-Profit Organization
U.S. Postage
PAID
Association of
Energy Engineers

Please Pass Along...

If you receive a duplicate copy of this invitation, are already a member, or know of another individual who might be a candidate for membership in AEE, please pass this information on to them for consideration. Thank you.

APPENDIX J

PROGRAM FOR 16TH WORLD ENERGY ENGINEERING CONGRESS

16TH WORLD ENERGY ENGINEERING CONGRESS®
ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

CONGRESS ADVANCE

OCTOBER 26-28, 1993 / GEORGIA WORLD CONGRESS CENTER / ATLANTA, GEORGIA

PREREGISTER FOR FREE SHOW ADMISSION

USE THE FORM ON PAGE 11

PRESENTED BY: THE ASSOCIATION OF ENERGY ENGINEERS® • THE COGENERATION & COMPETITIVE POWER INSTITUTE OF AEE • THE DEMAND-SIDE MANAGEMENT SOCIETY OF AEE • THE ENVIRONMENTAL ENGINEERS & MANAGERS INSTITUTE OF AEE

WEEC COSPONSORED BY: • General Services Administration • Georgia Office of Energy Resources • U.S. Department of Energy: State Energy Programs Division • U.S. Environmental Protection Agency: Green Lights Program
ETE COSPONSORED BY: • U.S. Environmental Protection Agency: Region IV

New Forces Impacting Energy and Environmental Strategies Emphasized at This Year's WEEC and ETE

Now in its 16th year, the World Energy Engineering Congress has gained the reputation as the "must attend" energy event of the year. Recognized as the No. 1 conference and exposition covering the Energy Policy Act, new natural gas purchasing strategies resulting from FERC Order 636, PUHCA reforms' impact on the electric power generating industry, and new technologies to reduce energy consumption, this year's WEEC is more important than ever before. The importance of integrating energy and environmental strategies will be thoroughly explored in the companion Environmental Technology Conference & Expo (ETE).

Delegates who register for the three-day conference may attend any session of the concurrent program (does not include seminars). With over 200 speakers, 44 sessions, nine intensive seminars, banquet and luncheons, and the expanded 400-booth expo, the WEEC/ETE packs a year of training into just four days. Truly comprehensive in nature, each full-conference delegate receives at the start of the program a fully edited 600-page bound *Proceedings*, which not only helps maximize participation, but also serves as a handy reference back on the job.

The energy and environmental industry has drastically changed from just a year ago. Delegates at this year's WEEC/ETE will learn how the Energy Policy Act and possible new energy taxes will impact the energy industry. Spurred by factors such as CFC-phaseout requirements, new demand-side management programs, federal energy management opportunities, expanded Green Lights and buildings programs, this year's WEEC/ETE addresses all aspects of the changing industry.

No other event offers attendees such a "supermarket" of new products, innovative applications, and proven technologies covering the total spectrum of energy and environmental concerns.

In addition, WEEC/ETE attendees gain a bonus admission into the colocated Powdex '93 and Paint Industries Show.

The only way to appreciate the scope and depth of the WEEC and ETE is to review the conference program outlines in this newspaper. To maximize your participation we suggest you send a team so that your organization won't miss out on any of the concurrent sessions. Special team and company plan discounts are outlined on p. 11.

IN THIS ISSUE

Guest Tour, Hotel Information ... 2
Plenary Program ... 3
16th World Energy Engineering Congress ... 4-5
Environmental Technology Conference & Expo ... 6-7
Preconference Seminars ... 8-10
Registration Form ... 11
AEE Membership Information ... 11
Week At-A-Glance ... 12

Free Show Admission!

Only have time to attend the expo? Then plan to register now so you can attend free of charge. *You can accomplish more in one day here than in months of reading, researching, and talking to salespeople.* This savings of time and money starts when you register in advance for free show admission. Save the $20 on-site admission fee by filling out and mailing the registration form on page 11 today: we'll send your free admission badge by return mail. You'll also avoid waiting in line at the expo and have one less problem to solve! So act now.

EXPO HOURS

TUESDAY / October 26
10:00 am – 5:00 pm

WEDNESDAY / October 27
10:00 am – 5:00 pm

THURSDAY / October 28
9:00 am – 12:30 pm

ASSOCIATION OF ENERGY ENGINEERS®
4025 PLEASANTDALE ROAD, SUITE 420
ATLANTA, GA 30340

Non Profit Organization
U.S. Postage
PAID
THE ASSOCIATION OF ENERGY ENGINEERS

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GUEST TOUR

WEDNESDAY, OCTOBER 27, 1993

TIME: 10:00 am – 3:00 pm / COST: $40.00

STONE MOUNTAIN

The largest mass of exposed granite in the world is the focus of the lovely 3,200-acre Stone Mountain Park. Enjoy a driving tour of the park with its beautifully landscaped grounds as your guide shows you the many points of interest. Stop at Memorial Hall for a close-up view and story of the world's largest bas-relief sculpture. Bigger than the carving on Mount Rushmore, this carving depicts Confederate President Jefferson Davis and Generals Robert E. Lee and Stonewall Jackson on horseback. Then choose two of the following interesting attractions:

The Plantation. Stroll through history while touring this authentic antebellum plantation with its 19 outbuildings, including the oldest restored house in the state.

The Railroad. An old-fashioned steam locomotive lets you see the park from a new perspective as it chugs leisurely around the mountain on a scenic ride.

The Riverboat. Take a lazy cruise on Stone Mountain Lake as you relax on a paddlewheel riverboat, the *Scarlett O'Hara* or the *Henry Grady*.

The Skylift. Enjoy a breathtaking view of the countryside and Atlanta, 16 miles away, as the Swiss cable car whisks you to the top of the mountain.

Browse, if you like, in the Craft Shop located near the Plantation, then off to Stone Mountain Village to visit the many charming shops, arts/crafts, and antique stores. You won't want to miss the old-fashioned soda fountain at the drugstore and the Stone Mountain Handbags store. Luncheon will be served in the Magnolia Tea Room.

Arranging Accommodations at the Congress Hotels

Blocks of rooms at reduced rates have been set aside at the hotels listed below for WEEC/ETE attendees making their reservations by *September 17, 1993*, or until the reserved blocks have been filled, whichever comes first.

*Comfort Inn	$84/94 S/D	404-524-5555
*Days Inn	$85/95 S/D	404-523-1144
Hyatt Regency	$122 S/D	404-577-1234
*Westin Peachtree Plaza	$110/133 S/D	404-659-1400

**Limited number of rooms being offered at government rates.*

Due to other meetings taking place in Atlanta during the week of the WEEC/ETE, hotels will fill quickly and availability after cut-off date will be very limited. RESERVE EARLY for special rates and accommodations.

Special Air Travel Discounts

To help our attendees obtain the lowest possible air fares, AEE has negotiated significant savings roundtrip to Atlanta for this event from anywhere in the U.S. and Canada through various major airlines. These discounts (normally lower than other published fares) are available by calling:

1-800-635-3618
(or 1-404-449-4244)

Please call as soon as possible, since some special rates may have limitations.

WEEC/ETE Attendees Will Receive *Proceedings* and CEU Credit

Each full three-day conference registrant will receive a fully edited, bound 16th WEEC/ETE *Proceedings*. Continuing education units (CEUs) will be granted to 1993 WEEC/ETE conference attendees. Those registering for the complete three-day program will qualify for one unit of credit; attendees at a full-day seminar will receive 0.7 CEUs; two-day seminar attendees will earn 1.4 CEUs.

LEARN FROM TOP PROFESSIONALS WHO TEACH PRACTICAL SOLUTIONS TO THE TOP-PRIORITY ENERGY ISSUES FACING BUSINESS AND INDUSTRY IN THE COMING MONTHS.

PLAN TO PARTICIPATE IN THE WEEC AND ETE EXPOSI

The concurrent exposition at the Georgia World Congress Center will feature 400 booths highlighting the latest technologies in energy management, HVAC, lighting efficiency, power generation, and environmental compliance. For information on exhibiting at WEEC, call (404) 925-9648 or FAX (404) 381-9865. To exhibit at ETE, call (312) 868-6960 or FAX (312) 868-9076.

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WEEC / ETE

PLENARY AGENDA

OPENING CEREMONIES

TUESDAY, OCTOBER 26, 1993 / 8:45 - 11:10 am

HAZEL R. O'LEARY

EDWARD T. ADDISON

WILLIAM A. NITZE

Chair: George Kritzler
Consolidated Edison of New York
New York, NY

8:45 - 9:25 am
United States Army Ground Forces Command
Band and Color Guard, Fort McPherson, GA

9:30 - 9:35 am
Welcome
Al Thumann, P.E., CEM, CLEP, Executive Director,
Association of Energy Engineers, Atlanta, GA

9:40 - 10:20 am
The Implementation of the Energy Policy Act
Hazel R. O'Leary, Secretary of Energy
U.S. Department of Energy, Washington, DC

10:00 - 10:40 am
The View from America's Electric Utilities
Edward T. Addison, President
The Southern Company, Atlanta, GA
Vice Chair, Edison Electric Institute, Washington, DC

10:40 - 11:10 am
The Impact of Possible New Taxes on Energy and Global Warming
William A. Nitze, President
The Alliance To Save Energy, Washington, DC

"Meet Your Peers"

LUNCHEON IN THE EXHIBIT HALL

TUESDAY, OCTOBER 26
GEORGIA WORLD CONGRESS CENTER
ATLANTA, GEORGIA

LUNCHEON: 11:30 am

Luncheon provided to conference attendees registered for full three-day conference.

"You Are Invited"

Delegates to either the 16th World Energy Engineering Congress or the Environmental Technology Conference & Expo are invited to attend the AEE Banquet on Monday night, October 25; the Opening Ceremonies and Luncheon in Exhibit Hall on Tuesday, October 26; and the Keynote Luncheon on Thursday, October 28.

AEE BANQUET

MONDAY, OCTOBER 25 / GEORGIA WORLD CONGRESS CENTER

SOCIAL HOUR 6:30 pm
DINNER 7:15 pm

Don't miss the award-winning Zucchini Brothers as they bring to Atlanta the exciting juggling act that has thrilled thousands across North America.

The banquet is included in your full conference registration. Note that additional reservations are required in advance.

KEYNOTE LUNCHEON

THURSDAY, OCTOBER 28 / GEORGIA WORLD CONGRESS CENTER

LUNCHEON: 12:30 pm

International Linkage on Energy and the Environment

WILLIAM C. CHANDLER
Director
Advanced International Studies Unit
Battelle Pacific Northwest Laboratories
Washington, DC

The keynote luncheon is included in your full conference registration.

WEEC PROGRAM AGENDA

AEE BANQUET See page 3
OPENING CEREMONIES See page 3
KEYNOTE LUNCHEON See page 3
SEMINARS See page 10

TUESDAY P.M. 7 CONCURRENT SESSIONS

• *2:30-5:10 pm*

E: DSM APPLICATIONS I

Chair: ROBERT A. PENNEY, P.E., CEM, Clearinghouse Lead Engineer, Washington State Energy Office

Lessons from the Trenches: Niagara Mohawk's Commercial/Industrial Energy Survey Program
Thomas K. DePaull, Senior Marketing Program Coordinator, Niagara Mohawk Power Corp

Moving the Industrial Motor Market: Development and Performance of BG&E's Efficient Motor Rebate
Barry Hedden, Program Administrator, and **Cristina P. Packard,** DSM Analyst, Baltimore Gas & Electric

Equipment Efficiency Levels for Utility Rebates — What Are the Right Ones?
Denis Nadas, Energy Technology Specialist, New York State Energy Office

Reducing Transmission and Distribution Costs with DSM: Five Questions You Should Ask
Gary McDonald, Senior Engineer, A&C Enercom

• *2:30-5:10 pm*

F: COMPETING IN THE WHOLESALE POWER MARKETS: THE KEY REGULATORY DEVELOPMENTS

Chair: ROGER D. FELDMAN, P.C., Partner, McDermott, Will & Emery

State PURPA Proceedings: Effects on Competition
Roger D. Feldman

Integrated Resource Planning: Effects on Regulation and Competitive Markets
Peter Spinney, Charles River Associates, Inc

EWG and QFs Making Choices and Working with the Rules
John Seelke, Skyway Power Corporation

Wholesale Ratemaking for EWGs
Ed Selgrade, Tillinghast, Collins & Graham

• *2:30-5:10 pm*

G: EFFECTIVE ENERGY MANAGEMENT

Chair: WILLIAM H. MASHBURN, P.E., Professor, Mechanical Engineering Department, Virginia Polytechnic Institute

Effective Technologies Used by Utilities as Part of Their DSM and Rebate Programs
Walter Johnston and **Chris Packard,** Industrial Extension Service, North Carolina State University

Auditing Cost Avoidance Using Energy Accounting Software
Steven D. Heinz, President, OmniComp

EMS Data Collection and Analysis
Mark K. LaForest, Honeywell, Inc.

Energy Conservation Projects—Putting It All Together
Edward Varno, Manager, Energy Services, Larsen Engineers

• *2:30-5:10 pm*

H: LIGHTING EFFICIENCY IMPROVEMENT

Ultraviolet Light Output from High-Efficiency Light Sources: Concerns, Field Measurements, Analysis
Lindsay Audin, CEM, CLEP, IES, Manager, Energy Conservation, Columbia University

Relighting Program — Furman University
Phill Simpson, Furman University

Lighting Maintenance Practices That Save Energy
R. Arnold Tucker, P.E., CEM, CLEP, Personal Lighting Engineer, Osram Sylvania, Inc

Upgrading "Modern" Lighting Systems
David J. Burke, CEM, CLEP, Asst. Vice President, Facilities Engineering, Dean Witter & Discover

• *2:30-5:10 pm*

I: FEDERAL ENERGY MANAGEMENT

Energy Conservation Technology Selection: A Software Approach
Lee DeBaillie, Associate Investigator, U.S. Army Construction Engineering Research Lab Energy & Utilities Systems Division

Establishing a Money-Saving Energy Management Program at a DOD Research Facility
G. Robert Kelly, P.E., Head, Water & Energy Management Branch, Naval Surface Warfare Center

Automated Utilities Damage Assessment (AUDA) System
Reza Salavani and **George C. Laventure, Jr.,** Wright Laboratory/Operability & Repair, Tyndall AFB

Federal Energy Decision Screening (FEDS) Process at Fort Drum, New York
Douglas R. Dixon, Program Manager, Battelle Pacific Northwest Laboratory

• *2:30-5:10 pm*

J: NATIONAL ENERGY POLICY ACT

Chair: MARK HOPKINS, Director of Corporate Relations, The Alliance To Save Energy

Appliance and Equipment Standards
Howard Geller, Executive Director, American Council for an Energy Efficient Economy

Federal Energy Management
Glen Skovholt, Director Policy and Strategy, Corporate Public Affairs, Honeywell, Inc.

Buildings and State and Local Programs
Jeff Genzer, Counsel to National Association of State Energy Officials, Duncan, Weinberg, Miller & Pembroke

Global Warming, Utility Provisions and Alternative Fuels
Leslie Black Cordes, Professional Staff Member, Senate Energy and Natural Resources Committee Subcommittee on Renewable Energy Efficiency Competitiveness

Industrial Provisions and DOE Program Response
Denise Swink, Associate Deputy Asst. Secretary, U.S. DOE, Energy Efficiency/Renewable Energy, Office of Industrial Technology

• *2:30-5:10 pm*

K: NATURAL GAS PROCUREMENT STRATEGIES AND FERC ORDER 636

Chair: RON SMITH, Staff Engineer, Energy Section, General Motors

Competitive Implications of FERC Order 636
Sterling Smith, Counsel, Sutherland Asbill Brennan

Natural Gas Purchasing Strategies as Affected by FERC Order 636
Joseph Kubacki, Jr., Director of Energy Projects, Strategic Energy, Ltd.

Gas Management Strategies after FERC Order 636
Guy Asmus, Sr. Supply Manager, Inland Steel Co

The Challenges of FERC Order 636: How Does Ohio Respond?
J. Michael Biddison, Commissioner, Public Utilities Commission of Ohio

WEDNESDAY A.M. 7 CONCURRENT SESSIONS

• *9:00-11:40 am*

E: DSM APPLICATIONS II

Chair: PAUL E. CONLAN, CEM, CLEP, Group Vice President, A&C Enercom

The Three E Project — Integrating Environmental Efficiency and Electricity
Paul E. Conlan, CEM, CLEP

An Impact Evaluation of Mandatory Time-of-Use Rate Structures for Residential Electric Utility Users
Michael P. Gallaher, Senior Economist, Research Triangle Institute

From Demand-Side to Integrated Resource Planning: EPRI's DS-Manager & IRP-Manager Planning Models
Mathew D. Hankenstad, Vice President, Electric Power Software

DSM Principles to HVAC Retirement: A New DSM Program Strategy
Jay Stein, E-Cube, Inc.

• *9:00-11:40 am*

F: PUHCA & ELECTRIC TRANSMISSION

Chair: SCOTT SPIEWAK, *Cogeneration & Resource Recovery* Magazine

International Transmission of Power
Phillip Gennarelli, Vice President Marketing, Indeck Energy Services, Inc.

Market Pricing and Open Transmission Access
Joseph Kubacki, Jr., Strategic Energy, Ltd

Tracking the Bulk Power Market
Kent Knutson, Resource Data International

Transmission in the Southeast
John Seelke, Skyway Power Corporation

The New England Regional Transmission Agreements
Frank Sabatino, Vice President Marketing, NorthEast Utilities

• *9:00-11:40 am*

G: INTERNATIONAL ENERGY OPPORTUNITIES

Chair: DAVID KEITH, RCG/Hagler Bailly, Inc

Vojany Station Reconstruction, Repowering, and Expansion Assessment
Wiliam F. Coe, Project Manager, Southern Electric International

Implementing Demand-Side Management Through Integrated Resource Planning in Poland
Jarosław Dybowski, Polish Power Grid Company

Achieving Environmental Benefits with Industrial DSM Programs in Mexico
Ing. Salvador Herrera, FIDE (Fund for Electric Energy Efficiency)

International Markets for Energy Efficiency Products and Services
Suzanne Smith, RCG/Hagler Bailly, Inc

• *9:00-11:40 am*

H: UPGRADING LIGHTING SYSTEMS FOR EFFICIENCY IMPROVEMENT

Chair: NICOLAAS BLEKER, Application Marketing Manager, Philips Lighting Company

National Energy Policy Act — How It Can Affect Future Building Management Policies
Eric A. Dunham, CEM, Chief/Energy Branch, General Services Administration Public Buildings Service

Lighting Systems That Provide Energy Efficiency
George Preston, Director Fluorescent Lamps, Philips Lighting Company

T8 Ballasts — Developing Efficient Alternatives
Michael J. Ostaffe, Manager, Electronic Development, Advanced Transformer Company

Successful HID Case Studies that Demonstrate Cost-Effectiveness
David H. Finch, I&C Lighting Specialist, Public Service Conservation Resource Corporation

• *9:00-11:40 am*

I: ENERGY CONSERVATION IN FEDERAL BUILDINGS I

Chair: DOUGLAS DECKER, P.E., Business Development Manager, Systems & Services Division, Johnson Controls, Inc

New Energy Directions
Douglas Decker, P.E.

Implementing Energy Performance Standards in Commercial and Federal Buildings
Carlos S. Warren, Ph.D., P.E., CLEP, Vice President, Energy Services, Reynolds, Smith and Hills, Inc

Energy Resource Management in the Department of Defense
Millard E. Carr, P.E., Acting Director of Energy Policy, The Pentagon

Funding Federal Energy Projects
Mark Ginsberg, Director, Federal Energy Management Program, U.S. Department of Energy

• *9:00-11:40 am*

J: HVAC SYSTEM OPTIMIZATION I

Energy-Efficient Office Equipment: An Overview
Loretta A. Smith, Research Associate, American Council for an Energy Efficient Economy and **Mark Ledbetter,** Associate Program Manager, Battelle Pacific Northwest Laboratory

The Retrofit of a Run-Around Loop for Economical Humidity Control in a Surgery Center
William R. Beckwith, President, Indoor Environment & Energy

Evaporative/Vapor-Compression Hybrid Cooling in Three California Climates
Gary McDonald, Senior Engineer, A&E Enercom

Ground-Source Heat Pumps: A Feasibility Study
Hameed G. Nezhad, Ph.D., Director Energy Research Institute, Moorhead State University

• *9:00-11:40 am*

K: PERFORMANCE CONTRACTING

Chair: SHIRLEY HANSEN, Ph.D., President, Hansen Associates, Inc.

Managing the Risks of Performance Contracting
Christopher Kane, P.E., Principal, ER3, Inc.

Performance Contracting: A Global Perspective
Thomas K. Dreessen, President, Energy Performing Services

Protecting the "Host" in Performance Contracting for DSM
Shirley Hansen, Ph.D.

Performance Contracting Across Market Sectors
Terry Singer, Executive Director, National Association of Energy Service Companies

NOTE: FULL CONFERENCE DELEGATES MAY ATTEND ANY SESSION OF WEEC OR EEE. CONFERENCE PROGRAM SUBJECT TO CHANGE.

WEDNESDAY P.M. 7 CONCURRENT SESSIONS

• *1:30-2:30 pm*

POSTER SESSION

• *2:30-5:10 pm*

E: DSM — BIDDING AND PLANNING

Chair: Mary Anne Lauderdale, P.E., CEM, Group Manager, Energy Investment, Inc.

Designing Competitive Procurement Systems for Power Supplies and Demand-Side Resources
John C. Higgins, Senior Consultant, Reed Consulting Group

The Agony and Ecstacy of Implementing Bid Projects
Frederick Mitchell, Marketing Manager, Energy Investment, Inc.

Development of a DSM Infrastructure: Planning, Implementation and Verification for Conservation Bidding
Jack S. Wolpert, Ph.D., CEM, E-Cube, Inc., and **Bob Bandy,** Public Service Company of Colorado

What Utilities Are Saying About DSM Bidding
William J. LaBlanc, Project Director, Barakat & Chamberlin, Inc.

• *2:30-5:10 pm*

F: COGENERATION UPDATE

Chair: Thomas Mooc, Facilities Specialist, Virginia Power

The Analysis of Cogeneration Systems
Cecilio E. Gracias, Ph.D., Energy Technical Specialist, and **Lloyd Hoffstatter,** Technical Services Bureau, New York State Energy Office

Design Considerations for Installing Cogeneration into an Existing Plant
Matthew J. Peterson, Manager, Facilities Maintenance & Utilities, Hoechst Celanese Corp.

Cogeneration Emissions Breakthrough
Robert H. Warren, P.E., CEM, CCP, Senior Vice President, Commercial Energy Systems Management Corporation

State of Florida Capital Center Cogeneration Project
James Geers, President, PLM Technologies, and **Carl Svard,** President, Integrated Planning & Engineering, Inc.

• *2:30-5:10 pm*

G: ENERGY MANAGEMENT I

Chair: Timothy B. Janos, CEM, President, Energy Management Specialists, Inc.

25 More Tips and Tricks to Save You Even More Big Bucks at Your Facility
John Puskar, P.E., President, CLC Consultants, Inc.

An Integrated Approach to Providing Solutions for HVAC Systems
Ellen Newcomb, Engineer, Existing Building Services, The Trane Company

Energy Savings in Computer/Data Centers
Paul F. Hutchins, Ph.D., P.E., CEM, Director of Energy Programs, Reynolds, Smith & Hills, Inc.

Implementing Energy Performance Standards in Commercial and Federal Buildings
Carlos S. Warren, Ph.D., P.E., CLEP, VP-Energy Services, Reynolds, Smith & Hills, Inc.

• *2:30-5:10 pm*

H: STRUCTURING LIGHTING RETROFIT PROJECTS FOR SUCCESS

Chair: John Feiters, CEM, Senior Engineer-EM Lighting Consultant, AT&T Network Systems Columbus Works

Bright Ideas: A Comprehensive Lighting Retrofit in an Academic Setting
David Groves and **Eric Selmon,** Stanford University

Efficient Lighting–A Solution to the Energy Challenges of the 1990s
Howard L. Wolfman, P.E., Manager of Industry Standards & Utilities, Motorola Lighting, Inc.

Lighting Retrofits: The Good, the Bad, and the Ugly
Laurie Czeschin, Market Specialist, Cooper Lighting

Environmentally Responsible Disposal of Lighting Equipment
Robert A. Penney, P.E., CEM, Clearinghouse Lead Engineer, Washington State Energy Office

• *2:30-5:10 pm*

I: ENERGY CONSERVATION IN FEDERAL BUILDINGS II

Chair: James Woods, CEM, General Services Administration Office (PMFE)

Energy Conservation in the Federal Sector
Mark Ginsberg, Director, Federal Energy Management Program, U.S. Department of Energy

Increasing Energy Awareness in the Department of Defense
Millard E. Carr, P.E., Assistant/Energy Policy, Office Secretary of Defense, The Pentagon

Exploring Energy and Environmental Opportunities. How the CFC Issues Can Work to Your Advantage
Eric Dunham, Chief of Energy Division, Public Buildings Service, General Services Admin

Why Should You Use DLAs Energy-Efficient Product Services?
B. Montague Ingram, Product Executive, Energy Efficient Lighting, Marketing Office Defense General Supply Center

• *2:30-5:10 pm*

J: THERMAL ENERGY STORAGE APPLICATIONS

Chair: Raj Gopal, P.E., Principal Engineer, Technical Resources, Inc.

Marketing Opportunities with Thermal Storage
Frederick N. Broberg, P.E., Project Engineer, H.F. Lenz Company

Thermal Energy Storage–The Natural Way
Klaus Schiess, P.E., CEM, KSEngineers

Procedure for Analyzing Performance of a Thermal Storage Energy System Using an Energy and Demand Balance Approach
Shylender Reddy, ACR Engineering, Inc.

Panel Discussion

• *2:30-5:10 pm*

K: DIRECT DIGITAL CONTROLS

Chair: John J. McGowan, CEM, CCD Market Development, Honeywell, Inc.

Integration Enables Coordination of Diverse Building Systems
John D. Petze, CEM, President, Teletrol Systems

Developing a Performance-Based Competitive Bid Specification for a Direct Digital Control System
Randy G. Paquette, Corporate Director of Facilities & Management, McLaren Health Care Corporation

DDC Laboratory and Fume Hood Controls for More Safety and Less Energy
Larry J. Fisher, President, ECI Services

Integrating DDC Systems
John J. McGowan, CEM

• *5:15-6:30 pm*

NETWORKING ROUNDTABLE DISCUSSION GROUP

(Cash bar available)

THURSDAY A.M. 7 CONCURRENT SESSIONS

• *9:00-11:40 am*

E: VERIFICATION OF SAVINGS — DSM

Chair: Martin A. Mozzo, Jr., P.E., CEM, CLEP, Senior Project Manager, KENETECH Energy Management, Inc.

DSM Measurement and Verification — Balancing the Scales
Charles Coccaro, Public Service Electric & Gas Co.

Turning Black and White into Green; Healthier Programs Through Measuring and Monitoring
Joseph Pulaski, Measuring & Monitoring Services

Ford Performance Contract Experience
James Kaman, Ford Motor Company

New Developments in DSM Verification
Martin A. Mozzo, Jr., P.E., CEM, CLEP

• *9:00-11:40 am*

F: POWER GENERATION

An Integrated Approach to a Combined Cycle Repowering Project
Philip V. Ziminsky, Manager Cogeneration Projects, Stowe Engineering Corporation

Power Generation and the Effect of Cooling Water
Robert Burger, President, Burger Cooling Tower Co.

Solar Thermal Electric Technologies for Power Generation
Dinesh Kumar, Senior Analyst, Meridian Corp.

Biomass Energy Generation — Trends and Outlook in California
Dr. Joanta H. Green, Engineer, R&D, Bechtel Group, Inc.

• *9:00 am-12:20 pm*

G: ENERGY MANAGEMENT II

Industrial Energy Efficiency: A North Carolina Experience
R. Neal Elliott, Ph.D., P.E., Research Associate, American Council for an Energy-Efficient Economy

A Facility Monitoring System: The Most Valuable and Cost-Effective Tool Available to an Energy Manager
William A. Holmes, P.E., CEM, President, Holmes Energy Services, Inc.

Improving Energy and Loss Efficiency: The Total Quality Way
V. Venkatesan, Senior Process Engineer, Refineria Isla (Curazao) SA

Energy Management and Policy Strategies at New Jersey Transit
Ransome E. Owan, Senior Energy Analyst, Management Engineering & Analysis, New Jersey Transit

Energy Saving in Coke Industry by Using DCS
Dr. Samir El-Bardissi, Tabbin Institute for Metallurgical Studies

• *9:00-10:20 am*

H1: VARIABLE SPEED DRIVES

Are You Certain You Understand the Economics for Applying ASD Systems to Centrifugal Fan and Pump Loads? Well, Here's the Rest of the Story
Wayne L. Stebbins, Electrical Staff Engineer, Textile Fibers Group, Hoechst Celanese Corporation

Simple Solutions to VSD Pumping Measures
Richard R. Vaillencourt, P.E., Project Manager, Energy Investment, Inc.

• *10:20-11:40 am*

H2: CHILLED WATER SYSTEMS

Evaluation of the Technical and Economic Performance of Energy-Efficient, Engine-Driven Chillers (EDC)
Donald Anderson, President, Nova Group

Industrial District Cooling Application Using Distributed Chilled Water Storage
Donald P. Fiorino, P.E., Facility Engineer, Texas Instruments, Inc.

• *9:00-11:40 am*

I: DOD ENERGY UTILIZATION

Chair: Freddie L. Beason, P.E., Mechanical Engineer, Systems Engineering, Air Force Engineering Services Center, Tyndall AFB

Renewable Energy in the Department of Defense
Garyl D. Smith, Chairman, DOD Photovoltaics Review Committee, Energy Program Office, Naval Air Weapons Station

120 KW Lightweight Mobile Generator
Thomas C. Hardy, P.E., Program Manager, U.S. Air Force — Wright Laboratory, Tyndall AFB

The Centralized Purchase of Natural Gas for DOD: The Details and Dollar Benefits to DOD
Col. John J. Carr, Defense Fuel Supply Center, Cameron Station

Central Energy Supply Planning for DOD Installations
Martin J. Savoie, Energy & Utility Systems Division, U.S. Army Construction Engineering Research Labs

• *9:00-11:40 am*

J: HVAC SYSTEM OPTIMIZATION II

Electric Motor Do's and Don'ts
Robert K. Hoshide, CEM, CLEP, Project Manager-EM, Energy Technology Engineering Center, Rockwell International

Improving the Performance of Small Type Air-Conditioners
Rogeh K. Alnajjar, Mechanical Commissioning Engineer, International Test & Balance, Inc.

Process Cooling Primary/Secondary System Renovation
Karl Gerken, Facilities Engineer, Storage Technology Corporation, and **Carl Svard, P.E.,** President, Integrated Planning & Engineering, Inc.

Thermodynamic Analysis of a Combined Vapor Compression/Absorption Refrigeration System
S.A. Sherif, Ph.D., Associate Professor, Dept of Mechanical Engineering, University of Florida

• *9:00-11:40 am*

K: RENEWABLE ENERGY APPLICATIONS

Emerging Renewable Energy Electric Applications: New Views of the Market
Kevin DeGroat, Renewable Energy Branch Director, Meridian Corporation

Assessment of Renewable Energy Technologies in Arizona
Prem K. Bahl, Utilities Consultant-Utilities Division, Arizona Corporation Commission

Solar Integrated Pumping Application
Stephen C. Turner, Energy Analyst, Florida Atlantic University

Recent Advances in Microprocessor Control and Variable Speed Drive Strategies for Small Wood-Fired Boilers: A Case History
Robert M. Cluaie, P.E., Project Manager, Applied Engineering, Inc.

ETE PROGRAM AGENDA

ALL-BANQUET See page 3
OPENING CEREMONIES See page 3
KEYNOTE LUNCHEON See page 3
SENIOR PROGRAM See page 4

TUESDAY P.M.
4 CONCURRENT SESSIONS

• 2:30-5:10 pm

A: CLEAN AIR ACT AMENDMENTS TAKE HOLD

Chair: Wayne C. Turner, Ph.D., P.E., CEM, Professor, Industrial Engineering & Management, Oklahoma State University

Clean Air Act Amendments: Overviews and Update
Wayne C. Turner, Ph.D., P.E., CEM, and **Regi Hyre**, Oklahoma State University

Possible Emission of Hazardous Air Pollutants from Fossil-Fired Boilers and Their Regulation Order Section 112 of the Clean Air Act
Paul Hendrickson, Battelle Pacific Northwest Laboratories

Permitting Under the New Clean Air Act
Thomas Lacki, Research Associate, Industrial Engineering & Management, Oklahoma State University

Phaseout of CFC Usage in Industrial Refrigeration Equipment
Bill Sullivan, P.E., and **Bobby G. Beach, P.E.**, Emerson Services, Inc

• 2:30-5:10 pm

B: POLLUTION PREVENTION

Chair: Tom Nessmith, Branch Chief, Policy Planning & Evaluation Branch, U.S. EPA Region IV

Overview of Perspectives on Pollution Prevention
Tom Nessmith

Overview of Federal Perspectives
Carol Monell, Chief, Pollution Prevention Unit, Policy Planning & Evaluation Branch, U.S. EPA

Pollution Prevention — A State Perspective
J. Robert Donaghue, Project Director, Georgia Hazardous Waste Management Authority

Pollution Prevention — What Does It All Mean?
Bob Kerr, Director of Georgia Pollution Prevention Assistance Division

• 2:30-5:10 pm

C: UPDATE ON SOLID/HAZARDOUS WASTE REGULATIONS

Chair: Joseph T. Surowiec, Senior Scientist, Atlanta Office Manager, Environmental Science & Engineering, Inc

RCRA Regulatory Developments
A. Jean Tolman, Attorney at Law, Arnall, Golden & Gregory

Corrective Action Management Units (CAMUs)
Robert J. Pulfrey, PG, Project Scientist, Environmental Science & Engineering, Inc.

Regulatory Policies in Monitoring DNAPL and Other Contamination in Fractured Rock Formations
Ram Arora, Ph.D., PG, President, Hydrovision, Inc.; Professor & Director, Center of Hydrogeology, Department of Geology, Georgia State University

Solid Waste Management Trends
Daniel Morrical, P.E., Senior Engineer, Environmental Science & Engineering, Inc

• 2:30-5:10 pm

D: ENVIRONMENTAL BUSINESS DEVELOPMENT

Chair: Richard K. Miller, CEM, President, Richard K. Miller & Associates, Inc

Strategic Overview of the Environmental Market
Grant Ferrier, Publisher and Editor, *Environmental Business Journal*

Market Assessment: Demand for Innovative Cleanup Technologies
Margaret Kelly, Deputy Director, Technology Innovation Office, U.S. EPA

Doing Environmental Business with Mexico
Elaina Espinosa, Trade Commission of Mexico

Billion-Dollar Environmental Projects and Programs
Terri C. Walker, Vice President, and **Richard K. Miller, CEM**, Richard K. Miller & Associates, Inc

WEDNESDAY A.M.
4 CONCURRENT SESSIONS

• 9:00-11:40 am

A: TITLE 1: CLEAN AIR ACT AND BOILERS

Chair: Harry Taplin, P.E., CEM, President, BTU Consultants

Title 1: Clean Air Act and Boilers
Harry Taplin, P.E., CEM

The panel will discuss topics affecting Title 1 such as the impact of the Clean Air Act Amendments of 1990 on boiler operations, selection criteria for boilers to meet new NO_x limits, reduce emissions, and improve efficiency.

Compliance with the New Source Performance Standards, SCR/SNCR combustion systems along with case histories and modifying boilers to comply with the new pollution regulations will also be addressed.

• 9:00-11:40 am

B: TOXICITY IN INDUSTRIAL WASTEWATER DISCHARGE

Chair: William W. Camp, P.E., Principal, Hydroscience, Inc

Toxicity-Based Approaches and Methodologies for Developing Alternative Discharge Limits
Richard J. Mirenda, Ph.D., Senior Manager, Aquatic Toxicity Group, Eckenfelder, Inc

A Site-Specific Water Quality Standard for a Textile Wastewater Discharge
Robert G. Gross, P.E., Vice President, Hydroscience, Inc

Industrial Wastewater Toxicity Case Histories
Sam White, Ph.D., RMT, Inc

Effluent Diffuser Design for Wastewater Toxicity Control
Van Seiner, P.E., Project Engineer, Hydroscience, Inc

• 9:00-11:40 am

C: HAZARDOUS AND SOLID WASTE MANAGEMENT

Can Hazardous Material Regulations Be Met in a Cost-Effective Manner?
Reginald A. Willis, Vice President, Logical Technology, Inc

New ASTM Standards for Environmental Site Assessment
James C. Mauch, Vice President, VISTA Environmental Information, Inc

Operation Experience with Harbauer Soil Washing Plants
Grosvnor Fish, J.A. Jones Construction Services Company

Preparation of Liquid Fuels for Use at Cement Kilns from Solid and Semi-Solid Hazardous Waste Slurries
Roy R. Scott, Sales Manager, Arde Baringo, Inc

• 9:00-11:40 am

D: CFCs

Chair: Walter P. Smith, Jr., Energy Technology Services Consulting

Update on Refrigerant Issues: Accelerated Phase out, Safety, and Refrigerant Management
Bruce Lindsay, Assistant Director, EPRI Thermal Storage Applications Research Center, University of Wisconsin-Madison

Industrial Guidelines for CFC Use Phaseout: Decisions on Chiller Operations and Replacement During the Transition Period
Neil Forte, Utility Superintendent, and **Greg Harrell**, Utility Engineer, BASF Corporation

Performance and Efficiency Evaluations of Non-CFC Refrigerants/Performance and Efficiency Evaluation of New Fluorinated Propanes, Butanes, and Ethers/ Criteria for Evaluation of the Efficiency Improvements in Vapor Compression Cycles Using Internal Heat Exchange
Dr. George S. Kazachki, Senior Research Engineer, Acurex Environmental Corporation, and **Dr. Cynthia L. Gage**, Senior Project Engineer, Air & Energy Engineering Research Laboratory, U.S. EPA

CFC Issues from a User's Point of View
Chang W. Sohn, Ph.D., P.E. and **Kelly Homan**, U.S. Army Construction Engineering Research Laboratory, and **Henry Gignilliat**, U.S. Army Engineering & Housing Support Center

LEARN FROM THESE TOP AUTHORITIES WHO'LL PRESENT PRACTICAL APPROACHES TO CHALLENGES FACING INDUSTRY IN THE AREAS OF POLLUTION PREVENTION, HAZARDOUS WASTE AND WASTEWATER TREATMENT.

PAUL HENDRICKSON
Battelle Pacific Northwest Laboratories
ETE/Tuesday pm/Session A

A. JEAN TOLMAN
Arnall, Golden & Gregory
ETE/Tuesday pm/Session C

GRANT FERRIER
Environmental Business Journal
ETE/Tuesday pm/Session D

SAM WHITE
RMT, Inc
ETE/Wednesday am/Session B

CHANG W. SOHN
U.S. Army Construction Engineering Research Lab
ETE/Wednesday am/Session D

NOTE: FULL-CONFERENCE DELEGATES MAY ATTEND ANY SESSION OF WEEC OR ETE. CONFERENCE PROGRAM SUBJECT TO CHANGE.

WEDNESDAY P.M. 4 CONCURRENT SESSIONS

• *1:30-2:30 pm*
POSTER SESSION

• *2:30-5:10 pm*
A: ALLOWANCE TRADING

Managing Emission Allowance Inventories
Alan S. Taylor, Senior Associate, Utility Services Group, RCG Hagler Bailly, Inc

An Overview of the SO_2 Allowance Market
Jeffrey Campbell, Associate Education and Marketing Manager, Chicago Board of Trade

The International Power Exchange
Michael C. Lyle, Manager, Wholesale Power Services, Inc

Panel Discussion

• *2:30-5:10 pm*
B: INDUSTRIAL STORM WATER MANAGEMENT

Chair: Charles E. Beck, Manager, Regulatory Affairs, Kennon Environmental Services, Inc

Management of Storm Water Runoff from Uncontrolled Hazardous Waste Sites
William F. Norton, P.E., Westinghouse Remediation Services, Inc

Storm Water Pollution Prevention Plans for Industrial Activities
Gerald E. Seaburn, Ph.D., P.E., *Law Environmental, Inc*

Storm Water Best Management Practices That Work
John Oster, Lockwood Greene

Flow Proportioned Composite Sampling Without Flow Measurement — Manual Techniques
Edward C. Hicks, P.E., Manager of Engineering Services, and **Charles E. Beck**, Manager of Regulatory Affairs, Kennon Environmental Services

• *2:30-5:10 pm*
C: INDUSTRIAL WASTE MINIMIZATION

Chair: Patricia Rose, Energy Conservation Specialist, State Energy Programs, U.S. DOE

DOE's Industrial Waste Reduction Program — *More Jobs, Less Waste, Less Energy*
Bruce Cranford, Jr., P.E., Program Manager, Office of Industrial Technologies, U.S. DOE

Survey Analysis of Waste Minimization Opportunities for Small to Medium Size Manufacturing Facilities
Dr. Richard Jendrucko, Department of Engineering Science & Mechanics, University of Tennessee

Industrial Pollution Prevention: Meeting the Environmental and Economic Challenges of the 90s
Dr. Robert Atkinson, Office of Technology Assessment, U.S. Congress

How to Transform Liabilities in Used Oils and Other Waste Fluids into Valuable Assets and Free Energy On-Site
Wayne Robertson, Environmental Attorney and President, Black Gold Corporation

• *2:30-5:10 pm*
D: ALTERNATIVE FUEL VEHICLES

Alternative Aviation Fuels: Near-Term Opportunities to Enhance Energy Independence and Improve Regional Air Quality
Robert O. Price, Senior Project Manager, CH2M Hill

Impact of Driving Trends in Automobile Fuel Efficiency
Ivan Vera, Project Manager, Decision Analysis Corporation of Virginia

An Overview of the Natural Gas Vehicle Industry
David E. Bruderly, P.E., Project Manager, Hentuels, Inc.

The Future of the Electric Vehicle
Annie Hunt-Burriss, Manager, Electric Transportation, Georgia Power Company

• *5:15-6:30 pm*
NETWORKING ROUNDTABLE DISUSSION GROUP
(Cash bar available)

THURSDAY A.M. 4 CONCURRENT SESSIONS

• *9:00-11:40 am*
A: IMPROVING INDOOR AIR QUALITY

Chair: Jerry A. Taylor, A.I.A., P.E., CEM, President, Jerry A. Taylor Environmental

Gaseous Filtration for Prevention and Mitigation of Indoor Environment Problems
H.F. "Barney" Burroughs, P.E., President, IAQ Building Wellness Consultancy

Low Indoor Air Pressure's Causes, Dangers, and Solutions
Jon E. Traudt, Vice President Engineering, Air Pro, Inc

Indoor Air Quality and Energy — A Common Sense Approach
Charles F. Wiles, President, Metro Environmental Company

Synergistic Effects of IAQ Components
Jerry A. Taylor, A.I.A., P.E., CEM

• *9:00-11:40 am*
B: RESOURCE CONSERVATION AND RECOVERY

Resource Conservation and Recovery — A Worldwide Call to Action in the War on Wastes, Environmental Pollution, and Hunger
J. Patrick Nicholson, Chief Executive, N Viro Energy Systems, Ltd

Groundwater Quality Statistical Analysis: Implementing the New RCRA Regulations
Henry R. Horsey, Ph.D., *Intelligent Decision Technologies*

Brayton Cycle Solvent Recovery Heat Pump Technology Update
J.C. Emeking, Vice President, NUCORI International, Inc

Georgia Tech Experience and Plan in Environmental Science Technology and Policy
C.S. Kiang, Ph.D., Center for International Strategy, Technology, and Policy, School of Earth Science and Atmospheric Sciences, Georgia Institute of Technology

• *9:00 am-12:20 pm*
C: ENVIRONMENTAL MANAGEMENT

Patent Laws: Help or Hindrance in Solving Environmental Problems
Scott R. Foster, Esq., Lorusso & Loud

Evaluating the Performance of Active Noise Control Systems in Industrial Applications
Susan Dineen, Digisonix Commercial & Industrial Systems Group

Radon Prevention and Mitigation
Kaiss K. Al-Munady, Mechanical Engineer, University of Florida

The Environmental Impact of Energy Efficiency
Alden M. Hathaway, Manager of Energy Programs, Osram Sylvania, Inc

The Main Problems and the Prospect for the Year 2000: Energy, Environment, and Economy Development in China
Wei Pingzhong, Central Coal Mining Research Institute

• *9:00-11:40 am*
D: GLOBAL WARMING

Energy Conservation Technologies for Global Warming Mitigation
Henry A. Courtright, P.E., Director Customer Systems Division, Electric Power Research Institute

Fuel Cells for Energy Generation at Medical Centers
Thomas A. Damberger, CEM, Energy Specialist, Energy Department, Kaiser Permanente

The Methodology and Model for Costing of the Environmental Impacts of Austin Energy Conservation/DSM Programs
Yang Ziming, Engineering Associate II, City of Austin Environmental & Conservation Services Department

***Strategic Targeting*: Prioritizing Measures to Reduce Greenhouse Gas Emissions**
Cory Berish, Ph.D., U.S. EPA Region IV and **Jeff Tiller**, Southface Energy Institute

THESE EXPERTS ON ENERGY AND ENVIRONMENT WILL OFFER THE LATEST IDEAS ON CFC'S, ALLOWANCE TRADING, STORM WATER MANAGEMENT, ALTERNATIVE FUELS, IAQ, GLOBAL WARMING, CONSERVATION, AND MUCH MORE.

ROBERT ATKINSON
U.S. Congress Office of Technology Assessment
ETE/Wednesday pm/Session C

IVAN VERA
Decision Analysis Corporation of Virginia
ETE/Wednesday pm/Session D

BARNEY BURROUGHS
IAQ/Building Wellness Consultancy
ETE/Thursday am/Session A

C.S. KIANG
Georgia Institute of Technology
ETE/Thursday am/Session B

SUSAN DINEEN
Digisonix Commercial & Industrial Systems Group
ETE/Thursday am/Session C

YANG ZIMING
City of Austin Environmental & Conservation Services Dept
ETE/Thursday am/Session D

SEMINAR LINE-UP

MONDAY, OCTOBER 25, 1993
9:00 am – 5:00 pm / 0.7 CEUs / FEE: $395

SEMINAR 521

Building Energy Management

COURSE OUTLINE

This one-day workshop is designed to assist building operators in implementing ongoing energy management programs. Areas covered include energy accounting and utility bill analysis, rate schedules, preventive maintenance programs, common problems and solutions, performing building inspections, evaluating conservation options, energy economics, environmental considerations, establishing goals, and selling the program to administrators. Participants will learn to assess energy use by tracking and graphing energy consumption and apportioning energy use to specific building systems. They will use this data to narrow the focus of walk-through inspections and to evaluate the operating condition of existing equipment. Thus, it becomes easier to identify areas with the greatest savings potential and to prioritize conservation activities. Today's energy managers cannot rely on reducing temperatures and turning out lights to maintain an effective conservation program. They must not only be well versed in all aspects of building operation, but must also effectively communicate conservation strategies in a positive way to administrators and board members.

Building Energy Management Techniques

- The top energy savers
  Quick & easy steps that cost little or nothing
- The energy conservation measures that work best
- Six-step energy management program
- Energy accounting
- How to reduce operating costs with preventive maintenance
- Energy auditing techniques
- Indoor air quality & ventilation standards
- Common problems & solutions
- Life cycle cost analysis
- Infrared scanning
- Tuning boilers & calibrating thermostats
- Balancing the HVAC system
- CFC ban on chiller performance
- Prioritizing conservation projects
- Selling conservation to administrators

INSTRUCTORS

WAYNE C. TURNER, Ph.D., P.E., CEM, is a Regents Professor in the Oklahoma State University School of Industrial Engineering and Management and is a founder and director of the Oklahoma Energy Analysis and Diagnostic Center at OSU. He has supervised energy audits of over 300 buildings. Author of two textbooks on energy management, his experience includes working with industry, institutions, schools, hospitals, resorts, and country clubs. He earned his doctorate at VPI.

BILL YOUNGER, CEM, is a Commercial Energy Specialist with the Washington State Energy Extension Service in Seattle. He has developed and administers an expanding program for commercial and institutional building operators in the areas of energy systems and energy management for the state of Washington. He has worked with the Energy Division of the Montana Department of Natural Resources and Conservation providing technical assistance on energy-related problems.

SEMINAR 522

Environmental Business Markets

COURSE OUTLINE

There are a myriad of opportunities in this rapidly growing $100-plus billion industry. This seminar provides pertinent information to strategic planners who are exploring the opportunities associated with initiating or expanding environmental and pollution control market activities within their organizations. The seminar will focus on the five major environmental market sectors: environmental consulting services, remediation, hazardous waste management, air pollution control, and water management. Estimates of market size, growth rate forecasts, market drivers, market share leaders, key players, and business trends are discussed for each. While the focus will be primarily aimed at consulting, management, and contracting services, the session will also assess and discuss support markets: laboratory services, software, and related products. The presentation will discuss the Mexican and Canadian markets as well as the U.S. market. The intended audience for this seminar is marketing and business development managers, and business ownership officers in companies which offer products or services to the environmental and pollution control markets. The seminar is designed to guide the identification of new business opportunities, forecast market potentials, and assess competitive positions in established markets.

The Environmental Business

- Market expenditures and growth rates
- Market drivers
- The maturing of the environmental industry
- Identification of most dynamic markets
- Opportunities in Mexico
- Opportunities in Canada
- Directions of the Clinton Administration
- Risk assessment

Remediation

- Superfund
- DOD program
- DOE program
- Leaking underground tanks
- RCRC corrective action
- State superfunds
- Bioremediation

Hazardous Waste Management

- Impact of regulations
- Off-site services
- Incineration
- Landfills
- Transportation services
- Medical waste management
- Nuclear waste management

Air Pollution Control

- Clean Air Act amendments
- Electric utility markets
- Industrial markets
- Indoor air quality
- Products and services

Water Management

- Municipal water supply
- Municipal and industrial wastewater treatment
- Products and services
- Stormwater management

INSTRUCTOR

RICHARD MILLER is president of Richard K. Miller & Associates, Inc., a leading market forecast company. He holds a bachelor's degree in mechanical engineering from Purdue University and has authored more than 30 articles on technology and the environment.

SEMINAR 523

Impact of Energy Policy Act

COURSE OUTLINE

This comprehensive seminar addresses how the Energy Policy Act will be implemented and also helps interpret its significance for the energy efficiency industry. Attendees will learn about new building code requirements, as well as new efficiency standards being put in place for commercial heating and air-conditioning equipment, large motors, and lamps. The instructor will also examine new procedures, goals, and financing mechanisms required for federal energy management.

Overview of the Energy Policy Act

Energy Efficiency in Buildings

- Building codes
- ASHRAE 90.1
- CABO MEC

Utilities

- Integrated resource planning

Equipment Standards

- Commercial heating and air conditioning
- Motors
- Lamps
- Transformers

Industrial

- Energy efficiency grants program
- Industrial energy audits

Federal Energy Management

- Performance contracting
- Energy bank
- Training

Fleets and Alternative Fuels

- Alternative fuel incentives
- Electric vehicles

Renewable Energy

- Global climate change
- Alternative energy
- Tax considerations

INSTRUCTOR

VICTOR B. OTTAVIANO, CEM, is president of OTS. Over the past two decades, he has trained over 5,000 engineers, contractors, building managers, and facilities personnel on a broad range of energy management-related topics.

Begin your information-packed week with one of these outstanding intensive seminars taught by recognized experts in the field!

SEMINAR 524

Motor Applications: Efficiency Improvement and Testing

COURSE OUTLINE

Probably no single area is as important to reducing utility bills as motor efficiency. This seminar will provide you with practical, ready-to-apply information which will enable you to select motors which will operate with maximum efficiency, as well as improve the efficiency of existing motors. Emphasis will be placed on methods for determining and eliminating the causes of poor motor performance such as inherent inefficiency, improper match to load, poor rewinding, voltage, imbalance, etc. Participants will learn how to utilize the most effective field test procedures, what instrumentation is required to achieve optimum results, and how to develop and implement an overall program to upgrade motor performance.

Basic Principles
- Principles of energy transformation
- Power sources

Fundamentals of Motors
- Operation, construction, design features
- Selection
- Basic load types
- Starting
- Running and stopping characteristics
- Determining horsepower
- Determining motor field efficiency
- Economics

Motor Selection
- Application of high-efficient motors
- How to size a motor for maximum performance
- Motor ratings
- Motor enclosures and insulation types
- Effects of rewind on motor efficiency

Motor Testing
- Test equipment available
- Testing procedures
- Computer programs to evaluate field testing
- Determine retrofit options and causes for poor performance
- Improper match to load
- Voltage imbalances
- Inherently inefficient motor
- Poor rewind job

Motor Maintenance
- Preventative maintenance program

INSTRUCTOR

KONSTANTIN LOBODOVSKY is an electrical engineer for Pacific Gas & Electric Company. He has over 30 years of hands-on experience in the improvement of motor performance, including the development of a comprehensive field management and motor retrofit program. He holds a BSEE and a BSME from Healds College, where he has also served as instructor and dean.

SEMINAR 525

Refrigeration CFCs: Recovery, Reuse, Alternatives, and New Legislation

COURSE OUTLINE

For those who must put a viable plan in place for complying with new CFC regulations and combating the increased cost of refrigerants, this course is a must. You will learn proven, state-of-the-art techniques for CFC recovery and reuse, along with procedures for reducing CFC emissions during manufacturing, installation, testing, operation, and maintenance of HVAC/R equipment. You'll learn about new refrigerants now available and modifications to existing equipment needed to permit their use. The instructors will explain the compliance requirements imposed by the Clean Air Act, Montreal Protocols, and EPA regulations, and show you how to develop effective strategies to meet them.

Part 1: History and Overview of Regulations Impacting CFC Use
- Chiller plant options: retrofit and new construction
- Centrifugal/absorption chillers
- Heat pumps, screw compressors
- Joint ventures technologies
- Ozone depletion factor
- Global warming factor
- Exposure limits
- HCFC/Fluid CFC products
- Equipment and [illegible]
- Other sources of CFC, related requirements
- Pending legislation

Part 2: CFC Considerations in Existing Facilities
- Understanding ASHRAE Guideline 3-1990
- Impact of CFC taxes
- Identification, disposal and recycling of CFCs
- Minimizing CFC leakage
- Maintenance of CFC containing equipment
- Procedures, equipment and [illegible] for mitigation
- Alternative refrigerants
- Safety/health considerations
- Maintenance compatibility
- Equipment modifications for using alternative refrigerants
- Efficiency impact of alternative refrigerants

Part 3: CFC Considerations in New Construction
- Maximum public benefit
- Requirements
- Performance and efficiency losses from migration
- Balancing facility energy demands with CFC mitigation
- Developing a long-term energy and environmental program
- Case studies

INSTRUCTORS

CARL SALAS, P.E. has been evaluating and designing HVAC and central plant monitoring and control systems for over 13 years. A nationally noted lecturer, he is an owner of the consulting firm, Salas O'Brien Engineers, San Jose, CA. In response to recently increasing concerns, he has developed a practical, "real-world" approach to new requirements, costs and limitations imposed by the CFC issue.

MARIANNE THOMAS has ten years of consulting experience in project management and industrial engineering. As an industrial systems analyst for Robert Cliff & Associates, she has instructed workshops in a broad range of industries. She brings to this program practical expertise on the managerial issues involved in responding to the new CFC requirements.

SEMINAR 526

Simple Solutions to Energy Calculations

COURSE OUTLINE

Here is a course which simplifies energy calculations for lighting, pumps, fans, blowers, heat transfer, fuel switching, and heat recovery. You'll learn a host of techniques to speed up your selection of energy-efficient equipment.

Introduction

The Walk-Through Energy Audit
- The art of performing a walk-through energy audit
  What it is, why it is done, how it is done

Lighting Measures
- Definitions of lighting terms: translation to English
- How to evaluate specific lighting options
  Fluorescent, high-intensity discharge, incandescent
- Formulas and calculations / Anecdotes

Pump Measures
- Definitions of pump terms: translation to English
- How to evaluate specific pump options
  1. Circulating pump applications: HVAC, process
  2. Transfer and lift applications: water supply systems, water treatment facilities
- Formulas and calculations / Anecdotes

Fans and Blowers
- Definitions of fan terms: translation to English
- How to evaluate specific fans and blower options
  1. HVAC applications: VAV, exhaust, cooling towers
  2. Process and combustion air applications: fume exhaust, induced and forced draft
- Formulas and calculations / Anecdotes

Motors
- Definitions of motor terms: translation to English
- How to evaluate specific motor options
- Formulas and calculations / Anecdotes

Heat Transfer (Insulation)
- Definitions of heat transfer terms: translation to English
- How to evaluate specific heat transfer options
  1. Process applications: pipe, tanks
  2. Building envelope applications: windows, doors, etc.
- Formulas and calculations / Anecdotes

Fuel Switching
- How to evaluate specific fuel switching options
- Formulas and calculations / Anecdotes

Heat Recovery
- How to evaluate specific heat recovery options
  Exhaust air heat, water effluent heat recovery
- Formulas and calculations / Anecdotes

INSTRUCTOR

RICHARD R. VAILLENCOURT has two decades of mechanical and electrical engineering experience. He has designed and installed energy conservation projects for process, HVAC, and lighting systems in hundreds of facilities nationwide. As Project Manager at Energy Investment, Inc., he performs a full range of engineering services for utility-sponsored demand-side management programs and energy conservation projects in commercial, industri-

SEMINARS *continued*

MONDAY, OCTOBER 25, 1993
9:00 am – 5:00 pm / 0.7 CEUs / FEE: $395

SEMINAR 527

Realities of Lighting Retrofits

COURSE OUTLINE

This practical, comprehensive seminar reviews the realities of lighting retrofits today. Upgrading older lighting systems through retrofits can substantially reduce lighting costs, improve the overall quality of the workplace, and reduce harmful environmental emissions. Now you can avoid the pitfalls of lighting retrofit products by learning how to apply them effectively and with measurable results.

Effective Lighting Surveys
- Site survey, survey tools, tips, and techniques

Retrofit Lamps
- Energy-efficient incandescent
- Fluorescent and compact fluorescent lamp choices
- Metal halide, HPS, and white HPS

Ballast Efficiency Improvements
- Ballast basics
- Energy saving and electronic ballasts
- Retrofit opportunities
- Tandem ballasting and power reducers

Luminaire Modifications
- Luminaire efficiency
- Thermal factors
- Specular reflectors, lenses, and louvers

Improving Lighting System Efficiency
- Systems approach vs. component approach
- Lamp efficacy vs. system efficacy
- Unit power density (UPD)
- Exit light retrofits
- Performance issues

Lighting Control for Energy Management I
- Control strategies and occupancy sensors

Lighting Control for Energy Management II
- Dimming systems, photo sensors, and centralized controls

Retrofit Economics
- Electric rates and cost of light
- Calculating costs, savings, rates of return

Avoiding Retrofit Mistakes

Environmental
- Lamp and ballast disposal
- Regulations
- Emission reductions
- Impact of efficient lighting
- EPA Green Lights Program

INSTRUCTOR

JOHN FETTERS, CEM, CLEP, directs the energy management program for the AT&T Columbus Works in Ohio, where he provides lighting consulting services for the Columbus complex and for the AT&T Corporate Energy Management Team. A senior member of AEE and a member of the Illuminating Engineering Society, where he chairs the Industrial Lighting Committee. Mr. Fetters is treasurer of the IES Buckeye Section and co-chairs its Education Committee. A widely published author of lighting articles, he has served on the Technical Advisory Board of *Energy User News*.

SEMINAR 528

Waste Heat Boilers

COURSE OUTLINE

This course is aimed at consultants and engineers involved in specifying, operating, engineering, and marketing of waste heat boilers (or Heat Recovery Steam Generators (HRSG)). It offers valuable information on fire tube, water tube, single or multiple pressure, unfired or fired HRSG, used in chemical plants, cogeneration, incineration systems, and power plants. Participants will learn qualitatively how to evaluate different designs, understand off-design operating behavior, significance of surface areas in bare and extended surface designs, importance of high and low temperature corrosion problems, how to predict gas/steam temperature profiles, effect of fouling on operating costs, how to optimize HRSG temperature profiles, how to maximize energy recovery using simulation process, and how to specify HRSGs for their plant requirements. Techniques for evaluating boiler circulation in various types of boilers will also be discussed. Participants are advised to bring calculators.

Systems and Types of Boilers
- Chemical plants
- Incineration systems
- Cogeneration/combined cycle plants
- Natural/forced circulation designs
- Unfired/fired HRSGs
- High/low temperature corrosion problems

Fire Tube Boilers
- Guidelines for selection
- Design principles
- Off-design performance
- Fouling effect on performance
- Circulation systems

Water Tube Boilers
- Guidelines for selection
- Design methods-bare and finned surfaces
- Design of superheaters, evaporators, economizers
- Off-design performance
- Heat flux circulation

HRSG Simulation
- Selection of pinch and approach points
- Design and off-design temperature profiles
- Optimizing energy recovery for multiple pressure HRSGs
- Using field data to simulate HRSG performance
- HRSG efficiency

Specifying Waste Heat Boilers
- Gas parameters
- Steam purity, water chemistry, blow down
- Importance of surface areas
- Evaluating operating costs

INSTRUCTOR

V. GANAPATHY is a heat transfer specialist at ABCO Industries, Abilene, Texas. He is the author of over 175 articles and papers which have been published in several professional and trade journals. His writings have been related to practical engineering problems and have focused on providing quantitative answers. He is also the author of five books including the *Waste Heat Boiler Deskbook*.

TWO-DAY SEMINAR

WEDNESDAY & THURSDAY
OCTOBER 27 & 28, 1993
9:00 am – 5:00 pm / 1.4 CEUs

FEES:
AEE or NREP Member/Government/Nonprofit: $595
Nonmember: $695

Please note that completed registration forms and fees for NREP Seminar must be submitted to AEE – not to NREP. To register, please see "Seminars" section on page 11.

SEMINAR 529

NREP's Professional Certification Program: Registered Environmental Manager, Certified Environmental Auditor, and Registered Environmental Property Assessor

COURSE OUTLINE

The National Registry of Environmental Professionals (NREP) believes qualified and credible environmental professionals should be nationally recognized and has therefore implemented programs to achieve that objective. Three such programs are the Registered Environmental Manager (REM), the Certified Environmental Auditor (CEA), and the Registered Environmental Property Assessor (REPA). The REM is the highest professional management level of NREP registrations. The REM/CEA/REPA seminar is designed to enhance the overall knowledge and effectiveness of professional environmental candidates including engineers, scientists, lawyers, and managers. As a refresher course, it prepares participants to take any of the three NREP official certification exams during the second day. As part of the two-day package, participants will receive the recommended study guide, *Professional Environmental Management and Auditing*, a $39.95 value. Upon successful completion of the seminar and exam, participants will be awarded 1.4 CEUs. Two-day seminar registration includes taking one of the three NREP certification exams, admission to the ETB '93 exhibit, and luncheon in the exhibit hall on Tuesday. Topics to be covered during this two-day seminar include:

Operating philosophies
Environmental management tools
Air and water pollution control
Hazardous waste management
Toxic substances control
Environmental and community safety
Emergency preparedness plans
Audits, assessments, and checklists

INSTRUCTOR

DR. VALCAR A. BOWMAN, CEP, REM, CEA, is NREP's Vice President of Education & Training. He has over 20 years of industrial environmental management experience, authored several environmental management books, and is a former U.S. EPA Advisory Committee member.

BEST AVAILABLE COPY

16TH WORLD ENERGY ENGINEERING CONGRESS / ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO
OCTOBER 26-28, 1993 / GEORGIA WORLD CONGRESS CENTER / 285 INTERNATIONAL BLVD., ATLANTA, GEORGIA
PHOTOCOPIES OF THIS FORM MAY BE USED

D E F G X Y Z

YOUR COMPLETED REGISTRATION FORM MUST BE RECEIVED NO LATER THAN OCTOBER 15, 1993.

(After that date, plan to register on-site.)

DETACH & MAIL YOUR COMPLETED REGISTRATION FORM TO:
Registrar, AEE
4025 Pleasantdale Rd., Suite 420
Atlanta, GA 30340-4264

OR

If you are paying by credit card — FAX YOUR COMPLETED FORM TO:
(404) 446-3969
(Please type)

DELEGATE INFORMATION

Name [ ] MR [ ] MS ______ LAST ______ FIRST ______ MI

Title ______

AEE Member No. if applicable ______
(Must be provided if you are already a member and taking member rates)

Company ______

Address ______

City State Zip ______

Telephone ( ) ______

Please complete as part of registration:

1
TYPE OF FIRM/BUSINESS:
(Check only one)
[ ] Consulting Engineers Construction Architect
[ ] Commercial
[ ] Government Institutional
[ ] Industrial
[ ] Manufacturer Vendor
[ ] Utility Energy Producer

2
OCCUPATION TITLE
(Check only one)
[ ] Manager/Owner Developer
[ ] Engineer
[ ] Consultant
[ ] Sales Marketing
[ ] Educator Researcher

Join AEE and take the member rate on your Congress registration now!

I wish to become a member of the ASSOCIATION OF ENERGY ENGINEERS in the category checked below:

[ ] **MEMBER**–A graduate of an engineering college or university or a registered professional engineer or architect. (Persons who believe they are qualified by experience or related degree may petition for full membership consideration.)

[ ] **AFFILIATE MEMBER**–A person interested in the objectives of the Association who does not meet the above criteria to be a full member.

If you are a registered professional engineer or architect, please indicate state(s) and registration number(s)

State ______ No ______ State ______ No ______

Years of experience in energy field ______ yrs

College ______ Degree ______ Year ______

Additional pertinent information may be listed on a separate sheet and attached

I certify that the statements made in this application are correct and I agree, if elected, that I will be governed by the Constitution and Bylaws of the Association as long as I continue to be a member. I furthermore agree to promote the purposes of the Association so far as shall be in my power.

______ (APPLICANT'S SIGNATURE) ______ (DATE)

Please choose one category
[ ] AEE Membership – Dues $105.00
[ ] AEE Membership plus Cogeneration & Competitive Power Institute – Dues $125.00
[ ] AEE Membership plus Environmental Engineers & Managers Institute – Dues $125.00
[ ] AEE Membership plus Demand-Side Management Society – Dues $125.00

Appropriate membership fee must be included in your total registration payment for your application to be processed and for member registration rates to apply.

Do you require special accommodations for a disability to enable you to attend this meeting? Call (404) 447-5083 with your request.

EXHIBITS ONLY — FREE REGISTRATION

[ ] Check here to preregister for exhibits only. In order to receive free registration, you must mail this form in time to reach us by Oct. 8, 1993. (This saves you the $20.00 admission charge at the door.)

CONFERENCE REGISTRATION & FEES

3-DAY CONFERENCE & EXPO, OCTOBER 26-28, 1993

Indicate program of choice:
[ ] 16TH WORLD ENERGY ENGINEERING CONGRESS
[ ] ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

Whichever program you select, your conference registration entitles you to attend the sessions of your choice from either of the two programs (does not include seminars)

Select appropriate fee and write in blank at right
(Fee includes 3-day conference program, expo registration, Proceedings, banquet, exhibit hall luncheon, & keynote luncheon.)

INDIVIDUAL FEES
Nonmember Fee: $695
Gov't./Nonprofit Fee: $595
AEE/CI/EEMI/DSMS/NREP Member Fee: $595 — $ ______

GROUP RATES
Team Discount: deduct $100 per delegate from applicable individual fee. *(Applies for 2 or more delegates registering at the same time from the same company. Separate registration forms must be completed for each delegate. Must be received with full payment by October 15, 1993.)*

Company Plan: $3000 flat fee for up to ten delegates,
$2800 for AEE Sustaining Member Firm,
$280 for each additional delegate. — $ ______

Submit separate registration form for each delegate (use photocopies) and mail together. Registration will be processed at discounted rates ONLY if full payment accompanies this form. Names of all delegates and full fee must be received by October 15, 1993.

SEMINARS—SEPARATE FEES

One-Day Preconference Seminars: October 25, 1993

[ ] **#521: Building Energy Management**
[ ] **#522: Environmental Business Markets**
[ ] **#523: Impact of the Energy Policy Act**
[ ] **#524: Motor Applications: Efficiency Improvement & Testing**
[ ] **#525: Refrigeration CFCs: Recovery, Reuse, Alternatives and New Legislation**
[ ] **#526: Simple Solutions to Energy Calculations**
[ ] **#527: Realities of Lighting Retrofits**
[ ] **#528: Waste Heat Boilers**

Fee for all registrants: $395 — $ ______

OR SEMINAR CONCURRENT WITH CONFERENCE:

Two-Day Concurrent Seminar: October 27 & 28, 1993

[ ] **#529: NREP's Professional Certification Program: Registered Environmental Manager, Certified Environmental Auditor, and Registered Environmental Property Assessor**

AEE or NREP MEMBER/Government/Nonprofit: $595
Nonmember: $695 — $ ______

Please complete

TOTAL CONFERENCE & SEMINAR REGISTRATION FEES $ ______

(All memberships are optional)
AEE Membership — [ ] $105 per applicant
AEE & Cogeneration & Competitive Power Institute Membership — [ ] $125 per applicant
AEE & EEMI Membership — [ ] $125 per applicant
AEE & DSMS Membership [ ] $125 per applicant — $ ______

Make check payable in U.S. dollars only to
ASSOCIATION OF ENERGY ENGINEERS
(Include this form with your check.)

TOTAL ENCLOSED $ ______

Select method of payment
[ ] **CHECK ENCLOSED** (Payable in U.S. funds to AEE ENERGY SEMINARS)
[ ] **CHARGE TO MY CREDIT CARD** (for advance registrations only)
[ ] American Express [ ] VISA [ ] MasterCard

CARD No. | | | | | | | | | | | | | | | | |

EXPIRATION DATE ______ SIGNATURE ______

REGISTRATION INFORMATION, POLICY & INSTRUCTIONS

Fee includes 3-day conference program, banquet ticket, *Proceedings*, expo registration, and Tuesday and Thursday luncheons. Additional fees for seminars are indicated on the registration form. Use a separate registration form for each registrant. Photocopies of the registration form are acceptable.

HOW TO REGISTER

Complete the registration form at the left, being sure to check the appropriate boxes for all events in which you wish to participate. *Your completed registration form along with full payment should be received no later than Oct. 15, 1993.*

PREREGISTRATION:

You may preregister in three ways:

1. **BY MAIL:** Complete the registration form at the left and return it with check or your credit card number, expiration date, and signature to the address indicated.
2. **BY PHONE:** If you plan to pay by credit card, you may register by telephone by calling the following number:

   (404) 447-5083 Extension 224

   Give us the name of each registrant, name of conference and/or seminar, and credit card information.
3. **BY FAX:** If you plan to pay by credit card, you may complete the registration form at the left (please type), including all credit card information, and transmit to the following FAX number:

   (404) 446-3969

   Government agency participants registering by FAX must submit completed "Request, Authorization, Agreement and Certification of Training" form or completed DD1556 forms with completed registration.

If you are unable to register in advance, you may register on site beginning at 1:00 p.m., Oct. 25, 1993, at the Georgia World Congress Center. Full payment must be received at that time. (Seminar participants may pick up materials at above location after 8:00 a.m. on Oct. 25.)

JOIN AEE AND SAVE ON YOUR CONFERENCE REGISTRATION FEES!

The Association of Energy Engineers (AEE), together with its three divisions, is sponsoring the WEEC and ETE. If you are not already a member of AEE, you may join by completing the application at left. You will then qualify for the AEE member rate. Benefits of membership include free subscriptions to *AEE Energy Insight, Energy User News, Energy Engineering,* and *Strategic Planning for Energy and the Environment.*

REGISTRATION CANCELLATION POLICY

Adjusted refund of conference or seminar fees, less $100 service charge, will be made **if AEE receives cancellation in writing** on or before Oct. 15, 1993. No refunds after Oct. 15, 1993. Substitutions may be made, **if a written release from original registrant is provided.** Should a program be cancelled because of weather, illness or any other reason, all attendees will be notified as early as possible, and our liability will be limited to the return of the registration fee.

SAVE $100 PER DELEGATE WITH TEAM DISCOUNTS

For two or more persons registering at the same time from the same company, a $100 discount may be deducted from the three-day conference/expo registration fee. This discount *applies only if completed registration forms and fees are received by Oct. 15, 1993.* A separate registration form must be completed for each person, and all registration forms must be mailed together along with full payment.

COMPANY PLAN & UTILITY SPONSORED CUSTOMER DISCOUNT PLAN

Companies and utilities may register up to 10 delegates for one fee (*see "Fees" section at left*). Fee includes full three-day conference, expo, Monday evening banquet, luncheon in exhibit hall Tuesday, keynote luncheon Thursday, and a copy of printed *Proceedings*. Company plan rate applies ONLY IF NAMES OF ALL DELEGATES AND FEE ARE RECEIVED IN AEE OFFICE BEFORE OCTOBER 15, 1993 (all names and fee must be submitted at the same time).

... please see page ...

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PREREGISTER FOR EARLY HOUR ADMISSION

USE THE FORM ON PAGE 11

MONDAY, OCTOBER 25 — BANQUET / SOCIAL HOUR: 6:30 pm / DINNER: 7:15 pm

TUESDAY, OCTOBER 26 — OPENING CEREMONIES: 8:45 am – 11:10 am

16TH WORLD ENERGY ENGINEERING CONGRESS | **ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO**

TUESDAY, OCTOBER 26 — CONCURRENT AFTERNOON TECHNICAL SESSIONS: 2:30 pm – 5:10 pm

DSM Applications I	Competing in the Wholesale Power Markets: The Key Regulatory Developments	Effective Energy Management	Lighting Efficiency Improvement	Federal Energy Management	National Energy Policy Act	Natural Gas Procurement Strategies and FERC Order 636	Clean Air Act Amendments Take Hold	Pollution Prevention	Update on Solid/Hazardous Waste Regulations	Environmental Business Development

WEDNESDAY, OCTOBER 27 — CONCURRENT MORNING TECHNICAL SESSIONS: 9:00 am – 11:40 am

DSM Applications II	PUHCA and Electric Transmission	International Energy Opportunities	Upgrading Lighting Systems for Efficiency Improvement	Energy Conservation in Federal Buildings I	HVAC System Optimization I	Performance Contracting	Title I — Clean Air Act and Boilers	Toxicity in Industrial Wastewater Discharge	Hazardous and Solid Waste Management	CFCs

WEDNESDAY, OCTOBER 27 — CONCURRENT AFTERNOON TECHNICAL SESSIONS: 2:30 pm – 5:10 pm

DSM — Bidding and Planning	Cogeneration Update	Energy Management I	Structuring Lighting Retrofit Projects for Success	Energy Conservation in Federal Buildings II	Thermal Energy Storage Applications	Direct Digital Controls	Allowance Trading	Industrial Storm Water Management	Industrial Waste Minimization	Alternative Fuel Vehicles

THURSDAY, OCTOBER 28 — CONCURRENT MORNING TECHNICAL SESSIONS: 9:00 am – 11:40 am

Verification of Savings — DSM	Power Generation	Energy Management II	Variable Speed Drives/Chilled Water System	DOD Energy Utilization	HVAC System Optimization II	Renewable Energy Applications	Improving Indoor Air Quality	Resource Conservation and Recovery	Environmental Management	Global Warming

SPECIAL EVENTS HELD IN CONJUNCTION WITH WEEC/ETE

MONDAY, OCTOBER 25, 1993

Preconference Seminars: 9:00 am – 5:00 pm

No. 521 Building Energy Management
No. 522 Environmental Business Markets
No. 523 *Impact of the Energy Policy Act*
No. 524 Motor Applications: Efficiency Improvement and Testing
No. 525 Refrigeration CFCs: Recovery, Reuse, Alternatives & New Legislation
No. 526 Simple Solutions to Energy Calculations
No. 527 Realities of Lighting Retrofits
No. 528 Waste Heat Boilers

TUESDAY, OCTOBER 26, 1993

Exhibits Open: 10:00 am – 5:00 pm
"Meet Your Peers" Luncheon in Exhibit Hall: 11:30 am

WEDNESDAY, OCTOBER 27, 1993

Concurrent Two-Day Seminar: 9:00 am – 5:00 pm
No. 529 NREP's Professional Certification Program:
Registered Environmental Manager, Certified Environmental Auditor, and Registered Environmental Property Assessor (DAY 1)
Exhibits Open: 10:00 am – 5:00 pm
Guest Tour: 10:00 am – 3:00 pm
Poster Session: 1:30 pm – 2:30 pm
Networking Roundtable Discussion Group: 5:15 pm – 6:30 pm *(Cash bar)*

THURSDAY, OCTOBER 28, 1993

Concurrent Two-Day Seminar: 9:00 am – 5:00 pm
No. 529 NREP's Professional Certification Program & Exam (DAY 2)
Exhibits Open: 9:00 am – 12:30 pm
Keynote Luncheon: 12:30 pm — "International Linkage on Energy and the Environment"

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CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT
EUR-0030-C-00-2053-00

Energy Pricing, Energy Efficiency, and
Energy Sector Restructuring Component

Regional
Invitational Travel and
AEE Conference - 1993

Task Completion Memorandum

Prepared for:

U.S. Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy,
and Urban Development
Energy and Infrastructure Division

Prepared by:

Hagler Bailly Consulting, Inc.
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(703) 351-0300

December 1996

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CENTRAL AND EASTERN EUROPE
REGIONAL ENERGY EFFICIENCY PROJECT

Task Completion Memorandum

Regional - Invitational Travel and AEE Conference 1993

Summary Task Description

In October 1993 the USAID Bureau for Europe and Independent States, Europe, Office of Development Resources, Energy and Infrastructure Division (AID/ENI/EUR/DR/EI) sponsored the second annual invitational travel delegation of European energy efficiency professionals to the United States. The purpose was to provide increased business opportunities for U.S. energy efficiency equipment manufacturers and investors, assist in the development of local markets for energy efficiency in Eastern Europe, and develop ongoing organizational and business relationships between energy efficiency officials and firms in Eastern Europe and similar organizations in the United States.

The itinerary for the delegation started in Atlanta, Georgia, where the group attended AEE's 16th World Energy Engineering Congress (WEEC) and met with energy efficiency companies and organizations. Later, in Washington DC, the delegation attended presentations by officers from Hagler Bailly, met with Robert Archer at the State Department for an evaluation session, and enjoyed a day of organized sightseeing in the capital.

This invitational trip provided opportunities for the establishment of business relationships between U.S. and Eastern European companies. It was also an excellent way to reinforce the determination of private entrepreneurs to develop energy efficiency capabilities in their countries, and to give them access to a wealth of technical, commercial, and management information about energy efficiency.

Specific Goals and Objectives

Under the Emergency Energy Program and the PEER Program, USAID has developed ongoing relations with Eastern and Central European energy efficiency professionals, many of whom are actively promoting the development of markets for energy efficiency products and services in their respective countries.

In particular, USAID has set-up a program of industrial energy efficiency market development under which local professionals have been trained in energy auditing and related disciplines, and are provided technical assistance in their initial energy auditing activities. These professionals passed the Certified Energy Manager (CEM) examination of the Association of Energy Engineers (AEE), and have been actively involved in the creation of local chapters of the AEE.

Inviting a number of these professionals to attend the World Energy Engineering Congress sponsored by AEE, and to meet with US energy engineers and equipment manufacturers, therefore complemented the activities developed in Eastern and Central Europe.

This activity had the dual objective of providing increased business (trade and investment) for U.S. energy efficiency vendors and local market development for energy efficiency in Eastern Europe. An important objective was to develop ongoing business relationships between energy efficiency officials in Eastern Europe and business people in the United States.

Expected Outputs

The expected outputs from the annual invitational travel were primarily based on the results of the contacts established between the delegates and US organizations; on how much information and new ideas the delegates collect during their trip; and on how this trip reinforces the motivation and ability of the delegates to provide market-based energy efficiency services to potential clients in their countries. These elements were to be first evaluated through a questionnaire given to the participants, but could also be assessed during subsequent in-country trips by Hagler Bailly staff.

Deliverables

- Logistical arrangements
- Invitations
- Conference coordination
- meeting coordination
- Trip report and evaluation

A report on the 1993 invitational travel was prepared, including evaluation by the participants.

Results and Next Steps

The invitational travel resulted in the scheduled agenda of meetings and conferences being met, as illustrated by Appendix A (Schedule) and Appendix C (Activity Report).

The invitational travel task also resulted in 16 participants from Eastern and Central Europe taking parts in the activities. Appendix B illustrates the participant list.

The evaluation forms completed by the delegation members indicated that this program was well-organized, went smoothly, and met its objectives.

The congress was of great interest to all the participants, with enough diversity of information to satisfy everyone. Several delegates regretted that so many sessions were concurrent. The book of proceedings is therefore considered a very valuable source of information. On a subsequent trip to Romania, it was noticed that some of the participants were using this book a lot. Participants seemed to be impressed by the US commitment to energy conservation, by the dynamism of the efficiency market, and by the wealth of US expertise, especially in the management and regulatory fields. They were surprised by the variety of products available for the commercial sector, especially in the lighting field. On the other hand, a number of delegates mentioned that some of the technical fields of importance to their countries were not heavily addressed by the congress: industrial processes, low-tech residential applications, cogeneration, turbines, district heating... But they all seemed to recognize that the congress was naturally geared towards US priorities.

Accordingly, the "International Energy Opportunities" session generated a lot of interest among the delegates, who stated that they were glad to realize that their country's problems were not unique and appreciated gaining some insight into other countries' experiences. "Same questions, same issues" said Dagnija Blumberga from Latvia.

Many Eastern Europeans indicated that they very much appreciated the attention that AEE gave them, especially at the AEE Chapter Leadership Meeting and at the closing luncheon. Mr. Zilys from Lithuania "highly appreciated the attention [AEE] paid to the Eastern European delegation"; Mr Cristescu expressed to AEE his "gratitude for the kindness towards the Romanian delegation"; and Mr. Zdravcu, from Romania said "this was a big honor for me when Mr. Thumann introduced [our new chapters]."

A lot of interest was also expressed by the group in the various sessions and meetings on performance contracting. "'Managing the Risks of Performance Contracting' is very useful in our first steps in the selection of our clients for energy audits" said Simona Parvu from Romania. But delegates also noted that true performance contracting seems to be rare in the US, and that the current reality may not be as advanced as the theory. Some of the ESCOs are currently trying to market equipment, or even audits, on a shared-savings basis.

The Eastern European delegates were generally extremely concerned with the issue of financing energy efficiency. As such, they were very interested in the meeting with Shirley Hansen, Terry Singer, and Thomas Dreessen, but would have liked to have much more time to discuss the subject and talk more about their own experiences. Competitive considerations contribute to perpetuate the lack of free information about US sources of financing interested in investing in

Eastern European energy projects. In the "Client/ESCO/Financier" triangle, the "Financier" leg is crucial but constitutes the real unknown for the Eastern European energy professionals.

The meetings organized aside from the WEEC also received positive evaluations by the delegation. Starting the week with a meeting with Rick Watkins, President of Dean Oliver & Associates, enabled the members to immediately meet a U.S. entrepreneur involved in industrial engineering, who put a friendly face on a so-far anonymous entity and emphasized the importance of networking as an introduction to the Congress and the whole week. The subjects of the subsequent meetings -- DSM, real-time pricing, Process Energy Reduction... -- were fairly specialized and, as such, could not be exactly in line with everybody's direct preoccupation, but generated good interest due to the diversity of subject they brought.

Comments about the meeting with Robert Archer at USAID were unanimously positive. The participants mentioned how grateful they were for the attention given to them, and said they were particularly impressed that suggestions and feedback were sought from them by Mr. Archer himself.

Delegation members developed contacts with U.S. companies, with the objective of purchasing U.S, products, identifying U.S. consultants, market their services in the U.S., acting as representatives or distributors for U.S. manufacturers, or establishing joint ventures. The participants were satisfied with the individual contacts they made, but seemed a bit disappointed with the overall level of interest expressed by U.S. companies. It is probably too early to judge the amount of contacts and business generated by this invitational travel. Because Hagler Bailly will stay in touch with most of the delegates through the ongoing industrial energy efficiency market development programs, it will be possible to later better evaluate the impact of this task on U.S. - Eastern European business relations.

The most obvious result of this invitational travel is a clear motivational boost for the Eastern European entrepreneurs in their energy efficiency endeavors. One delegate now actively involved in selling energy conservation projects recently admitted having seriously thought about stopping the ESCO activities, until the Congress brought enough motivation to decide to continue. This trip gave the delegates clear examples of the markets that can be generated through energy efficiency. The delegation members also saw first-hand how energy can be a rallying subject for professionals involved in various sectors and disciplines. Finally, the participants were very inspired by the support shown to them by AEE and USAID.

Overall, this invitational trip was a good first step in the establishment of business relationships between U.S. and Eastern European companies, and was an excellent way to further motivate the ESCOs and to provide them with additional technical, commercial, and management information.

On subsequent trips to the Eastern European countries from which delegates had been invited to the US, the Hagler Bailly staff received more evidence that the 1993 invitational travel has had a

very positive impact on the dynamism of the energy efficiency entrepreneurs of these countries. It is also clear that this trip helped these professionals be more aware of the products offered by US manufacturers. This information is much needed as the US products often seem to be much less present on the Eastern European energy efficiency market than their Western European counterparts.

In light of these results, it is strongly recommended that another invitational travel be scheduled next year around the 17th World Energy Engineering Congress.

It has also appeared, though, that the interest shown by the US manufacturers in exporting products to Eastern Europe is not overwhelming, especially when talking to exhibitors at random. For this reason, the two following actions are recommended:

1) To actively seek out US companies interested in developing business with Eastern Europe prior to the arrival in the US of the delegation, and to set-up focused trade meetings between these US firms and the delegation, either during the Congress or independently from it.

2) To organize a trade conference in Eastern Europe to allow a larger number of ESCOs to meet with a focused group of manufacturers with a real interest in developing business in those countries.

Finally, it is recommended to try set-up meetings between the Eastern European energy professionals and US investors interested in developing loan programs for energy efficiency retrofit projects.

Appendix A - Schedule and Agenda

Sunday October 24, 1993	3:15 am -	Arrival of delegation in Atlanta
Monday October 25, 1993	8:00 am	Meeting at the Best Western Hotel. - Introductions, briefing on week's schedule - Richard Watkins, President of Dean Oliver & Associates, gives a presentation on issues related to engineering business.
	10:15 am	Presentation by Georgia Power Company on the Energy Management Program Mr. Ed Fischler, Manager of Power Marketing at Georgia Power Company, presents Georgia Power's Commercial Energy Management Program. Mr. Kim Berry, Sales Specialist - Retail Sales & Services at Georgia Power Company, presents Georgia Power's Industrial Energy Management Program. Mr. Arthur Skinner, Director - Services Division at SEI, describes SEI/Southern Enterprises focus on Energy Management.
	11:30 am	Open discussion about the Eastern European context
	12:00 pm	Lunch at Georgia Power Company (Executive Dining Room)
	1:15 pm	Presentation by Dean Oliver & Associates on Energy Engineering Mr. Walter Lowthian, Vice-President, Manager - Process and Environmental Group at Dean Oliver, discusses the role of engineering firms in process energy efficiency projects. Mr. Paul Wilson, Process Engineering Manager, Process and Environmental Group at Dean Oliver, describes results achievable with computerized mass balance simulation system.
	3:30 pm	Departure from Georgia Power Corporate Headquarters.
	4:00 pm	Optional meeting at the Georgia World Congress Center, West, Room 260: Creation and Management of AEE local chapters.
	6:30 pm	AEE Banquet.
Tuesday October 26, 1993	8:45 am - 11:10 am	Opening ceremony of WEEC (Exhibits open 10:00 am - 5:00 pm)

	11:30 am	"Meet Your Peers" Luncheon in Exhibit Hall
	2:30 pm -	Concurrent Afternoon Technical Sessions
	4:00 pm - 6:00 pm	Meeting at the Georgia World Congress Center, Room 167: Performance Contracting and the Role of Energy Service Companies - U.S. and Eastern European contexts, with: Shirley Hanson, Hanson Associates, Terry Singer, Executive Director of the National Association of Energy Service Companies (NAESCO), Thomas Dreessen, President, Energy Performing Services
Wednesday October 27, 1993	9:00 am - 5:10 pm	Concurrent Morning and Afternoon Technical Sessions (incl. International Energy Opportunities in the morning) (Exhibits open 10:00 am - 5:00 pm) (For other events, see WEEC program)
	5:15 pm - 6:30 pm	Networking Roundtable Discussion Groups (Optional)
Thursday October 28, 1993	9:00 am - 11:40 am	Concurrent Morning Technical Sessions (Exhibits open 10:00 am - 5:00 pm)
	12:30 pm	Keynote Luncheon "International Linkage on Energy and the Environment", The newly created AEE Chapters are recognized.
	2:30 pm	Departure for the airport for Delta 850 flight to Washington National (departure at 5:03 pm; arrival at 6:45 pm)
Friday October 29, 1993	9:00 am	Meeting at Hagler Bailly, Inc.
	1:30 pm	Minibus meets delegation at Hagler Bailly and transfers to U.S. State Department.
	2:00 pm -	Meeting with Robert Archer, Deputy Chief, USAID, Bureau for Europe, Energy and Infrastructure Division
		Remainder of evening at leisure
Saturday October 30, 1993		Free day
Sunday October 31, 1993	2:00 pm - 4:00 pm	Departures for airports (Washington National and Dulles)

Appendix B - Participant List

Bulgaria

1. Mr. Dimitar Velev Baev
   Ph.D. Senior Research Associate
   Dimitar Baev Consulting
   P.O. Box 654
   Sofia 1000
   BULGARIA
   Tel/Fax: (359) 2 83-35-14

Mr. Baev has a PhD in Engineering, with 25 years of professional experience. He was Chief of the Production Management Department at Sofia's Central Institute of Complex Automation, and spent two years as director of the Development and Technological Center. He currently manages his own consulting firm which specializes in process and operations control systems, energy efficiency audits and analyses, and marketing in the industrial sector. He is a Certified Energy Manager.

2. Mr. Boris V. Petkov
   Ivel Ltd.
   56 Svoboda St.
   Plovdiv 4002
   BULGARIA
   Tel: (359) 32 447-563
   Fax: (359) 32 455-505

Mr. Petkov has an MSc in Engineering. He has free lance experience in HVAC and control systems. He started Ivel Ltd. in 1990 and has worked on the reconstruction of central heating systems, heat waste utilization, and energy efficiency audits of industrial heat systems. He is a Certified Energy Manager.

3. Mr. Janos B. Zhelev
   Rendd Ltd.
   Vladislavovo 9/6/54
   P.O. Box 62
   Varna 9023
   BULGARIA
   Tel: (359) 52 425591

Mr. Zhelev had a PhD in Engineering with 13 years of professional experience. Prior to working at Rendd, he worked for the Institute of Chemical Engineers in the area of combustion and utilization of oil wastes. He has participated in projects that developed energy savings methods

in the chemical and ceramics industries. He is a Certified Energy Manager.

4. Ms. Raina Petrova Zlatareva
   Ph.D. Engineer
   Ecotech Products
   66 Dimitar Manov Street
   Sofia 1408
   BULGARIA
   Tel/Fax: (359) 2 541-267

Ms. Zlatareva has a Ph.D. with 15 years of experience in the energy field. Recently she has completed a US$ 1 million heating system upgrade for a shipbuilding facility in Rousse, using Armstrong steam specialty equipment. She has been associated with Ecotech Products for several years, and has participated in a wide variety of energy efficiency work, from studies to project design and implementation.

Estonia

1. Mr. Heinar Nurste
   Managing Director
   ENPRO Engineers Bureau Ltd
   Mustamae tee 33
   Tallinn EE0006
   ESTONIA
   tel: (372) 2 52 86 06
   fax: (372) 2 52 84 07

Mr. Nurste is the managing Director of EnPro Engineers Bureau Ltd., which was formed in 1991. Until 1992, he was senior research scientist at the Institute of Thermophysics and Electrophysics of the Estonian Academy of Sciences. He has over 15 years of experience in the energy field, specializing in energy demand forecasting and energy auditing.

Hungary

1. Mr. Gyorgy A. Foldvary
   Senior Technical & Economic Adviser
   Department of Energy Strategy
   Ministry of Industry and Trade
   Margit Korut 85
   H-1024 Budapest II.
   HUNGARY

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fax: (361) 175-4593

2. Mr. Miklos Gellert
Managing Director
Gellert Innovative Bureau of Engineering
Barackos u. 24
Pecs 7635
HUNGARY
Tel/Fax: (36) 72-319 661

Mr. Gellert is the director of his own consulting firm. He has an MSc in Mechanical Engineering and 15 years of experience in management consulting. He is a Certified Energy Manager.

3. Mr. Tibor Nagy
Consultant
Controll Quality Consulting Limited
Radvany u. 34/b
Budapest 1118
HUNGARY
Tel: (361) 267-1101
Fax: (361) 161-2040

Mr. Nagy has an MSc in Electrical Engineering. He has been a consultant for two years. His work includes auditing energy production/distribution systems. He is a Certified Energy Manager.

4. Mr. Gyorgy Viragh
Manager
KONTRAVILL
Domahaza u. 28
Budapest 1145
HUNGARY, Tel/Fax: (361) 271-9553

Mr. Viragh has 8 years of experience as a design engineer. He is the director of Kontravill, a privately-held company with projects relating to heat storage efficiency in buildings, underground and above surface steam and hot water pipelines, industrial technologies, and high power electrical systems. He has a BSc in Electrical Engineering. He is a Certified Energy Manager.

Latvia

1. Ms. Dagnija Blumberga

Professor, Dr. Sc. Eng.
RIGA TECHNICAL UNIVERSITY
Department of Technical Energy
12-49 Zentenes Str.
LV 1069 Riga
LATVIA
tel: (371) 2 419853
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Ms. Blumberga has a Ph.D. in Engineering and is a Professor at Riga Technical University. She is also President of B.V. Ekodoma, a consulting firm.

Lithuania

1. Mr. Kazys Zilys
Head of Research & Development Department
Ministry of Energy
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fax: (370) 2 62 68 45

Mr. Zilys is the Director of the R&D Department of the Lithuanian Ministry of Energy, where he manages the energy efficiency, planning, and economics sections.

Poland

1. Mr. Maciej Lenczweski
Polish Power Grid Company
2 Mysia Str.
Warsaw 00-496
POLAND
tel.: (48) 693 21 17
fax: (48) 628 59 64

Mr. Lenczewski presented a paper on "Implementing Demand-Side Management Through Integrated Resource Planning in Poland" at the 16th World Energy Engineering Congress in Atlanta.

Romania

1. Mr. Valentin-Vasile N. Cristescu
   Managing Associate
   ECO-VEL SRL
   P.O. Box 39-122
   73200 Bucharest
   ROMANIA
   tel: (401) 653-71-58
   fax: (401) 213-79-56

Mr. Cristescu is the manager of ECO-VEL, a privately-held consulting company specializing in HVAC, energy recovery, and air pollution abatement, and publishing management educational books. He is a Certified Energy Manager.

2. Ms. Simona G. Parvu
   Associate Manager
   Automatizari Orion SRL.
   Str. Basarabi No. 14
   Ploiesti 2000
   ROMANIA
   tel: 4 097 12 1311

Ms. Pirvu is an engineer for Automatizari Orion. This company works on design and installation of automation systems for boilers, thermo-power stations, and flow monitoring.
She is a Certified Energy Manager.

3. Mr. Paul- Alexandru Zara
   General Manager
   Bureau of Industry and Technology SRL
   Str. Icoanei 74 - Sect. 2
   Bucharest 72128
   ROMANIA
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   fax : (401) 312 1098

Mr. Zara is the manager of a 4-person consulting firm. He was formerly employed by the Research Institute where he concentrated on energy savings, energy policy and energy balances in industry. He is a Certified Energy Manager.

4. Mr. Mihail D. Zdravcu
   Director
   ARCON SRL.

Intr Odobesti NR 1
BL Z2, Sc. 5, AP 59
74578 Bucharest 3
ROMANIA
Tel: (401) 673-6081
Fax: (401) 312-9085

Mr. Zdravcu is the manager of this small consulting firm which is experienced in electrical engineering, energetics, power generators, HVAC, and boiler automation. He is a Certified Energy Manager

Appendix C - Activities

Delegation

Sixteen delegates were selected from seven countries: Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, and Romania. Invited delegates were chosen primarily among owners of private energy engineering firms, or managers and engineers of these firms, actively developing energy service activities in their countries and interested in establishing links with U.S. companies. Most delegates were professionals who participated in the USAID-sponsored energy efficiency market development training programs in three countries - Bulgaria, Hungary, and Romania-, had received the Certified Energy Manager (CEM) certification of the U.S.-based Association of Energy Engineers (AEE), and had petitioned for the creation of local chapters of the AEE in their countries. A few delegates were government energy officials and electric utility representatives from countries where USAID has been promoting the development of Demand-Side Management (DSM) initiatives.

Atlanta

On Monday, a series of meetings were organized on the subject of energy engineering business.

The first meeting took place at the hotel and gave an opportunity to the delegation members to introduce themselves to the group. The speaker, Richard Watkins, President of Dean Oliver & Associates, introduced the activities of his company, an engineering firm with strong expertise in pulp & paper and process industries. He then focused on the business development process for small U.S. engineering firms: networking, various contract types, negotiated/bid work, importance of customer service, risks associated with shared energy savings projects etc...

The delegation then went to the headquarters of the Georgia Power Company. Ed Fischler, Manager of Power Marketing at Georgia Power, gave an overview of how Georgia Power tries to fit DSM in its customer service and business development strategy. He also described his company's strong interest in real-time pricing, and the resulting implementation efforts. Kim Berry, Sales Specialist, Retail & Services at Georgia Power, then presented the utility's energy audit program. Finally, Arthur Skinner, Director of the Services Division of Southern Electric International (SEI), described the relation between his firm and Georgia Power and the role of non-regulated utility subsidiaries in the development of services "beyond the meter".

After the luncheon hosted by Georgia Power in its executive dining room, a presentation was made on Process Energy reduction (PER) by Walter Lowthian, Vice President and Manager of Dean Oliver's Process and Environmental Group, and Paul Wilson, Process Engineering Manager in the same Group. Mr. Lowthian described how a comprehensive look at industrial processes can lead to very significant energy reduction opportunities if enough attention is paid to the

function of the equipment, not just to its technological efficiency. Mr. Wilson then gave specific examples of the application of the CADSYM MASSBAL software to PER.

A number of delegates later attended the AEE Chapter Leadership meeting organized by AEE for local chapter officers. The Eastern European delegates introduced themselves to the assembly and presented their efforts to create chapters in Bulgaria, Hungary, and Romania, or expressed their interest in creating new chapters in the other countries.

The delegates attended the 16th World Energy Engineering Congress in Atlanta from Tuesday to Thursday. The WEEC, which is organized by the AEE, represents the largest technical conference on energy efficiency in the United States. The program included four periods of 11 concurrent sessions featuring approximately 110 technical presentations, and exhibitions by around 150 energy efficiency companies and 120 environmental firms.

On Tuesday evening, a meeting was organized with Shirley Hansen, Terry Singer, Executive Director of the National Association of Energy Service Companies (NAESCO), and Thomas Dreessen, President of NAESCO and President of Energy Performing Services (EPS). Dr. Hansen summarized the key points of the training sessions on performance contracting that she had conducted in Bulgaria, Hungary, and Romania; Ms. Singer introduced NAESCO; and Mr. Dreessen described his experience with developing performance contracts in Eastern Europe. A general discussion on the financing issues specific to Eastern Europe followed. The next day, Dr. Hansen, Ms. Singer, and Mr. Dreessen conducted a session on Performance Contracting, and Dr. Hansen chaired a networking roundtable on the same subject. Both events were attended by several of the delegates.

On Wednesday morning, the International Energy Opportunities session was chaired by David Keith of Hagler Bailly. Presentations were given by Suzanne Smith and David Wolcott of Hagler Bailly, William Coe of SEI, and Maciej Lenczewski of the Polish Power Grid Company, a member of the delegation.

Later in the day, at the suggestion of the Hungarian participants, Hagler Bailly organized a networking session to give U.S. conference attendees an opportunity to meet with the delegation. Approximately two dozen people came to meet with the participants and watch a draft copy of the video on the USAID trade-mission to Russia. More people would probably have come if the meeting had been planned earlier and therefore better advertized. Nonetheless, participants seemed to appreciate being able to reach out to other attendees, to complement the networking they were doing with the exhibitors.

On Thursday, the keynote luncheon speech entitled "International Linkage on Energy and the Environment", was given by William Chandler of Battelle Pacific Northwest Laboratories, who discussed energy conservation in Eastern Europe, with examples from the Polish situation. During the luncheon, the newly created AEE local chapters were recognized, and charter plaques were given to the representatives from the three chapters - Bulgaria, Hungary, and Romania.

Washington

On Friday morning, the delegation attended a presentation at Hagler Bailly on Energy Efficiency Consulting. Henri-Claude Bailly, Chairman of the Board, and several other officers from Hagler Bailly gave presentations on the company and on the energy consulting business. Joe Vilardo, Director, Eastern European Business Development, Honeywell, also discussed the relationship of suppliers to consulting engineers, with specific examples from Honeywell's recent projects in the Russian district heating sector.

In the afternoon, the delegation went to the State Department to meet with Robert A. Archer, Deputy Chief, USAID ENI/EUR/DR/EI.

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1993 EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE UNITED STATES

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December 1993

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C: Elements of Welcome Pack

D: Agenda for Meeting at Georgia Power Company

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G: Agenda for Association of Engineers Chapter Leadership Meeting

H: Program for the 16th World Energy Engineering Congress

I: Table of Contents of the Proceedings of the 16th World Energy Engineering Congress

J: Directory of Exhibitors at the 16th World Energy Engineering Congress

K: Agenda for Meeting at RCG/Hagler, Bailly, Inc.

L: Overheads for Various Presentations at RCG/Hagler, Bailly, Inc.

M: 16th World Energy Engineering Congress Evaluation Forms

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EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE UNITED STATES

October 24 - 31, 1993

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1. INTRODUCTION

In October 1993 the USAID Bureau for Europe and Independent States, Europe, Office of Development Resources, Energy and Infrastructure Division (AID/ENI/EUR/DR/EI) sponsored the second annual invitational travel delegation of European energy efficiency professionals to the United States. The purpose was to provide increased business opportunities for U.S. energy efficiency equipment manufacturers and investors, assist in the development of local markets for energy efficiency in Eastern Europe, and develop ongoing organizational and business relationships between energy efficiency officials and firms in Eastern Europe and similar organizations in the United States.

The itinerary for the delegation started in Atlanta, Georgia, where the group attended AEE's 16th World Energy Engineering Congress (WEEC) and met with energy efficiency companies and organizations. Later, in Washington DC, the delegation attended presentations by officers from Hagler Bailly, met with Robert Archer at the State Department for an evaluation session, and enjoyed a day of organized sightseeing in the capital.

2. RATIONALE / OBJECTIVES

Under the Emergency Energy Program and the PEER Program, USAID has developed ongoing relations with Eastern and Central European energy efficiency professionals, many of whom are actively promoting the development of markets for energy efficiency products and services in their respective countries.

In particular, USAID has set-up a program of industrial energy efficiency market development under which local professionals have been trained in energy auditing and related disciplines, and are provided technical assistance in their initial energy auditing activities. These professionals passed the Certified Energy Manager (CEM) examination of the Association of Energy Engineers (AEE), and have been actively involved in the creation of local chapters of the AEE.

Inviting a number of these professionals to attend the World Energy Engineering Congress sponsored by AEE, and to meet with US energy engineers and equipment manufacturers, therefore complemented the activities developed in Eastern and Central Europe.

This activity had the dual objective of providing increased business (trade and investment) for U.S. energy efficiency vendors and local market development for energy efficiency in Eastern Europe. An important objective was to develop ongoing business relationships between energy efficiency officials in Eastern Europe and business people in the United States.

3. WORK PERFORMED

3.1 Delegation

Sixteen delegates were selected from seven countries: Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, and Romania. Invited delegates were chosen primarily among owners of private energy engineering firms, or managers and engineers of these firms, actively developing energy service activities in their countries and interested in establishing links with U.S. companies. Most delegates were professionals who participated in the USAID-sponsored energy efficiency market development training programs in three countries - Bulgaria, Hungary, and Romania-, had received the Certified Energy Manager (CEM) certification of the U.S.-based Association of Energy Engineers (AEE), and had petitioned for the creation of local chapters of the AEE in their countries. A few delegates were government energy officials and electric utility representatives from countries where USAID has been promoting the development of Demand-Side Management (DSM) initiatives. Appendix A includes a list of the 16 delegation members.

Appendix B sets forth the group's itinerary. The trip is described in more details in the following paragraphs.

3.2 Atlanta

Delegates were met at the airport on Sunday evening, October 24 by Laurent Pommier of Hagler Bailly. Appendix C includes elements of the welcome pack distributed to the delegates at the airport.

On Monday, a series of meetings were organized on the subject of energy engineering business.

The first meeting took place at the hotel and gave an opportunity to the delegation members to introduce themselves to the group. The speaker, Richard Watkins, President of Dean Oliver & Associates, introduced the activities of his company, an engineering firm with strong expertise in pulp & paper and process industries. He then focused on the business development process

for small U.S. engineering firms: networking, various contract types, negotiated/bid work, importance of customer service, risks associated with shared energy savings projects etc...

The delegation then went to the headquarters of the Georgia Power Company. Appendix D includes the agenda for the meeting. Ed Fischler, Manager of Power Marketing at Georgia Power, gave an overview of how Georgia Power tries to fit DSM in its customer service and business development strategy. He also described his company's strong interest in real-time pricing, and the resulting implementation efforts. Kim Berry, Sales Specialist, Retail & Services at Georgia Power, then presented the utility's energy audit program. Finally, Arthur Skinner, Director of the Services Division of Southern Electric International (SEI), described the relation between his firm and Georgia Power and the role of non-regulated utility subsidiaries in the development of services "beyond the meter". Appendix E includes papers distributed by Georgia Power during the presentation.

After the luncheon hosted by Georgia Power in its executive dining room, a presentation was made on Process Energy reduction (PER) by Walter Lowthian, Vice President and Manager of Dean Oliver's Process and Environmental Group, and Paul Wilson, Process Engineering Manager in the same Group. Mr. Lowthian described how a comprehensive look at industrial processes can lead to very significant energy reduction opportunities if enough attention is paid to the function of the equipment, not just to its technological efficiency. Mr. Wilson then gave specific examples of the application of the CADSYM MASSBAL software to PER. Appendix F includes transparencies of the presentation given by Mr. Lowthian.

A number of delegates later attended the AEE Chapter Leadership meeting organized by AEE for local chapter officers. The Eastern European delegates introduced themselves to the assembly and presented their efforts to create chapters in Bulgaria, Hungary, and Romania, or expressed their interest in creating new chapters in the other countries. Appendix G includes an agenda for the meeting.

On Monday evening, the delegation attended the AEE banquet.

The delegates attended the 16th World Energy Engineering Congress in Atlanta from Tuesday to Thursday. The WEEC, which is organized by the AEE, represents the largest technical conference on energy efficiency in the United States. The program included four periods of 11 concurrent sessions featuring approximately 110 technical presentations, and exhibitions by around 150 energy efficiency companies and 120 environmental firms. Please find the WEEC program in Appendix H, the table of contents of the Congress's proceedings in Appendix I, and the directory of exhibitors in Appendix J.

On Tuesday evening, a meeting was organized with Shirley Hansen, Terry Singer, Executive Director of the National Association of Energy Service Companies (NAESCO), and Thomas

Dreessen, President of NAESCO and President of Energy Performing Services (EPS). Dr. Hansen summarized the key points of the training sessions on performance contracting that she had conducted in Bulgaria, Hungary, and Romania; Ms. Singer introduced NAESCO; and Mr. Dreessen described his experience with developing performance contracts in Eastern Europe. A general discussion on the financing issues specific to Eastern Europe followed. The next day, Dr. Hansen, Ms. Singer, and Mr. Dreessen conducted a session on Performance Contracting, and Dr. Hansen chaired a networking roundtable on the same subject. Both events were attended by several of the delegates.

On Wednesday morning, the International Energy Opportunities session was chaired by David Keith of Hagler Bailly. Presentations were given by Suzanne Smith and David Wolcott of Hagler Bailly, William Coe of SEI, and Maciej Lenczewski of the Polish Power Grid Company, a member of the delegation.

Later in the day, at the suggestion of the Hungarian participants, Hagler Bailly organized a networking session to give U.S. conference attendees an opportunity to meet with the delegation. Approximately two dozen people came to meet with the participants and watch a draft copy of the video on the USAID trade-mission to Russia. More people would probably have come if the meeting had been planned earlier and therefore better advertized. Nonetheless, participants seemed to appreciate being able to reach out to other attendees, to complement the networking they were doing with the exhibitors.

On Thursday, the keynote luncheon speech entitled "International Linkage on Energy and the Environment", was given by William Chandler of Battelle Pacific Northwest Laboratories, who discussed energy conservation in Eastern Europe, with examples from the Polish situation. During the luncheon, the newly created AEE local chapters were recognized, and charter plaques were given to the representatives from the three chapters - Bulgaria, Hungary, and Romania.

The night before, Hagler Bailly had sponsored a dinner for the delegation and several invited guests at a local restaurant and jazz club, Dante's Down the Hatch.

3.3 Washington

On Friday morning, the delegation attended a presentation at Hagler Bailly on Energy Efficiency Consulting. Henri-Claude Bailly, Chairman of the Board, and several other officers from Hagler Bailly gave presentations on the company and on the energy consulting business. Joe Vilardo, Director, Eastern European Business Development, Honeywell, also discussed the relationship of suppliers to consulting engineers, with specific examples from Honeywell's recent projects in the Russian district heating sector. Appendix K includes the agenda for the meeting; Appendix L includes overheads for some of the presentations.

In the afternoon, the delegation went to the State Department to meet with Robert A. Archer, Deputy Chief, USAID ENI/EUR/DR/EI.

In the evening Hagler Bailly hosted a dinner reception in its offices for the delegation, the Hagler Bailly staff, and several invited guests.

On Saturday, the delegation enjoyed a day of organized sightseeing, despite the rainy weather.

4. RESULTS AND ACCOMPLISHMENTS

The evaluation forms completed by the delegation members indicated that this program was well-organized, went smoothly, and met its objectives.

The congress was of great interest to all the participants, with enough diversity of information to satisfy everyone. Several delegates regretted that so many sessions were concurrent. The book of proceedings is therefore considered a very valuable source of information. On a subsequent trip to Romania, it was noticed that some of the participants were using this book a lot. Participants seemed to be impressed by the US commitment to energy conservation, by the dynamism of the efficiency market, and by the wealth of US expertise, especially in the management and regulatory fields. They were surprised by the variety of products available for the commercial sector, especially in the lighting field. On the other hand, a number of delegates mentioned that some of the technical fields of importance to their countries were not heavily addressed by the congress: industrial processes, low-tech residential applications, cogeneration, turbines, district heating... But they all seemed to recognize that the congress was naturally geared towards US priorities.

Accordingly, the "International Energy Opportunities" session generated a lot of interest among the delegates, who stated that they were glad to realize that their country's problems were not unique and appreciated gaining some insight into other countries' experiences. "Same questions, same issues" said Dagnija Blumberga from Latvia.

Many Eastern Europeans indicated that they very much appreciated the attention that AEE gave them, especially at the AEE Chapter Leadership Meeting and at the closing luncheon. Mr. Zilys from Lithuania "highly appreciated the attention [AEE] paid to the Eastern European delegation"; Mr Cristescu expressed to AEE his "gratitude for the kindness towards the Romanian delegation"; and Mr. Zdravcu, from Romania said "this was a big honor for me when Mr. Thumann introduced [our new chapters]."

A lot of interest was also expressed by the group in the various sessions and meetings on performance contracting. "'Managing the Risks of Performance Contracting' is very useful in our

first steps in the selection of our clients for energy audits" said Simona Parvu from Romania. But delegates also noted that true performance contracting seems to be rare in the US, and that the current reality may not be as advanced as the theory. Some of the ESCOs are currently trying to market equipment, or even audits, on a shared-savings basis.

The Eastern European delegates were generally extremely concerned with the issue of financing energy efficiency. As such, they were very interested in the meeting with Shirley Hansen, Terry Singer, and Thomas Dreessen, but would have liked to have much more time to discuss the subject and talk more about their own experiences. Competitive considerations contribute to perpetuate the lack of free information about US sources of financing interested in investing in Eastern European energy projects. In the "Client/ESCO/Financier" triangle, the "Financier" leg is crucial but constitutes the real unknown for the Eastern European energy professionals.

The meetings organized aside from the WEEC also received positive evaluations by the delegation. Starting the week with a meeting with Rick Watkins, President of Dean Oliver & Associates, enabled the members to immediately meet a U.S. entrepreneur involved in industrial engineering, who put a friendly face on a so-far anonymous entity and emphasized the importance of networking as an introduction to the Congress and the whole week. The subjects of the subsequent meetings -- DSM, real-time pricing, Process Energy Reduction... -- were fairly specialized and, as such, could not be exactly in line with everybody's direct preoccupation, but generated good interest due to the diversity of subject they brought.

Comments about the meeting with Robert Archer at USAID were unanimously positive. The participants mentioned how grateful they were for the attention given to them, and said they were particularly impressed that suggestions and feedback were sought from them by Mr. Archer himself.

Delegation members developed contacts with U.S. companies, with the objective of purchasing U.S, products, identifying U.S. consultants, market their services in the U.S., acting as representatives or distributors for U.S. manufacturers, or establishing joint ventures. The participants were satisfied with the individual contacts they made, but seemed a bit disappointed with the overall level of interest expressed by U.S. companies. It is probably too early to judge the amount of contacts and business generated by this invitational travel. Because Hagler Bailly will stay in touch with most of the delegates through the ongoing industrial energy efficiency market development programs, it will be possible to later better evaluate the impact of this task on U.S. - Eastern European business relations.

The most obvious result of this invitational travel is a clear motivational boost for the Eastern European entrepreneurs in their energy efficiency endeavors. One delegate now actively involved in selling energy conservation projects recently admitted having seriously thought about stopping the ESCO activities, until the Congress brought enough motivation to decide to continue. This

trip gave the delegates clear examples of the markets that can be generated through energy efficiency. The delegation members also saw first-hand how energy can be a rallying subject for professionals involved in various sectors and disciplines. Finally, the participants were very inspired by the support shown to them by AEE and USAID.

Overall, this invitational trip was a good first step in the establishment of business relationships between U.S. and Eastern European companies, and was an excellent way to further motivate the ESCOs and to provide them with additional technical, commercial, and management information.

5. SIGNIFICANCE AND LESSONS LEARNED

On subsequent trips to the Eastern European countries from which delegates had been invited to the US, the Hagler Bailly staff received more evidence that the 1993 invitational travel has had a very positive impact on the dynamism of the energy efficiency entrepreneurs of these countries. It is also clear that this trip helped these professionals be more aware of the products offered by US manufacturers. This information is much needed as the US products often seem to be much less present on the Eastern European energy efficiency market than their Western European counterparts.

In light of these results, it is strongly recommended that another invitational travel be scheduled next year around the 17th World Energy Engineering Congress.

It has also appeared, though, that the interest shown by the US manufacturers in exporting products to Eastern Europe is not overwhelming, especially when talking to exhibitors at random. For this reason, the two following actions are recommended:

1) To actively seek out US companies interested in developing business with Eastern Europe prior to the arrival in the US of the delegation, and to set-up focused trade meetings between these US firms and the delegation, either during the Congress or independently from it.

2) To organize a trade conference in Eastern Europe to allow a larger number of ESCOs to meet with a focused group of manufacturers with a real interest in developing business in those countries.

Finally, it is recommended to try set-up meetings between the Eastern European energy professionals and US investors interested in developing loan programs for energy efficiency retrofit projects.

APPENDIX

REPORT TRANSPARENCIES

1993 ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE U.S.

OBJECTIVE/RATIONALE

THE EASTERN AND CENTRAL EUROPEAN ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE UNITED STATES HAD THE FOLLOWING OBJECTIVES:

- TO DEVELOP BUSINESS CONTACTS BETWEEN U.S. COMPANIES AND EASTERN EUROPEAN ENERGY EFFICIENCY PROFESSIONALS
- TO PROVIDE ENERGY EFFICIENCY INFORMATION TO THE DELEGATES
- TO FOSTER THE DEVELOPMENT OF PROFESSIONAL CONTACTS BETWEEN U.S. AND EASTERN EUROPEAN ENERGY ENGINEERS

1993 ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE U.S.

TASK DESCRIPTION

DELEGATES ATTENDED THE 16TH WORLD ENERGY ENGINEERING CONGRESS (WEEC):

- TRADE EXHIBITION
- TECHNICAL SESSIONS
- ROUNDTABLES AND PROFESSIONAL MEETINGS
- RECOGNITION OF THE NEWLY CREATED CHAPTER OF THE ASSOCIATION OF ENERGY ENGINEERS (AEE) IN BULGARIA, HUNGARY, AND ROMANIA

DELEGATES PARTICIPATED IN MEETINGS WITH:

- USAID
- ASSOCIATION OF ENERGY ENGINEERS (AEE)
- NATIONAL ASSOCIATION OF ENERGY SERVICE COMPANIES (NAESCO)
- ELECTRIC UTILITY AND ASSOCIATED SERVICE COMPANY
- PROCESS ENGINEERING CONSULTING FIRM
- ENERGY EFFICIENCY CONSULTING FIRM

1993 ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE U.S.

RESULTS/ACCOMPLISHMENTS

- CONGRESS ILLUSTRATED TO DELEGATES HOW ENERGY EFFICIENCY CAN CREATE VERY DYNAMIC MARKETS
- CONGRESS SESSIONS AND BOOK OF PROCEEDINGS GAVE DELEGATES DETAILED INFORMATION ON MOST RECENT TECHNICAL AND MANAGEMENT DEVELOPMENTS IN ENERGY EFFICIENCY FIELD
- DELEGATES OBTAINED INFORMATION ON U.S. PRODUCTS AND DEVELOPED BUSINESS CONTACTS
- DELEGATES MET WITH OTHER ENERGY ENGINEERING FIRMS AND PROFESSIONALS
- DELEGATES AND U.S. COUNTERPARTS EXCHANGED VIEWS ON THE ISSUES OF PROJECT DEVELOPMENT AND FINANCING

1993 ENERGY EFFICIENCY INVITATIONAL TRAVEL TO THE U.S.

SIGNIFICANCE/LESSONS LEARNED

ABOUT THIS 1993 INVITATIONAL TRAVEL:

- TRIP WAS A CATALYST FOR THE CREATION OF LOCAL AEE CHAPTERS
- TRIP FURTHER INCREASED THE MOTIVATION OF THE DELEGATES TO EXPAND THEIR ENERGY EFFICIENCY BUSINESSES
- DELEGATES RECEIVED MUCH NEEDED INFORMATION ABOUT U.S. PRODUCTS
- U.S. COMPANIES IN GENERAL SHOWED LIMITED INTEREST IN MARKETING THEIR PRODUCTS IN EASTERN EUROPE

RECOMMENDATIONS FOR THE FUTURE:

- IDENTIFY U.S. COMPANIES INTERESTED IN DEVELOPING BUSINESS IN EASTERN EUROPE, AND SET-UP FOCUSED TRADE MEETINGS BETWEEN THEM AND THE DELEGATES
- ORGANIZE TRADE MEETINGS WITH U.S. COMPANIES IN EASTERN EUROPE

APPENDIX A

LIST OF DELEGATION MEMBERS

USAID REGIONAL ENERGY EFFICIENCY PROGRAM

Invitational Travel:
16th World Energy Engineering Congress

October 24 - 31, 1993

Organized by: RCG/Hagler, Bailly, Inc.

DELEGATION MEMBERS

Bulgaria

1. Mr. Dimitar Velev Baev
   Ph.D. Senior Research Associate
   Dimitar Baev Consulting
   P.O. Box 654
   Sofia 1000
   BULGARIA
   Tel/Fax: (359) 2 83-35-14

Mr. Baev has a PhD in Engineering, with 25 years of professional experience. He was Chief of the Production Management Department at Sofia's Central Institute of Complex Automation, and spent two years as director of the Development and Technological Center. He currently manages his own consulting firm which specializes in process and operations control systems, energy efficiency audits and analyses, and marketing in the industrial sector. He is a Certified Energy Manager.

2. Mr. Boris V. Petkov
   Ivel Ltd.
   56 Svoboda St.
   Plovdiv 4002
   BULGARIA
   Tel: (359) 32 447-563
   Fax: (359) 32 455-505

Mr. Petkov has an MSc in Engineering. He has free lance experience in HVAC and control systems. He started Ivel Ltd. in 1990 and has worked on the reconstruction of central heating systems, heat waste utilization, and energy efficiency audits of industrial heat systems. He is a Certified Energy Manager.

3. Mr. Janos B. Zhelev
Rendd Ltd.
Vladislavovo 9/6/54
P.O. Box 62
Varna 9023
BULGARIA
Tel: (359) 52 425591

Mr. Zhelev had a PhD in Engineering with 13 years of professional experience. Prior to working at Rendd, he worked for the Institute of Chemical Engineers in the area of combustion and utilization of oil wastes. He has participated in projects that developed energy savings methods in the chemical and ceramics industries. He is a Certified Energy Manager.

4. Ms. Raina Petrova Zlatareva
Ph.D. Engineer
Ecotech Products
66 Dimitar Manov Street
Sofia 1408
BULGARIA
Tel/Fax: (359) 2 541-267

Ms. Zlatareva has a Ph.D. with 15 years of experience in the energy field. Recently she has completed a US$ 1 million heating system upgrade for a shipbuilding facility in Rousse, using Armstrong steam specialty equipment. She has been associated with Ecotech Products for several years, and has participated in a wide variety of energy efficiency work, from studies to project design and implementation.

Estonia

1. Mr. Heinar Nurste
Managing Director
ENPRO Engineers Bureau Ltd
Mustamae tee 33
Tallinn EE0006
ESTONIA
tel: (372) 2 52 86 06
fax: (372) 2 52 84 07

Mr. Nurste is the managing Director of EnPro Engineers Bureau Ltd., which was formed in 1991. Until 1992, he was senior research scientist at the Institute of Thermophysics and Electrophysics of the Estonian Academy of Sciences. He has over 15 years of experience in the energy field, specializing in energy demand forecasting and energy auditing.

Hungary

1. Mr. Gyorgy A. Foldvary
   Senior Technical & Economic Adviser
   Department of Energy Strategy
   Ministry of Industry and Trade
   Margit Korut 85
   H-1024 Budapest II.
   HUNGARY
   tel: (361) 175 7128
   fax: (361) 175-4593

2. Mr. Miklos Gellert
   Managing Director
   Gellert Innovative Bureau of Engineering
   Barackos u. 24
   Pecs 7635
   HUNGARY
   Tel/Fax: (36) 72-319 661

Mr. Gellert is the director of his own consulting firm. He has an MSc in Mechanical Engineering and 15 years of experience in management consulting. He is a Certified Energy Manager.

3. Mr. Tibor Nagy
   Consultant
   Controll Quality Consulting Limited
   Radvany u. 34/b
   Budapest 1118
   HUNGARY
   Tel: (361) 267-1101
   Fax: (361) 161-2040

Mr. Nagy has an MSc in Electrical Engineering. He has been an energy consultant for two years. His work includes auditing energy production and distribution systems. He is a Certified Energy Manager.

4. Mr. Gyorgy Viragh
   Manager
   KONTRAVILL
   Domahaza u. 28
   Budapest 1145
   HUNGARY
   Tel/Fax: (361) 271-9553

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Mr. Viragh has 8 years of experience as a design engineer. He is the director of Kontravill, a privately-held company with projects relating to heat storage efficiency in buildings, underground and above surface steam and hot water pipelines, industrial technologies, and high power electrical systems. He has a BSc in Electrical Engineering. He is a Certified Energy Manager.

Latvia

1. Ms. Dagnija Blumberga
   Professor, Dr. Sc. Eng.
   RIGA TECHNICAL UNIVERSITY
   Department of Technical Energy
   12-49 Zentenes Str.
   LV 1069 Riga
   LATVIA
   tel: (371) 2 419853
   fax: (371) 2 212206

Ms. Blumberga has a Ph.D. in Engineering and is a Professor at Riga Technical University. She is also President of B.V. Ekodoma, a consulting firm.

Lithuania

1. Mr. Kazys Zilys
   Head of Research & Development Department
   Ministry of Energy
   Gedimino av. 36
   2600 Vilnius
   LITHUANIA
   tel: (370) 2 61 18 84
   fax: (370) 2 62 68 45

Mr. Zilys is the Director of the R&D Department of the Lithuanian Ministry of Energy, where he manages the energy efficiency, planning, and economics sections.

Poland

1. Mr. Maciej Lenczweski
   Polish Power Grid Company
   2 Mysia Str.
   Warsaw 00-496
   POLAND
   tel.: (48) 693 21 17
   fax: (48) 628 59 64

Mr. Lenczewski will be presenting a paper on "Implementing Demand-Side Management Through Integrated Resource Planning in Poland" at the 16th World Energy Engineering Congress in Atlanta.

Romania

1. Mr. Valentin-Vasile N. Cristescu
   Managing Associate
   ECO-VEL SRL
   P.O. Box 39-122
   73200 Bucharest
   ROMANIA
   tel: (401) 653-71-58
   fax: (401) 213-79-56

Mr. Cristescu is the manager of ECO-VEL, a privately-held consulting company specializing in HVAC, energy recovery, and air pollution abatement, and publishing management educational books. He is a Certified Energy Manager.

2. Ms. Simona G. Parvu
   Associate Manager
   Automatizari Orion SRL.
   Str. Basarabi No. 14
   Ploiesti 2000
   ROMANIA
   tel: 4 097 12 1311

Ms. Pirvu is an engineer for Automatizari Orion. This company works on design and installation of automation systems for boilers, thermo-power stations, and flow monitoring. She is a Certified Energy Manager.

3. Mr. Paul- Alexandru Zara
General Manager
Bureau of Industry and Technology SRL
Str. Icoanei 74 - Sect. 2
Bucharest 72128
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tel : (401) 610-2010
fax : (401) 312 1098

Mr. Zara is the manager of a 4-person consulting firm. He was formerly employed by the Research Institute where he concentrated on energy savings, energy policy and energy balances in industry. He is a Certified Energy Manager.

4. Mr. Mihail D. Zdravcu
Director
ARCON SRL.
Intr Odobesti NR 1
BL Z2, Sc. 5, AP 59
74578 Bucharest 3
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Tel: (401) 673-6081
Fax: (401) 312-9085

Mr. Zdravcu is the manager of this small consulting firm which is experienced in electrical engineering, energetics, power generators, HVAC, and boiler automation. He is a Certified Energy Manager.

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APPENDIX B

TRIP SCHEDULE

USAID REGIONAL ENERGY EFFICIENCY PROGRAM

Invitational Travel:
16th World Energy Engineering Congress

October 24 - 31, 1993

Organized by: RCG/Hagler, Bailly, Inc.

SCHEDULE

Sunday October 24, 1993

3:15 am - 9:55 am Arrival of delegation in Atlanta

Laurent Pommier of RCG/Hagler, Bailly welcomes the visitors and assists them in taking the Atlanta Airport Shuttle, or taxi, to go to the Best Western Hotel.

Best Western - American Hotel - Atlanta
160 Spring Street
Atlanta GA 30303
Tel: 1-800-621-7885 (from the U.S.)
Tel: 404-688-8600
Fax: 404-658-9458

Monday October 25, 1993

7:15 am Breakfast at the Best Western

8:00 am Meeting at the Best Western Hotel.

Introductions, briefing on week's schedule...

Richard Watkins, President of Dean Oliver & Associates, gives a presentation on issues related to engineering business.

9:45 am Departure for Georgia Power Corporate Headquarters, 333 Piedmont Avenue, Atlanta (taxi)

10:15 am Presentation by Georgia Power Company on the Energy Management Program

Mr. Ed Fischler, Manager of Power Marketing at Georgia Power Company, presents Georgia Power's Commercial Energy Management Program.

Mr. Kim Berry, Sales Specialist - Retail Sales & Services at Georgia Power Company, presents Georgia Power's Industrial Energy Management Program.

Mr. Arthur Skinner, Director - Services Division at SEI, describes SEI/Southern Enterprises focus on Energy Management.

11:30 am Open discussion about the Eastern European context

12:00 pm Lunch at Georgia Power Company (Executive Dining Room)

1:15 pm Presentation by Dean Oliver & Associates on Energy Engineering

Mr. Walter Lowthian, Vice-President, Manager - Process and Environmental Group at Dean Oliver, discusses the role of engineering firms in process energy efficiency projects.

Mr. Paul Wilson, Process Engineering Manager, Process and Environmental Group at Dean Oliver, describes results achievable with computerized mass balance simulation system.

3:30 pm Departure from Georgia Power Corporate Headquarters.

Participants interested in attending the AEE Chapter Leadership presentation go by taxi to the Georgia World Congress Center. The others can go back to the hotel.

4:00 pm Optional meeting at the Georgia World Congress Center, West, Room 260: Creation and Management of AEE local chapters.

6:30 pm AEE Banquet.

Tuesday October 26, 1993

8:45 am - 11:10 am Opening ceremony of WEEC
(Exhibits open 10:00 am - 5:00 pm)

11:30 am "Meet Your Peers" Luncheon in Exhibit Hall

2:30 pm - Concurrent Afternoon Technical Sessions

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4:00 pm - 6:00 pm Meeting at the Georgia World Congress Center, Room 167: Performance Contracting and the Role of Energy Service Companies - U.S. and Eastern European contexts

with:

Shirley Hanson, Hanson Associates

Terry Singer, Executive Director of the National Association of Energy Service Companies (NAESCO)

Thomas Dreessen, President, Energy Performing Services

Evening at leisure (Optional Shopping)

Wednesday October 27, 1993

9:00 am - 5:10 pm Concurrent Morning and Afternoon Technical Sessions (incl. International Energy Opportunities in the morning)
(Exhibits open 10:00 am - 5:00 pm)
(For other events, see WEEC program)

5:15 pm - 6:30 pm Networking Roundtable Discussion Groups (Optional)

8:00 pm Dinner hosted by RCG/Hagler, Bailly at Dante's Down the Hatch

Thursday October 28, 1993

Hotel check-out. Luggage stored at the Best Western.

9:00 am - 11:40 am Concurrent Morning Technical Sessions
(Exhibits open 10:00 am - 5:00 pm)

12:30 pm Keynote Luncheon "International Linkage on Energy and the Environment"

The newly created AEE Chapters are recognized.

2:30 pm Departure for the airport for Delta 850 flight to Washington National (departure at 5:03 pm; arrival at 6:45 pm)

Briefing on DC activities. Check-in at the Best-Western Rosslyn.

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Best Western - Rosslyn Westpark Hotel
1900 N. Fort Myer Drive
Arlington VA 22209
Tel: 703-527-4814
Fax: 703-522-7480

Remainder of evening at leisure (Panoramic restaurant open on top of the hotel...)

Friday October 29, 1993

9:00 am	Meeting at RCG/Hagler, Bailly, Inc.
12:00 pm	Lunch on own in Rosslyn. Suggested locations: Red, Hot & Blue (Barbecue) Santa Fe Cafe (Mexican)
1:30 pm	Minibus meets delegation at RCG/Hagler, Bailly and transfers to U.S. State Department.
2:00 pm -	Meeting with Robert Archer, Deputy Chief, USAID, Bureau for Europe, Energy and Infrastructure Division
4:00 pm	Minibus meets delegation at State Department and transfers to Rosslyn Westpark Hotel for short rest break.
4:45 pm	Minibus meets delegation at Rosslyn Westpark Hotel and transfers to RCG/Hagler, Bailly.
5:00 pm- 7:30 pm	Reception hosted by RCG/Hagler, Bailly.

Remainder of evening at leisure

Saturday October 30, 1993

9:00 am - 4:30 pm	Organized sight-seeing in Washington DC
7:00 pm	Evening in town

Sunday October 31, 1993

Morning	Morning at leisure
2:00 pm - 4:00 pm	Departures for airports (Washington National and Dulles)

APPENDIX C

ELEMENTS OF WELCOME PACK

RCG/Hagler, Bailly, Inc.

1530 Wilson Boulevard ■ Suite 900
Arlington, VA 22209-2406
703/351 0300
Telex: 710-822-1150 ■ Fax: 703/351 0342

Welcome to the United States!

This packet includes information and resources that will be valuable to you during your visit to Atlanta and Washington, D.C. The following items are enclosed:

- An overall schedule for the duration of your visit in the United States.
- A list of the participants to this invitational travel.
- Program for the 16th World Energy Engineering Congress (final edition).
- Cash per diem which is to be used for meals and incidentals*. You must sign the attached form in order to verify that you received the money. Please return the signed form to Laurent Pommier as soon as possible.
- Invitations by RCG/Hagler, Bailly for...
  - -- Dinner at Dante's Down the Hatch on Wednesday evening
  - -- Reception in the office on Friday evening

Additional items will be distributed upon arrival in Washington.

If you have any questions regarding the enclosed materials, please ask Laurent Pommier.

* Following are a few details on the use of per diem cash:

- A number of meals will be prepaid (Monday: lunch and dinner; Tuesday: lunch; Wednesday: dinner; Thursday: lunch; Friday: evening reception).
- Most group local transportation will also be prepaid.
- Hotel rooms are prepaid. When checking-in at the Atlanta and Washington, D.C. hotels, you do not need to give cash or a credit card to guarantee room incidental expenses. However, you will be ask to reimburse Laurent Pommier for any room incidental expenses you might incur (telephone, food...)

In Honor of the Eastern European Energy Efficiency Market Development Delegation

RCG/Hagler Bailly, Inc.

is pleased to invite you for an evening at

Dante's Down the Hatch
60 Upper Alabama Street, S.W.
Atlanta, Georgia 30303
(404) 577-1800

8:00 pm
Wednesday, October 27, 1993

- Dinner
- Live Jazz

In Honor of the

Eastern European Energy Efficiency Market

Development Delegation

RCG/Hagler Bailly, Inc.

is pleased to invite you to a
reception in their office at

1530 Wilson Blvd., Suite 900
Arlington, VA 22209

5:00 pm
Friday, October 29, 1993

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APPENDIX D

AGENDA FOR MEETING AT GEORGIA POWER

Visit to Southern Company, Georgia Power/SEI
and
Dean Oliver & Associates

Agenda

October 25, 1993

European Country Delegation

10:00 AM - 11:15 AM — Presentation by Georgia Power Company on Energy Management Program

Topic and Presenters:

-Mr. Ed. Fischler - Manager of Power Marketing
Georgia Power Company

Discussion: Georgia Power Company's Commercial Energy Management Program

-Mr. Kim Berry - Sales Specialist - Retail Sales & Services
Georgia Power Company

Discussion: Georgia Power Company's Industrial Energy Management Program

-Mr. Arthur Skinner - Director, Services Division
SEI

Discussion: SEI/Southern Enterprises focus on Energy Management

11:15 - 11:45AM — Open Discussions: Understand the issues in European Countries, delegation feedback

11:45 - 1:00 PM — Lunch at Georgia Power Company (Executive Dining Room)

1:30 - 3:00 PM — Presentation by Dean Oliver & Associates

APPENDIX E

EXECUTIVE SUMMARIES OF PAPERS DISTRIBUTED BY GEORGIA POWER COMPANY DURING THE COMPANY PRESENTATIONS

Marketing Customer Energy Efficiency Products--
A Utility Perspective

Edward Fischler
Manager, Power Marketing, Georgia Power Company

Abstract

During the last decade--and especially the last several years--the phrases least cost planning, integrated resource planning, demand side management and transmission access have become part of the electric utility vocabulary. This paper discusses the evolution of the utility culture, developments in the restructuring of the electric utility industry and the implications for the relationship between utility companies and their customers.

The re-structuring of the electric utility industry reached a milestone with the Public Utility Holding Company Act of 1977. Since then, the evolution of the industry has been marked by steady changes. Another milestone is likely to occur with the eventual passage of the National Energy Strategy Act, which includes amendments to the Public Utility Holding Act. Other provisions of the act loosen utility control of the electrical transmission grid.

Utility involvement on the customer's side of the meter is increasing. Many utilities have accepted the responsibility of being the "agent of change" for energy efficiency and conservation. Proponents of demand side programs view the utility mission as one that provides energy services from total resource point of view. Utilities are being asked, if not told, to consider *societal* cost of the service being provided; not just the cost of electricity. This broader view of cost includes the cost of the devices which use electricity, the efficiency of the devices, and other customer specific factors. In some cases, this definition of cost is expanded to consider real, but difficult to quantify, impacts on the environment.

These trends should not be viewed in isolation. They could easily collide with catastrophic results for the utility. The trend to increased competition will force utilities to become more efficient, not just in their operation, but in a marketing and pricing sense. Demand side program practices that exacerbate rather than ameliorate market imperfections will only harm the utility company's competitive position and inefficiently allocate society's resources.

This need not happen. Utilities can become more precise in identifying similar and dissimilar customers and providing the appropriate services to each customer group at the appropriate price. Utility services, including demand side programs need to be structured and priced to efficiently satisfy customer needs while also satisfying the needs of society.

Utilities must view their demand side management activities in the context of a larger marketing mission and strategy. They must follow the methods of marketing products--energy services as well as energy--to customers who have need for and value their services. Utilities must minimize impacts on customers who have no need for their services.

Georgia Power Company
Pilot Demand Side Programs for the Commercial and Industrial Customers

Executive Summary

1 Summary

1.1 Introduction

On July 30, 1993, the Georgia Public Service Commission approved Georgia Power Company's proposed conservation and efficiency proposals for commercial and industrial customers. These proposals were in addition to the Company's Standby Generator Program, which allows the Company to use existing generators on customer sites, and the Interruptible Service rates. Both of these strategies have already been approved by the Commission.

These programs, along with the previously approved programs, are part of the implementation of Georgia Power Company' Integrated Resource Plan (IRP). The IRP is a plan that outlines how Georgia Power Company will provide for the future energy needs of its customers. It includes supply side alternatives, such as combustion turbines; demand side alternatives, such as energy efficiency and load management programs; and purchases of power from other utilities and suppliers.

1.2 Georgia Power's Demand-Side Strategy and Objectives

Georgia Power's commercial and industrial demand-side strategy focuses on reducing peak demand. This is the correct strategy because:

- The greatest need for generation expansion is for peaking capacity.
- By focusing on reducing peak demand, the Company reduces the need for peaking plants, significantly reducing the need for capital investment in these plants.
- Peak demand reduction is the most cost-efficient means of increasing efficiency on Georgia Power's system. In other words, Georgia Power customers receive the greatest benefit from peak reduction programs, while other programs have less of an impact.
- Reducing peak offsets the need for new peaking plants and increasing kilowatt-hour sales during off-peak periods lowers the company's cost per kilowatt-hour. As with any other manufacturing business, spreading fixed costs across a larger unit sales base lowers the cost-per-unit.

Georgia Power's strategy is to encourage its customers to use the company's energy resources more efficiently, ensuring an adequate and reliable supply of new energy for

new or growing businesses and industry. This strategy will ensure the state's economic security and a chance for its citizens to compete in the emerging global economy.

The *primary* objective of Georgia Power's commercial and industrial demand side activities is to reduce peak demand growth by making it easier for customers to purchase and install energy efficient equipment and modify energy use.

These programs enable Georgia Power to aggressively sell efficiency to all commercial and industrial customers while simultaneously reducing the peak demand for electricity.

Assisting customers in becoming energy efficient will lower their production costs and overheads. This will help customers compete more effectively in the global marketplace. Georgia Power will provide financing or cash incentives and energy engineering services. This will enable customers to select the energy efficiency measures that provide the most benefit to them. These programs offer customers important benefits, shown on Table 1:

Executive Summary: Table 1
Customer Benefits of the Commercial and Industrial Pilot Programs

Access to Capital	Financing or cash incentives will provide the incremental capital to purchase and install energy efficient equipment.
Quicker Payback	The incentives in the small business program shorten the payback period for energy measures. Financing of measures for larger customers provides cost reductions with no cash outlay.
Information	The programs provide information to customers about their energy options and the benefits and cost of the options.
Less Risk	Inspections assure equipment is installed and operating as designed.

1.3 Georgia Power's Programs for Commercial and Industrial Customers

These programs and their planned start-up dates are:

- Energy Analysis (start-up date October 1, 1994);
- Small Business Rebate Program (start-up will be between November 1, 1993 and January 4, 1994);
- Custom Lighting Program (start-up on January 4, 1994);
- Custom Financing Program for New Construction (start-up on January 4, 1994);

These programs, along with the Company's load management activities through its Interruptible Services rates and its Standby Generator Services Program, form a comprehensive demand side strategy for commercial and industrial customers. This strategy will have significant impact on the growth of peak demand. The Company estimates that these programs, along with the Interruptible Services riders and the Standby Generator Services Program, will avoid the need for 455 megawatts by 1995.

APPENDIX F

PRESENTATION BY DEAN OLIVER & ASSOCIATES ON PROCESS ENERGY REDUCTION

DEAN OLIVER & ASSOCIATES
ENGINEERING CONSULTANTS

To: Members of the Eastern European Energy Delegation

From: Members of Dean Oliver

We were pleased and honored to be invited by RCG/Hagler Bailly to assist in your visit to the United States. We hope the consulting business information provided by our president, Richard (Rick) Watkins and the technical information presented by Paul Wilson and Walter Lowthian will be helpful to you. Please feel free to contact any of us with questions or for assistance.

Enclosed are two brochures concerning Dean Oliver. In brief, we are a multi-discipline engineering and consulting firm working primarily in industry, mostly the process industries.

Also enclosed are four papers we hope are useful:

- "CADD Active Flowsheets" presented at the15th World Energy Engineering Congress by Paul Wilson
- "Process Energy Reduction" by Paul Wilson
- "Process Energy Cost Reduction" presented at the12th World Energy Engineering Congress by Walt Lowthian
- "Process Energy Reduction" presented at the 15th World Energy Engineering Congress by Walt Lowthian

We hope your visit has been pleasant and information. Best of luck in your endeavors at home.

3005 Breckinridge Blvd. • Suite 240 • Duluth, Georgia 30136 • (404) 279-0505

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PURPOSE OF ENERGY

1. PROVIDE THE POWER AND THERMAL ENERGY TO RUN THE PROCESS OR MANUFACTURING

2. PROVIDE LIGHT AND COMFORT FOR OPERATORS TO RUN THE PROCESS OR MANUFACTURING

3. PROVIDE THE POWER AND THERMAL ENERGY FOR THE UNITLITIES (E.G COMPRESSED AIR) TO RUN THE PROCESS OR MANUFACTURING

ENERGY PATHS AT AN INDUSTRIAL SITE

ENERGY CATEGORY	THERMAL	ELECTRICAL
PURCHASE	COAL GAS OIL WOOD ETC.	COAL GAS OR OIL DIRECT WOOD PURCHASE ETC.
CONVERSION	BOILER - STEAM FURNACE - HOT GAS - HOT OIL	BOILER OR TURBINE NONE GENERATOR
DISTRIBUTION	PIPING VALVES REDUCTING STATIONS	CABLE TRANSFORMER SWITCH GEAR SWITCH GEAR
USE	HEATING MECHANICAL (SOME)	MECHANICAL HEAT (SOME)
DISPOSAL	COOLING WATER COOLING TOWERS AIR COOLERS HVAC	DISSIPATION HVAC - CONTROLS - WORK SPACE

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(13)

U.S. INDUSTRIAL
ENERGY COST REDUCTION

ENERGY CATEGORY	THERMAL	ELECTRICAL
PURCHASE	PURCHASE CONTRACTS SPECIAL PURCHASING FUEL SUBSTITUTION	RATE STRUCTURE - CHANGE - SYSTEM CONFORMANCE CO-GENERATION
CONVERSION	BETTER CONTROL HEAT RECOVERY CONSERVATION	POWER FACTOR ADJUSTMENT ENERGY EFFICIENT TRANSFORMERS
DISTRIBUTION	INSULATION CONDENSATE RETURN	DEMAND CONTROL
USE	OPTIMIZATION CASCADE EXCHANGER NETWORKING	ENERGY EFFICIENT MOTORS ENERGY EFFICIENT LIGHTING
DISPOSAL	HEAT RECOVERY	PRESSURE LETDOWN RECOVERY

METHODS TO REDUCE ENERGY COST

1. REDUCE PURCHASE PRICE
2. IMPROVE CONVERSION EFFICIENCIES
3. CONSERVE IN DISTRIBUTION AND USE
4. RECOVER AND RECYCLE

start with: 5. **P**ROCESS **E**NERGY **R**EDUCTION

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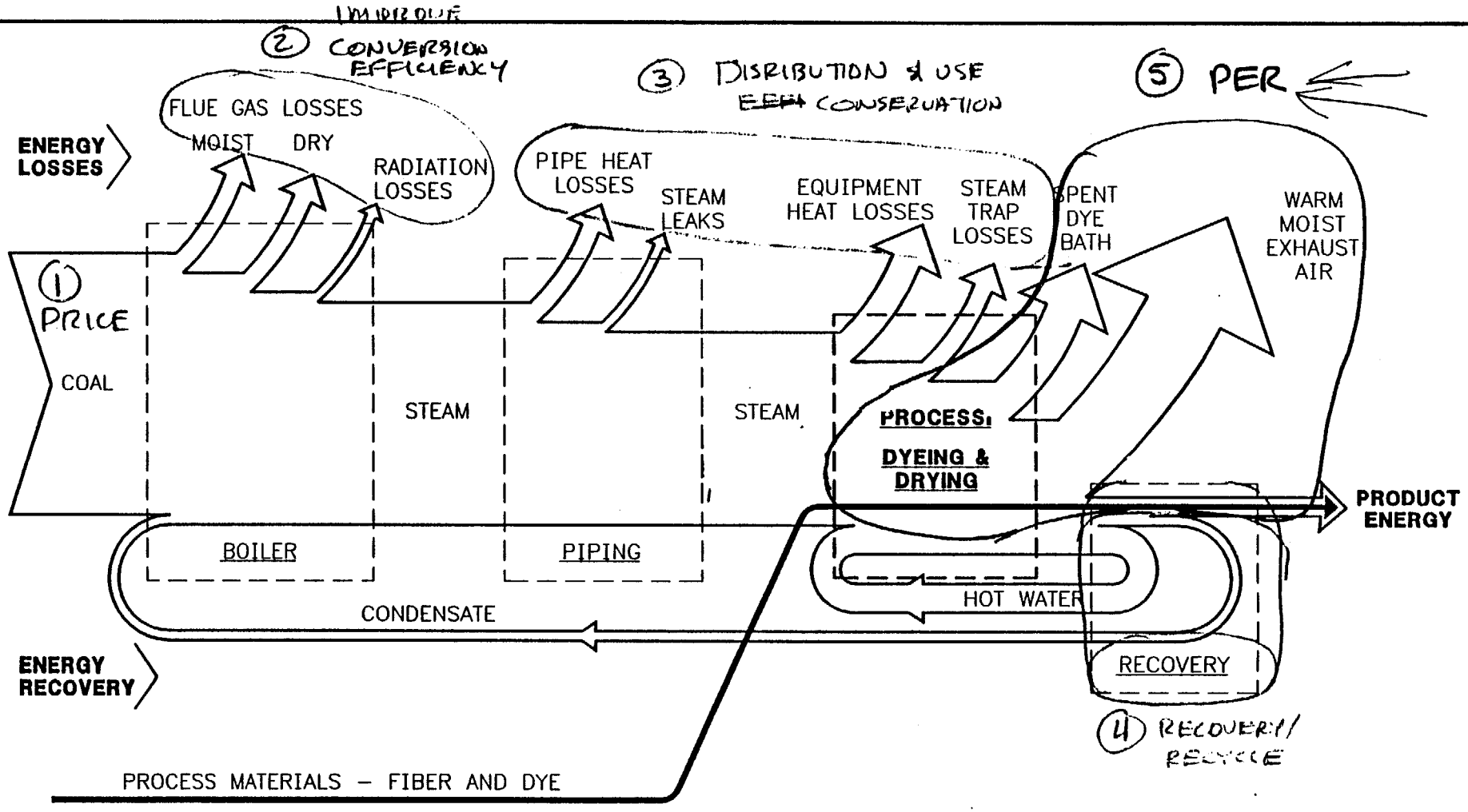


ENERGY INPUT	ENERGY CONVERSION	ENERGY TRANSPORT	*PROCESS ENERGY*	ENERGY RECYCLE	PRODUCT ENERGY
(SUPPLY)	(SUPPLY)	(SUPPLY)	*(DEMAND)*	(SUPPLY)	(FUNCTION)

TEXTILE FIBER

TRADITIONAL DYE INS OPERATION

ENERGY FLOW: SUPPLY → DEMAND → FUNCTION

1261DYE

SUPPLY SIDE STRATEGIES

1. PRICE

2. CONVERSION EFFICIENCY

3. DISTRIBUTION EFFICIENCY

4. RECOVERY/RECYCLE

- REDUCE THE COST OF ENERGY DELIVERED TO THE PROCESS

- TYPICALLY GOOD FOR A 5-30% REDUCTION

interface between supply and demand is not at meter but at equip't

PER

IS A
DEMAND SIDE STRATEGY

- 30-100% REDUCTION
- SOMETIMES PRODUCES ENERGY
- USUALLY REDUCES REQUIRED ~~CAN ELIMINATE MOST~~ SUPPLY SIDE ATTENTION

PER DEMAND: PUMPING

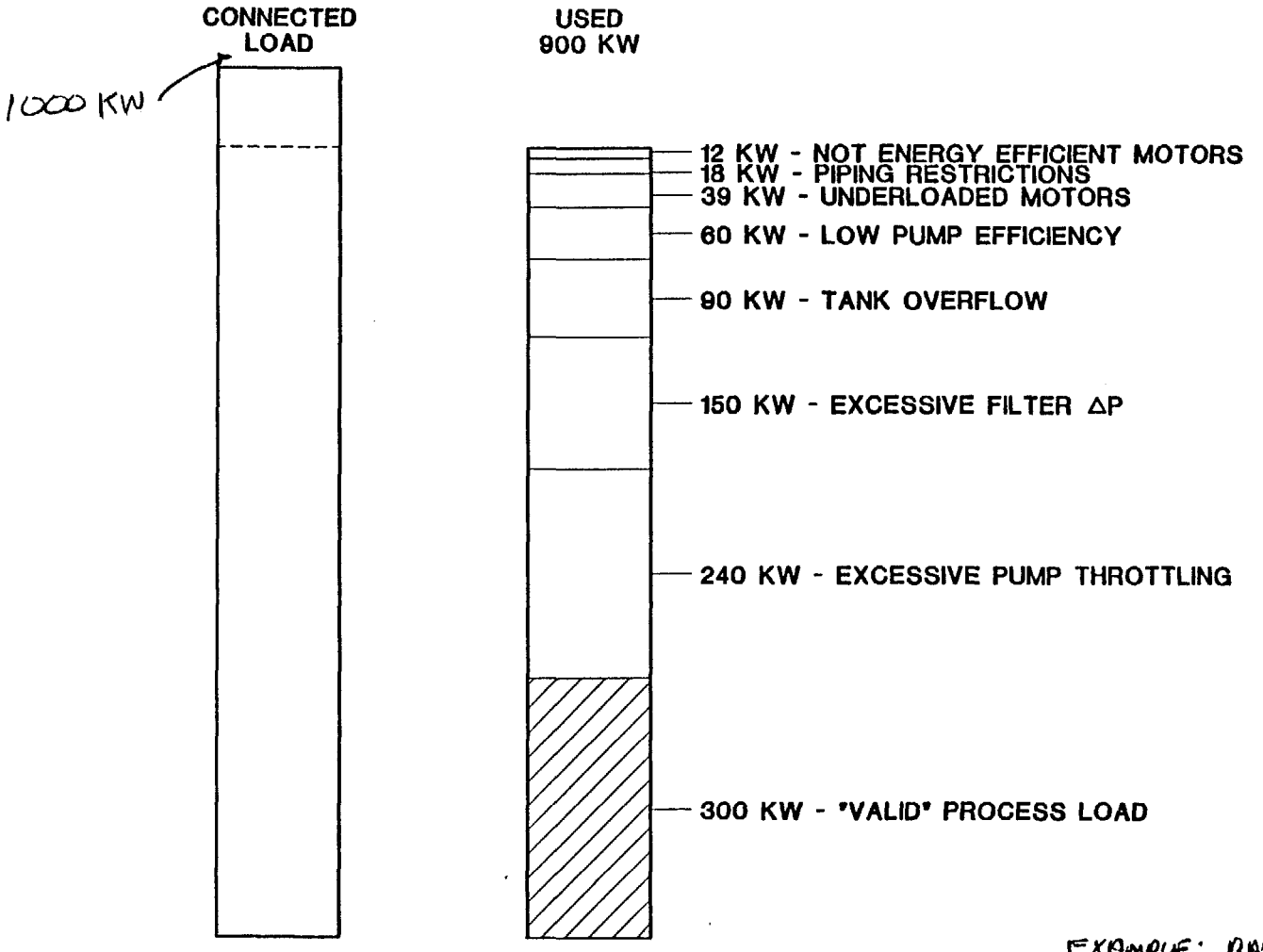
ELECTRICITY
↳ MOTOR
↳ PUMP SHAFT
↳ IMPELLER
↳ FLUID PRESSURE
FLUID FLOW
↳ • WHY IS THE PRESSURE SO HIGH?
• CAN THE FLOW BE REDUCED?
• WHY ARE WE PUMPING THIS STUFF ANYWAY?

• WHAT IS THE FUNCTION WE'RE TRYING TO ACHIEVE?

NOW WE'RE LOOKING AT **PER** DEMAND.

PER DEMAND: PUMPING LOAD

EXAMPLE: ACID RECOVERY PROCESS PUMPING



1261PER5

EXAMPLE: RAYON ACID RECOVERY PUMPIN

(24)

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PER DEMAND: HEATING

COAL
↪ STEAM
↪ HEAT EXCHANGER
↪ FLUID HEATING
↪DISTILLATION
↪ "PURE" COMPONENT
↪ • HOW PURE?
• IS THERE ANOTHER WAY TO PURIFY?
• WHAT'S THE PRODUCT FOR?

• WHAT FUNCTION ARE WE TRYING TO ACHIEVE?

NOW WE'RE LOOKING AT PER DEMAND

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SYSTEM-PROCESS-FUNCTION

SYSTEM - THE COLLECTION OF EQUIPMENT, PIPING, CONTROLS, ETC. WHICH CONTAINS AND CONTROLS THE PROCESS....THE HARDWARE.

WHAT HAPPENS INSIDE THE SYSTEM....

PROCESS - THE METHODS AND CONDITIONS USED TO ACHIEVE A RESULT OR FUNCTION.

FUNCTION - THE PURPOSE OR RESULT OF THE SYSTEM & PROCESS

SYSTEM - PROCESS - FUNCTION

SYSTEM	← CONTAINS THE	PROCESS	USING	ENERGY	← TO ACHIEVE A	FUNCTION
OVEN		BAKING BREAD		HEAT		TASTY FOOD
STILL		DISTILL ALCOHOL		HEAT		WHISKEY
AIR CONDITIONER		COOLING A ROOM		ELECTRICITY		COMFORT
LIGHTING		ILLUMINATING A MALL		ELECTRICITY		DISPLAY
WASHER		CLEANING PARTS		ELECTRICITY & HEAT		HIGH QUALITY
BOILER		MAKING STEAM		HEAT		STEAM

THE SYSTEM GENERALLY CONTAINS THE PROCESS AND APPLIES OR CONTROLS ENERGY TO MAKE THE "PROCESS "GO"" TO ACHIEVE THE DESIRED END, RESULT, OR FUNCTION.

PER FOCUS

FIRST: WHAT IS THE DESIRED RESULT OR FUNCTION OF THE SYSTEM/PROCESS?

SECOND: CAN THE *PROCESS* (I AM USING OR PLAN TO USE) BE IMPROVED?

THIRD: CAN THE *SYSTEM* (I HAVE OR PLAN TO USE) BE IMPROVED?

SYSTEM - PROCESS - FUNCTION

SYSTEM	PROCESS	FUNCTION
CHEMICAL PLANT	CHEMICAL REACTIONS & UNIT OPERATIONS	• SALEABLE PRODUCT
OFFICE	WORK	• PLANT DESIGN • ADVERTISING • INSURANCE PAYMENTS • ETC.
TRANSPORTATION SYSTEM • CARS, TRUCKS, PLANES, TRAINS, ETC. • HIGHWAYS • AIRPORTS, TRACKS, ETC	TRANSPORTING GOODS & PEOPLE	• THINGS WHERE YOU WANT THEM, WHEN YOU WANT THEM • PRODUCTION OF GOODS • COMFORTS • IDEA EXCHANGE • INTIMACY • FUN
COMPUTER/SOFTWARE	MAGIC ELECTRONS	• REPORTS • CALCULATIONS • GRAPHICS • ETC

WHAT'S WRONG WITH TRADITIONAL ENERGY AUDITS?

- STARTS AT THE WRONG END OF THE ENERGY CONDUIT
- FOCUS IS ON SYSTEM TARGETS
- RARELY TOUCHES THE PROCESS
- NEVER ASKS:

  1) WHAT IS THE FUNCTION OF THE ENERGY?
  2) WHAT IS THE FUNCTION OF THE SYSTEM?
  3) WHAT IS THE FUNCTION OF THE PROCESS?
  4) HOW CAN WE ACHIEVE THE SAME OR BETTER FUNCTION WITH LESS ENERGY?

- EASY TO GET BUSY WITH SYSTEM PROJECTS

APPENDIX G

AGENDA FOR ASSOCIATION OF ENERGY ENGINEERS CHAPTER LEADERSHIP MEETING

Association of Energy Engineers®

AGENDA
CHAPTER LEADERSHIP MEETING
October 25, 1993, 4-5:30 p.m.
Georgia World Congress Center
West Concourse, Room 260

4:00-4:05 p.m.	Welcome - MaryAnne Lauderdale, President
4:05-4:25 p.m.	*Marketing Your Chapter* MaryAnne Lauderdale, President
4:25-4:35 p.m.	*Innovative Programs of the DC Chapter* Larry Good, DC Chapter President
4:35-4:45 p.m.	*The Atlanta Chapter: Success the Second Time Around* Paul Conlan, Atlanta Chapter President
4:45-4:55 p.m.	*Problems and Pitfalls to Avoid in Sustaining Chapter Momentum* Ken Kogut, Illiana Chapter President
4:55-5:00 p.m.	Chapter Administration - Romay Rupnow
5:00-5:30 p.m.	Chapter Forum

4025 Pleasantdale Road, Suite 420 • Atlanta, Georgia 30340 • (404) 447-5083 • Fax (404) 446-3969

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APPENDIX H

PROGRAM FOR THE 16TH WORLD ENERGY ENGINEERING CONGRESS

THE WHITE HOUSE

WASHINGTON

October 19, 1993

Greetings to everyone gathered in Atlanta, Georgia, for the Sixteenth Annual World Energy Engineering Conference.

The coming century will challenge our nation in many ways. Maintaining a safe, adequate energy supply and preserving our natural resources will become increasingly difficult. With your commitment to energy engineering excellence, you can help us to find innovative solutions to our energy problems.

This Conference will provide energy engineering professionals an opportunity to build important relationships and exchange new ideas and information. With the skills, knowledge, and help of energy engineers like you, we can develop alternative energy sources, promote conservation, reduce our dependence on foreign oil, and continue to work toward an environmentally and economically sustainable energy future. With your commitment to helping our world meet its energy needs, we can ensure that our descendants will enjoy a more prosperous future.

Best wishes for a productive conference.

Bill Clinton

THE ENVIRONMENTAL TECHNOLOGY EXPO

CONFERENCE AND EXPOSITION

16th World Energy Engineering Congress

WEEC®

OCTOBER 26-28, 1993
GEORGIA WORLD CONGRESS CENTER
ATLANTA, GEORGIA

WELCOME

The year 1993 marks a new feature to the World Energy Engineering Congress (WEEC) with the addition of the companion Environmental Technology Conference & Expo (ETE). The combined WEEC and ETE represent the most comprehensive conference and exposition to date. For the next 3½ days, the top energy and environmental professionals will be presenting technical and managerial papers on the latest developments and applications. Attendees can attend any session of the two concurrent programs. Since the sessions run concurrently, we suggest that you review this program as well as the companion proceedings. Please feel free to move to the speaker or session of greatest interest to you. Again, welcome to the WEEC and ETE!

PRESENTED BY: THE ASSOCIATION OF ENERGY ENGINEERS® • THE COGENERATION & COMPETITVE POWER INSTITUTE OF AEE • THE DEMAND-SIDE MANAGEMENT SOCIETY OF AEE • THE ENVIRONMENTAL ENGINEERS & MANAGERS INSTITUTE OF AEE

WEEC COSPONSORED BY: Electric Power Research Institute • Georgia Office of Energy Resources • The Alliance To Save Energy • U.S. Environmental Protection Agency: Green Lights Program • U.S. General Services Administration • U.S. Department of Energy: Institutional Conservation Programs • U.S. Department of Energy: State Energy Programs

ETE COSPONSORED BY: National Registry of Environmental Professionals • *Pollution Engineering* Magazine • U. S. Environmental Protection Agency: Region IV

Your participation and support of the WEEC & ETE are greatly appreciated!

PROGRAM

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SPECIAL EVENTS

AEE AWARDS BANQUET AND RECEPTION

MONDAY, OCTOBER 25
Georgia World Congress Center
Galleria Ballroom IV
Reception 6:30 p.m.
Awards Banquet 7:30 p.m.
Reception sponsored by Johnson Controls, Inc.

TUESDAY, OCTOBER 26
Opening Ceremonies, Special Presentations by: **Frank Stewart,** U.S. Department of Energy; **Henry A. Courtright, P.E.,** Director, Customer Systems Division, Electric Power Research Institute; and **William A. Nitze,** President, The Alliance To Save Energy.
8:45 - 11:10 a.m. - Auditorium East Concourse

TUESDAY, OCTOBER 26
Luncheon in Exhibit Hall - 11:30 a.m.

WEDNESDAY, OCTOBER 27
Guest Tour 10:00 a.m. - 3:00 p.m.

THURSDAY, OCTOBER 28
Keynote Luncheon, guest speaker, **William U. Chandler,** Director, Advanced International Studies Unit, Battelle Pacific Northwest Laboratories
12:30 p.m. - Room 314

CONTINUING EDUCATION SEMINARS

MONDAY, October 25, 9:00 a.m. - 5:00 p.m.

#521 Building Energy Management – **Room 260**

#522 Environmental Business Markets – **Room 261**

#523 Impact of the Energy Policy Act – **Room 262**

#524 Motor Applications: Efficiency Improvement & Testing – **Room 263**

#525 Refrigeration CFCs: Recovery, Reuse, Alternatives & New Legislation – **Room 264**

#526 Simple Solutions to Energy Calculations – **Room 265/266**

#527 Realities of Lighting Retrofits – **Room 267**

#528 Waste Heat Boilers – **Room 268**

WEDNESDAY, October 27, 9:00 a.m. - 5:00 p.m.

#529 NREP Professional Certification Program: Registered Environmental Manager, Certified Environmental Auditor and Registered Environmental Property Assessor (Day 1) – **Room 201**

THURSDAY, October 28, 9:00 a.m. - 5:00 p.m.

#529 NREP Professional Certification Program & Exam (Day 2) – **Room 201**

(Separate Registration)

REGISTRATION HOURS

Monday:	8:00 -10:00 a.m. (Seminars Only)
	11:00 a.m. - 5:00 p.m.
Tuesday:	7:00 a.m. - 5:00 p.m.
Wednesday:	8:00 a.m. - 5:00 p.m.
Thursday:	8:00 a.m. - 12:30 p.m.

EXPOSITION - HALL G

Be sure to allow time to examine the latest in energy efficient and pollution control products on display the following hours:

Tuesday & Wednesday – 10:00 a.m. - 5:00 p.m.
Thursday – 9:00 a.m. - 12:30 p.m.

(To expedite your requests to WEEC exhibitors for information to be mailed to your company, please use your ENERGY EXPRESS CARD.)

SPEAKER / PRESS - Room 262

POWDEX '93 – ATLANTA – HALL H

PAINT INDUSTRIES – HALL E & F

As an attendee of the WEEC & ETE, you are invited to visit POWDEX '93 and Paint Industries exhibits at no extra charge. This is your opportunity to visit two premier shows:

POWDEX '93
Tuesday, Wednesday & Thursday
10:00 a.m. - 3:00 p.m.

PAINT INDUSTRIES
Wednesday – 12:00 noon - 5:00 p.m.
Thursday – 9:00 a.m. - 5:00 p.m.
Friday – 9:00 a.m. - 12:00 noon

THE WEEK AT-A-GLANCE

ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

16TH WORLD ENERGY ENGINEERING CONGRESS

	A	B	C	D	E	F	G	H	I	J	K
TUESDAY, OCTOBER 26 — CONCURRENT AFTERNOON TECHNICAL SESSIONS: 2:30-5:10 p.m.	Clean Air Act Amendments Take Hold	Pollution Prevention	Update on Solid/Hazardous Waste Regulations	Environmental Business Development	DSM Applications I	Competing in the Wholesale Power Markets: The Key Regulatory Developments	Effective Energy Management	Lighting Efficiency Improvement	Federal Energy Management	National Energy Policy Act	Natural Gas Procurement Strategies and FERC Order 636
WEDNESDAY, OCTOBER 27 — CONCURRENT MORNING TECHNICAL SESSIONS: 9:00-11:40 a.m.	Title I — Clean Air Act and Boilers	Toxicity in Industrial Wastewater Discharge	Hazardous and Solid Waste Management	CFCs	DSM Applications II	PUHCA and Electric Transmission	International Energy Opportunities	Upgrading Lighting Systems for Efficiency Improvement	Energy Conservation in Federal Buildings I	HVAC System Optimization I	Performance Contracting
WEDNESDAY, OCTOBER 27 — CONCURRENT AFTERNOON TECHNICAL SESSIONS: 2:30-5:10 p.m.	Allowance Trading	Industrial Storm Water Management	Industrial Waste Minimization	Alternative Fuel Vehicles	DSM — Bidding and Planning	Cogeneration Update	Energy Management I	Structuring Lighting Retrofit Projects for Success	Energy Conservation in Federal Buildings II	Thermal Energy Storage Applications	Direct Digital Controls
THURSDAY, OCTOBER 28 — CONCURRENT MORNING TECHNICAL SESSIONS: 9:00-11:40 a.m.	Improving Indoor Air Quality	Resource Conservation and Recovery	Environmental Management	Global Warming	Verification of Savings — DSM	Power Generation	Energy Management II	Variable Speed Drives/Chilled Water Systems	DOD Energy Utilization	HVAC System Optimization II	Renewable Energy Applications

CONGRESS SCHEDULE

MONDAY, OCTOBER 25, 1993

Continuing Education Seminars
9:00 a.m. - 5:00 p.m.
(See page 2 for details)

AEE BANQUET and RECEPTION
Reception sponsored by
Johnson Controls, Inc.: 6:30 p.m.
Dinner: 7:30 p.m.
Georgia World Congress Center
Ballroom IV

Press Releases - Room 262

Some papers not included in the proceedings are available at the registration desk.

Numbers by sessions indicate the chapter in proceedings.

TUESDAY, OCTOBER 26, 1993

Keynote Opening Ceremonies
8:45-11:10 a.m. Auditorium

Chair: George Kritzler
President-Elect of AEE, Consolidated Edison of NY, New York, NY

8:45-9:15 a.m. **283rd Army Band,** Ft. Benning, GA

9:15-9:20 a.m. **Welcome**
Albert Thumann, P.E., CEM, CLEP, Executive Director, Association of Energy Engineers, Atlanta, GA

9:20-10:00 a.m. **The Implementation of the Energy Policy Act**
Frank Stewart
U.S. Department of Energy, Washington, DC

10:00-10:40 a.m. **New Electric & Transportation Technologies for the 21st Century, Henry A. Courtright, P.E.,** Director, Customer Systems Division, Electric Power Research Institute

10:40-11:10 a.m. **The Impact of Possible New Taxes on Energy & Global Warming, William A. Nitze,** President, The Alliance To Save Energy, Washington, DC

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Tuesday Afternoon – October 26, 1993

ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

WORLD ENERGY ENGINEERING CONGRESS

Room 202 - East Concourse	Room 203 - East Concourse	Room 204 - East Concourse	Room 205 - East Concourse	Room 260 - West Concourse
• *2:30–3:10 p.m.* **Clean Air Act Amendments: Overview and Update (#1)** WAYNE C. TURNER, Ph.D., Professor, and REGI HYRE, Oklahoma State University	• *2:30–3:10 p.m.* **Overview of Perspectives on Pollution Prevention** TOM NESSMITH, U.S. Environmental Protection Agency Region IV	• *2:30–3:10 p.m.* **RCRA Regulatory Developments (#4)** A. JEAN TOLMAN, Attorney at Law, Arnall, Golden & Gregory	• *2:30–3:10 p.m.* **Strategic Overview of the Environmental Market** GRANT FERRIER, Publisher and Editor, *Environmental Business Journal*	• *2:30–3:10 p.m.* **Lessons from the Trenches—Niagara Mohawk's Commercial/ Industrial Energy Survey Program (#99)** THOMAS C. VOIGT, Chief Eng., CSU-Bakersfield
• *3:10–3:50 p.m.* **Regulation of Hazardous Air Pollutants Emitted from Fossil-Fired Boilers (#2)** PAUL HENDRICKSON, Battelle Pacific Northwest Laboratory	• *3:10–3:50 p.m.* **Overview of Federal Perspectives** CAROL MONELL, Chief, Pollution Prevention Unit, U.S. Environmental Protection Agency Region IV	• *3:10–3:50 p.m.* **Corrective Action Management Units (CAMUs) (#5)** ROBERT J. PULFREY, PG, Project Scientist, Environmental Science & Engineering, Inc.	• *3:10–3:50 p.m.* **Market Assessment: Demand for Innovative Treatment Technologies** LINDA FIEDLER, Environmental Eng., Tech. Innovation Office, U.S. Environmental Protection Agency	• *3:10–3:50 p.m.* **Moving the Industrial Motor Market: Development and Performance of BG&Es Efficient Motor Rebate (#100)** BARRY HEDDEN, Progra Admin., and CRISTINA P PACKARD, DSM Analyst Baltimore Gas & Electric
• *3:50–4:30 p.m.* **Permitting under the New Clean Air Act** THOMAS LACKI, Research Associate, Oklahoma State University	• *3:50–4:30 p.m.* **Pollution Prevention—A State Perspective** J. ROBERT DONAGHUE, Project Dir., Georgia Hazardous Waste Management Authority, State of Georgia	• *3:50–4:30 p.m.* **Regulatory Policies in Monitoring DNAPL and Other Contamination in Fractured Rock Formations** RAM ARORA, Ph.D., PG, President, Hydrovision, Inc.	• *3:50–4:30 p.m.* **Doing Environmental Business with Mexico** ELAINA ESPINOSA, Trade Commission of Mexico	• *3:50–4:30 p.m.* **Equipment Efficiency Levels for Utility Rebates—What Are the Right Ones? (#101)** DENIS NADAS, Energy Technical Specialist, New York State Energy Office
• *4:30–5:10 p.m.* **Phaseout of CFC Usage in Industrial Refrigeration Equipment (#3)** BILL SULLIVAN, P.E., and BOBBY G. BEACH, P.E., Enercon Services, Inc.	• *4:30–5:10 p.m.* **Pollution Prevention—What Does It All Mean?** BOB KERR, Dir. of Georgia Pollution Prevention, Assistant Div.	• *4:30–5:10 p.m.* **Solid Waste Management Trends** RICHARD WHEELER, P.E., Sr. Eng., Environmental Science & Engineering, Inc.	• *4:30–5:10 p.m.* **Billion-Dollar Environmental Projects and Programs (#6)** TERRI C. WALKER, Vice President, and RICHARD K. MILLER, CEM, President, Richard K. Miller & Associates, Inc.	• *4:30–5:10 p.m.* **Reducing Transmission & Distribution Costs with DSM: Five Questions You Should Ask** GARY McDONALD, Sr. Eng., A&C Enercom, Inc.

EXHIBIT HOURS **10:00 a.m.—5:00 p.m.**

WEEC / ETE PROCEEDINGS

To purchase extra copies of the proceedings, stop at the registration desk after 10:00 a.m. on Thursday.

NOTE: NUMBERS IN PARENTHESES FOLLOWING PRESENTATION TITLES INDICATE CHAPTER NUMBER IN BOUND PROCEEDINGS.

WEEC

F COMPETING IN THE WHOLESALE POWER MARKETS: THE KEY REGULATORY DEVELOPMENTS Chair: ROGER D. FELDMAN, P.C., Partner, McDermott, Will & Emery	G EFFECTIVE ENERGY MANAGEMENT Chair: WILLIAM H. MASHBURN, P.E., Professor, Mechanical Engineering Dept., Virginia Polytechnic Institute	H LIGHTING EFFICIENCY IMPROVEMENT Chair: KIM L. BERRY, CEM, Marketing Field Dir., Georgia Power	I FEDERAL ENERGY MANAGEMENT Chair: DONALD F. FOURNIER, Team Leader, U.S. Army Construction Engineering Research Lab	J NATIONAL ENERGY POLICY ACT Chair: MARK HOPKINS, Dir. of Corporate Relations, The Alliance To Save Energy	K NATURAL GAS PROCUREMENT STRATEGIES AND ORDER 636 Chair: RON SMITH, Staff Eng., Energy Section, General Motors
Room 261 - West Concourse	Room 264- West Concourse	Room 265/266 - West Concourse	Room 267 - West Concourse	Room 268 - West Concourse	Room 269- West Concourse
2:30–3:10 p.m. State PURPA Preceedings: Effects on Competition (#78) ROGER D. FELDMAN, P.C.	• 2:30–3:10 p.m. **Effective Energy Technologies Used by Utilities As Part of Their DSM and Rebate Programs** WALTER JOHNSTON, P.E., CEM, CCP, Energy/EM Program Mgr., Industrial Extension Service, North Carolina State University and THOMAS D. MULL, P.E., CEM, CLEP, President, Carolina Consulting Group	• 2:30–3:10 p.m. **Ultraviolet Light Output from High-Efficiency Light Sources: Concerns, Field Measurements and Analysis** LINDSAY AUDIN, CEM, CLEP, IES, Mgr., Energy Conservation, Columbia University	• 2:30–3:10 p.m. **Energy Conservation Technology Selection: An Agent-Based Approach (#87)** LEE DeBAILLIE, Associate Investigator, U.S. Army Construction Engineering Research Lab	• 2:30–3:00 p.m. **Equipment Efficiency Standards in the 1992 Energy Policy Act** HOWARD GELLER, Executive Dir., American Council for an Energy Efficient Economy • 3:00–3:30 p.m. **Federal Energy Management Provisions in the Energy Policy Act** GLEN SKOVHOLT, Vice President, National & International Affairs, Honeywell, Inc.	• 2:30–3:10 p.m. **Competitive Implications of FERC Order 636** STERLING SMITH, Council, Sotheriand Asbill Brennan
3:10–3:50 p.m. Integrated Resource Planning: Effects on Regulation and Competitive Markets PETER SPINNEY, Charles River Asociates, Inc.	• 3:10–3:50 p.m. **Auditing Cost Avoidance Using Energy Accounting Software** STEVEN D. HEINZ, President, OmniComp	• 3:10–3:50 p.m. **Relighting Program—Furman University, Greenville, SC (#54)** PHILL SIMPSON, Energy Eng., Furman University	• 3:10–3:50 p.m. **Establishing a Money-Saving Energy Management Program at a DOD Research Facility (#88)** G. ROBERT KELLEY, P.E., Head, Water & Energy Mgmt. Branch, MICHAEL W. DELURY, CEM, and MICHAEL E. AGUDO, P.E., Naval Surface Warfare Center	• 3:30–4:00 p.m. **Buildings and State and Local Programs** JEFF GENZER, Counsel to National Assoc. of State Energy Officials, Duncan, Weinberg, Miller & Pembroke	• 3:10–3:50 p.m. **Natural Gas Purchasing Strategies As Affected FERC Order 636** RICHARD GAFFNEY, JR., Sr. Energy Consultant, Strategic Energy Ltd.
3:50–4:30 p.m. EWG and QFs Making Choices and Working with the Rules JOHN SEELKE, President, Skyway Power Corporation	• 3:50–4:30 p.m. **EMS Data Collection and Analysis** MARK K. LaFOREST, Honeywell, Inc.	• 3:50–4:30 p.m. **Lighting Maintenance Practices That Save Energy (#55)** R. ARNOLD TUCKER, P.E., CEM, CLEP, Regional Lighting Eng., Osram Sylvania, Inc.	• 3:50–4:30 p.m. **Automated Utilities Damage Assessment (AUDA) System (#89)** REZA SALAVANI, GEORGE C. LAVENTURE, JR., Wright Laboratory	• 4:00–4:30 p.m. **Global Warming, Utility Provisions and Alternative Fuels** LESLIE BLACK CORDES, Professional Staff Member, Senate Energy and Natural Resources Committee	• 3:50–4:30 p.m. **The Gas Management Strategies after FERC Order 636 (#38)** GUY AUSMUS, Sr. Supply Mgr., Inland Steel Co.
4:30–5:10 p.m. Wholesale Ratemaking for EWGs (#79) TED SELGRADE, Partner, Tingnast, Collins & Graham	• 4:30–5:10 p.m. **Energy Conservation Projects—Putting It All Together (#37)** EDWARD VARNO, Mgr., Energy Services, Larsen Engineers	• 4:30–5:10 p.m. **Upgrading "Modern" Lighting Systems (#56)** DAVID J. BURKE, CEM, CLEP, Assistant Vice President, Facilities Eng., Dean Witter & Discover	• 4:30–5:10 p.m. **Federal Energy Decision Screening (FEDS) Process at Fort Drum, New York (#90)** DOUGLAS R. DIXON, Program Mgr., Pacific Northwest Laboratory	• 4:30–5:00 p.m. **Industrial Provisions and DOE Program Response** DENISE SWINK, Associate Deputy Assistant Secretary, U.S. Dept. of Energy	• 4:30–5:10 p.m. **The Challenges of FERC Order 636: How Does Ohio Respond?** J. MICHAEL BIDDISON, Commissioner, Public Utilities Commission of Ohio

LUNCHEON IN EXHIBIT HALL

TUESDAY, OCTOBER 26
GEORGIA WORLD CONGRESS CENTER
11:30 a.m.

Luncheon provided to conference attendees registered for full three-day conference.

Sponsored by
MagneTek and *Pollution Engineering* Magazine

ENVIRONMENTAL TECHNOLOGY EXPO

Wednesday Morning – October 27, 1993

ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

WORLD ENERGY ENGINEERING CONGRESS

A TITLE 1: CLEAN AIR ACT & BOILERS Chair: HARRY TAPLIN, P.E., CEM, President, BTU Consultants	B TOXICITY IN INDUSTRIAL WASTEWATER DISCHARGE Chair: WILLIAM W. CAMP, P.E., Principal, Hydroscience, Inc.	C HAZARDOUS & SOLID WASTE MANAGEMENT Chair: TIM GRIGG, CH2M Hill	D CFCs Chair: WALTER P. SMITH, Jr., Energy Technology Services Consulting	E DSM APPLICATIONS II Chair: PAUL E. CONLAN, CEM, CLEP, Group Vice President, A&C ENERCOM
Room 202 - East Concourse	Room 203 - East Concourse	Room 204 - East Concourse	Room 205 - East Concourse	Room 260 - West Concourse
• *9:00–9:40 a.m.* **Title IV Versus Title I: Potential NO_x Compliance Conflict for the Electric Power Industry** DAVID W. SOUTH, Program and Section Mgr., Argonne National Laboratory	• *9:00–9:40 a.m.* **Toxicity-Based Approaches and Methodologies for Developing Alternative Discharge Limits** RICHARD J. MIRENDA, Ph.D., Sr. Mgr., Aquatic Toxicity Group, Eckenfelder, Inc.	• *9:00–9:40 a.m.* **Can Hazardous Material Regulations Be Met in a Cost-Effective Manner? (#10)** REGINALD A. WILLIS, Vice President, Logical Technology, Inc.	• *9:00–9:40 a.m.* **Update on Refrigerant Issues: Accelerated Phaseout, Safety, and Refrigerant Management (#27)** BRUCE LINDSAY, Assistant Dir., EPRI Research Center, University of Wisconsin	• *9:00–9:40 a.m.* **The Three E Project—Integrating Environmental Efficiency and Electricity (#103)** PAUL E. CONLAN, CEM CLEP
• *9:40–10:20 a.m.* **Low NO_x Modification of a 200 MNBTU/MR Natural Gas-Fired Ring Burner** DAVID CZERNIAK, Carnot	• *9:40–10:20 a.m.* **A Site-Specific Water Quality Standard for a Textile Wastewater Discharge (#7)** ROBERT G. GROSS, P.E., Vice President, Hydroscience, Inc.	• *9:40–10:20 a.m.* **New ASTM Standards for Environmental Site Assessments (#11)** JAMES C. MAUCH, Vice President, VISTA Environmental Information, Inc.	• *9:40–10:20 a.m.* **Industrial Guidelines for CFC Use Phaseout: Decisions on Chiller Operations and Replacement during the Transition Period** NEIL FORTE, Utility Superintendent and GREGG HARRELL, Utility Eng., BASF Corp.	• *9:40–10:20 a.m.* **An Impact Evaluation of Mandatory Time-of-Use Rate Structures for Residential Electric Utility Users** MICHAEL P. GALLAHER, Sr. Economist, Research Triangle Institute
• *10:20–11:00 a.m.* **Minimizing Construction Disputes and Prudence Disallowances in Pollution Control Projects** JOHN C. PERSON, Lawyer, Newman & Holtzinger	• *10:20–11:00 a.m.* **Industrial Wastewater Toxicity Case Histories (#8)** SAM WHITE, Ph.D., RMT, Inc.	• *10:20–11:00 a.m.* **Operation Experience with Harbauer Soil Washing Plants** GROSVENOR (BUD) FISH, J.A. Jones Construction Services Co.	• *10:20–11:00 a.m.* **1. Performance and Efficiency Evaluations of Existing Non-CFC Refrigerants 2. Performance and Efficiency Evaluation of New Fluorinated Propanes, Butanes, and Ethers (#28) 3. Criteria for Evaluation of the Efficiency Improvements in Vapor Compression Cycles Using Internal Heat Exchange (#29)** DR. GEORGI S. KAZACHKI, Sr. Research Eng., Acurex Environmental Corp. and Dr. CYNTHIA L. GAGE, Sr. Project Eng., U.S. Environmental Protection Agency	• *10:20–11:00 a.m.* **From Demand-Side to Integrated Resource Planning: EPRI's DS-Manager and IRP-Manager Planning Models (#104)** MATHEW D. HAAKENSTAD, Vice President, Electric Power Software
• *11:00–11:40 a.m.* **Regulatory and Economic Flexibility for NO_x Control** RICHIE D. PICKENS, NALCO Fuel Technology	• *11:00–11:40 a.m.* **Effluent Diffuser Design for Wastewater Toxicity Control (#9)** YAN SEINER, P.E., Project Eng., Hydroscience, Inc.	• *11:00–11:40 a.m.* **Preparation of Liquid Fuels for Use at Cement Kilns from Solid and Semi-Solid Hazardous Waste Slurries (#12)** ROY R. SCOTT, Sales Mgr., Arde Baringo, Inc.	• *11:00–11:40 a.m.* **CFC Issues at a User's Point of View (#30)** CHANG W. SOHN, Ph.D., P.E. & KELLY HOMAN, U.S. Army Construction Engineering Research Laboratory and HENRY GIGNILLIAT, U.S. Army Installation Support Activity Center	• *11:00–11:40 a.m.* **HVAC Retirement: A New Demand-Side Management Strategy (#105)** JAY STEIN, E-Cube, Inc.

GUEST PROGRAM 10:00 a.m. - 3:00 p.m.

Meet Wednesday, October 27 in Room 273.

Coffee & rolls will be available at 9:00 AM. Tour will leave at 10:00 AM.

Take a bus ride through historic Stone Mountain Park and visit Memorial Hall. You may then choose two attractions for your enjoyment. Luncheon will be served at the Magnolia Tea Room and then on to Stone Mountain Village for shopping.

TICKETS ON SALE AT REGISTRATION DESK

NOTE: NUMBERS IN PARENTHESES FOLLOWING PRESENTATION TITLES INDICATE CHAPTER NUMBER IN BOUND PROCEEDINGS.

WEEC

F	G	H	I	J	K
PUHCA & ELECTRIC TRANSMISSION Chair: SCOTT SPIEWAK, Cogeneration & Resource Recovery	**INTERNATIONAL ENERGY OPPORTUNITIES** Chair: DAVID KEITH, RCG/ Hagler Bailly, Inc.	**UPGRADING LIGHTING SYSTEMS FOR EFFICIENCY IMPROVEMENT** Chair: NICOLAAS BLEEKER, Application Marketing Mgr., Philips Lighting Co.	**ENERGY CONSERVATION IN FEDERAL BUILDINGS I** Chair: DOUGLAS DECKER, P.E., Mgr., Government Affairs, Johnson Controls, Inc., Systems & Services Div.	**HVAC OPTIMIZATION I** Chair: FRANK SANTANGELO, Consultant	**PERFORMANCE CONTRACTING** Chair: SHIRLEY HANSEN, Ph.D., President, Hansen Associates, Inc.
Room 261 - West Concourse	Room 264- West Concourse	Room 265 266 - West Concourse	Room 267 - West Concourse	Room 268 - West Concourse	Room 269- West Concourse
• *9:00–9:30 a.m.* **International Transmission of Power** PHILLIP GENNARELLI, Vice President Marketing, Indeck Energy Services, Inc.	• *9:00–9:40 a.m.* **Vojany Station Reconstruction, Repowering and Expansion Assessment (#39)** JOE C. PEYTON, P.E., Project Eng., Southern Electric International	• *9:00–9:40 a.m.* **National Energy Policy Act—How It Can Affect Future Building Management Policies** ERIC A. DUNHAM, CEM, Chief/Energy Branch, General Services Administration	• *9:00–9:40 a.m.* **New Energy Directions** DOUGLAS DECKER, P.E.	• *9:00–9:40 a.m.* **Energy-Efficient Office Equipment: An Overview (#62)** LORETTA A. SMITH, Research Associate, American Council for an Energy-Efficient Economy	• *9:00–9:40 a.m.* **Managing the Risks of Performance Contracting (#42)** CHRISTOPHER KANE, P.E., Principal, ER3, Inc.
• *9:30–10:00 a.m.* **Market Pricing and Open Transmission Access** JOSEPH KUBACKI, Strategic Energy, Ltd.	• *9:40–10:20 a.m.* **Implementing Demand-Side Management through Integrated Resource Planning in Poland (#40)** JAROSLAW DYBOWSKI, Polish Power Grid Co.	• *9:40–10:20 a.m.* **Lighting Systems That Provide Energy Efficiency (#57)** GEORGE PRESTON, Dir./ Fluorescent Lamps, Philips Lighting Co.	• *9:40–10:20 a.m.* **Implementing Energy Performance Standards in Commercial and Federal Buildings (#91)** CARLOS S. WARREN, Ph.D., P.E., CLEP, Vice President, Energy Services, Reynolds, Smith and Hills, Inc.	• *9:40–10:20 a.m.* **The Retrofit of a Run-Around Loop for Economical Humidity Control in a Surgery Center (#63)** WILLIAM R. BECKWITH, President, Indoor Environment & Energy	• *9:40–10:20 a.m.* **Performance Contracting: A Global Perspective** THOMAS K. DREESSEN, President, Energy Performing Services
• *10:00–10:30 a.m.* **Tracking the Bulk Power Market (#80)** K[illegible]NUTSON, Vice P[illegible]nt, Resource Data International	• *10:20–11:00 a.m.* **Achieving Environmental Benefits with Industrial DSM Programs in Mexico (#41)** ING. SALVADOR HERRERA GONZALEZ, FIDE (Fund for Electric Energy Efficiency)	• *10:20–11:00 a.m.* **T8 Ballasts—Developing Efficient Alternatives** MICHAEL J. OSTAFFE, Mgr., Electronic Development, Advance Transformer Co.	• *10:20–11:00 a.m.* **Energy Resource Management in the Department of Defense** MILLARD E. CARR, P.E., Acting Dir. of Energy Policy, OASD (L) /MRM, The Pentagon	• *10:20–11:00 a.m.* **Evaporative/Vapor-Compression Hybrid Cooling in Three California Climates** GARY McDONALD, Sr. Eng., A&C ENERCOM, Inc.	• *10:20–11:00 a.m.* **Protecting the "Host" in Performance Contracting for DSM (#43)** SHIRLEY HANSEN, Ph.D.
• *10:30–11:00 a.m.* **Transmission Issues in Florida** JOHN SEELKE, President, Skyway Power Corp.					
• *11:00–11:30 a.m.* **The New England Regional Transmission Agreements** FRANK SABATINO, Vice President Marketing, NorthEast Utilities	• *11:00–11:40 a.m.* **International Markets for Energy Efficiency Products and Services** SUZANNE SMITH, RCG/ Hagler Bailly, Inc.	• *11:00–11:40 a.m.* **Successful HID Case Studies That Demonstrate Cost-Effectiveness** DAVID H. FINCH, I&C Lighting Specialist, Public Service Conservation Resource Corp.	• *11:00–11:40 a.m.* **Financing the Best Federal Projects (#92)** MARK GINSBERG, Dir., Federal Energy Management Program, U.S. Dept. of Energy	• *11:00–11:40 a.m.* **Ground-Source Heat Pumps: A Feasibility Study (#64)** HAMEED G. NEZHAD, Ph.D., Dir./Energy Research Institute, Moorehead State University	• *11:00–11:40 a.m.* **Performance Contracting across Market Sectors** TERRY SINGER, Executive Dir., National Association of Energy Service Companies
• *11:30–11:40 a.m.* **Questions & Answers**					

EXHIBIT HOURS 10:00 a.m.—5:00 p.m.

MEET YOUR COLLEAGUES

EXHIBIT HALL — HAPPY HOUR
TUESDAY & WEDNESDAY
1:00 - 5:00 p.m. (Cash Bar)

THE ENVIRONMENTAL TECHNOLOGY EXPO

Wednesday Afternoon – October 27, 1993

ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

WORLD ENERGY ENGINEERING CONGRESS

A	B	C	D	E
ALLOWANCE TRADING Chair: KENNETH J. KOGUT, CEM, Kenneth J. Kogut & Associates	**INDUSTRIAL STORM WATER MANAGEMENT** Chair: CHARLES E. BECK, Mgr., Regulatory Affairs, Kemron Environmental Services	**INDUSTRIAL WASTE MINIMIZATION** Chair: PATRICIA ROSE, Energy Conservation Specialist, U.S. Dept. of Energy, State Energy Programs	**ALTERNATIVE FUEL VEHICLES** Chair: LEONARD PARENT, Publisher, *The Gas Price Report*	**DSM BIDDING & PLANNING** Chair: MARYANNE LAUDERDALE, P.E., CEM Group Mgr., Energy Investment, Inc.
Room 202 - East Concourse	Room 203 - East Concourse	Room 204 - East Concourse	Room 205 - East Concourse	Room 260 - West Concourse
• *2:30–3:10 p.m.* **Managing Emission Allowance Inventories** ALAN S. TAYLOR, Sr. Associate, Utility Services Group, RCG/Hagler Bailly, Inc.	• *2:30–3:10 p.m.* **Management of Storm Water Runoff from Uncontrolled Hazardous Waste Sites (#14)** WILLIAM E. NORTON, P.E., Westinghouse Remediation Services, Inc.	• *2:30–3:10 p.m.* **DOE's Industrial Waste Reduction Program—More Jobs, Less Waste, Less Energy** BRUCE CRANFORD, JR., P.E., Program Mgr., Office of Industrial Technologies, U.S. Dept. of Energy	• *2:30–3:10 p.m.* **Impact of Driving Trends in Automobile Fuel Efficiency (#21)** IVAN VERA, Project Mgr., Decision Analysis Corp. of Virginia	• *2:30–3:10 p.m.* **Designing Competitive Procurement Systems for Demand-Side Resources (#106)** JOHN C. DALTON, Sr. Consultant, Reed Consulting Group
• *3:10–3:50 p.m.* **An Overview of the SO_2 Allowance Market (#13)** JEFFREY CAMPBELL, Assoc. Educ. & Mktg. Mgr., Chicago Board of Trade and DOUG ETHERIDGE, Sr. Financial Consultant, Merrill Lynch	• *3:10–3:50 p.m.* **Storm Water Pollution Prevention Plans for Industrial Activities (#15)** GERALD E. SEABURN, Ph.D., P.E., Law Environmental, Inc.	• *3:10–3:50 p.m.* **Survey Analysis of Waste Minimization Opportunities for Small-to Medium-Size Manufacturing Facilities (#18)** DR. RICHARD JENDRUCKO, The University of Tennessee	• *3:10–3:50 p.m.* **An Overview of the Natural Gas Vehicle Industry** DAVID E. BRUDERLY, P.E., Project Mgr., Bruderly Engineering Associates	• *3:10–3:50 p.m.* **The Agony and Ecstasy of Implementing Bid Projects (#107)** FREDERICK MITCHELL, Marketing Mgr., Energy Investment, Inc.
• *3:50–4:30 p.m.* **The International Power Exchange** MICHAEL C. LYLE, Mgr., Wholesale Power Services, Inc.	• *3:50–4:30 p.m.* **Storm Water Best Management Practices That Work** JOHN OSTER, Lockwood Greene	• *3:50–4:30 p.m.* **Industrial Pollution Prevention: Meeting the Environmental and Economic Challenges of the '90s** DR. ROBERT ATKINSON, Office of Technology Assessment, U.S. Congress	• *3:50–4:30 p.m.* **A New Role for Electricity as a Transportation Fuel: National Electric Vehicle and Infrastructure Programs** KATERI CALLAHAN, Executive Dir., Electric Transportation Coalition	• *3:50–4:30 p.m.* **Development of a DSM Infrastructure: Planning, Implementation and Verification for Conservation Bidding (#108)** JACK S. WOLPERT, Ph.D CEM, E-Cube, Inc. and BC BANDY, Public Service Co of Colorado
• *4:30–5:10 p.m.* **Panel Discussion**	• *4:30–5:10 p.m.* **Flow-Proportioned Composite Sampling without Flow Measurement—Manual Techniques** EDWARD C. HICKS, P.E., Mgr. of Engineering Services and CHARLES E. BECK, Mgr. of Regulatory Affairs, Kemron Environmental Services, Inc.	• *4:30–5:10 p.m.* **How to Transform Liabilities in Used Oils and Other Waste Fluids into Valuable Assets and Free Energy On-Site (#19)** WAYNE ROBERTSON, Environmental Attorney and President, Black Gold Corp.	• *4:30–5:10 p.m.* **Panel Discussion**	• *4:30–5:10 p.m.* **What Utilities Are Saying about DSM Bidding (#109** JANE PETERS, Principal, Barakat & Chamberlin, Inc

WEDNESDAY POSTER SESSION — 1:30-2:30 p.m. Room 263 West Concourse

POSTER SESSION *Speakers will present their papers in an informal one-on-one poster session.*

Frosting and Frosting Effects in Induction Coils (#77)
S.A. SHERIF, Associate Professor, University of Florida

Infrared High Temperature Thermal Desorption—An Alternative to Mobile Incineration (#26)
JEFFREY F. ROULEAU, Westinghouse Remediation Services, Inc.

Vibrations Diagnostic Analysis and Central Energy System Audit Applications
C.C. CHEN, D. ENG., P.E., Project Dir., Southern University

Automatic Processing of Photometric Data (#53)
CECILIO E. GRACIAS, New York State Energy Office

Owning a Primary Substation Makes Sense for AT&T (#86)
JOHN L. FETTERS, CEM, AT&T Columbus Works

A Major Technology Will Soon Sweep Over Utility DSM Programs Nationwide
CHRISTOPHER F HALPIN, P.E., Regional Dir., Energy Investment, Inc.

Making Fresh Air Ventilation, Energy Savings and Indoor Air Quality Work Together
MIKE SCHELL, Dir. Marketing Sales, Semco, Inc.

Turn Out Those Lights! Here Comes the Energy Patrol! A Step-by-Step Guide (#61)
WILLIAM B. HARDIN, Mgr. of Plant Engr./Energy Mgr., Springs Industries

Minimizing Pumping Costs in a Water Distribution System
ELAINE C. SADOWSKI, Facilities Management Coordinator, City of Pittsburgh

Securing Private Investment in Low-Income Energy Efficiency: Braking the Reliance on Government and Utility Programs
ROGER D. COLTON, Fisher Sheehan & Colton

NOTE: NUMBERS IN PARENTHESES FOLLOWING PRESENTATION TITLES INDICATE CHAPTER NUMBER IN BOUND PROCEEDINGS.

F COGENERATION UPDATE Chair: THOMAS MLOT, P.E., CEM, Facilities Specialist, Virginia Power	G ENERGY MANAGEMENT I Chair: TIMOTHY B. JANOS, CEM, President, Energy Management Specialists, Inc.	H STRUCTURING LIGHTING RETROFIT PROJECTS FOR SUCCESS Chair: JOHN FETTERS, CEM, Sr. Eng./EM Lighting Consultant, AT&T Network Systems - Columbus Works	I ENERGY CONSERVATION IN FEDERAL BUILDINGS II Chair: JAMES WOODS, CEM, General Services Administration Office	J THERMAL ENERGY STORAGE APPLICATIONS Chair: RAJ GOPAL, P.E., Principal Eng., Technical Resources, Inc.	K DIRECT DIGITAL CONTROLS Chair: ALAN STEWART, P.E., Sr. Engineering Consultant, Honeywell, Inc.
Room 261 - West Concourse	Room 264- West Concourse	Room 265 266 - West Concourse	Room 267 - West Concourse	Room 268 - West Concourse	Room 269- West Concourse
2:30–3:10 p.m. **The Analysis of Cogeneration Systems (#81)** CECILIO E. GRACIAS, Ph.D., Energy Technical Specialist and LLOYD HOFFSTATTER, Technical Services Bureau, New State Energy Office	• 2:30–3:10 p.m. **25 Energy/Environmental Tricks of Trade** JOHN PUSKAR, P.E., President, CEC Consultants, Inc.	• 2:30–3:10 p.m. **Bright Ideas: A Comprehensive Lighting Retrofit in an Academic Setting (#58)** DAVID GROVES and ERIC SELMON, Stanford University	• 2:30–3:10 p.m. **Identifying the Best Projects in the Federal Sector (#93)** MARK GINSBERG, Dir., Federal Energy Mgmt. Program, U.S. Dept. of Energy	• 2:30–3:10 p.m. **Marketing Opportunities with Thermal Storage (#65)** FREDERICK N. BROBERG, P.E., Project Eng., H.F. Lenz Co.	• 2:30–3:10 p.m. **Integration Enables Coordination of Diverse Building Systems (#68)** JOHN D. PETZE, CEM, President, Teletrol Systems, Inc.
3:10–3:50 p.m. **Design Considerations for Installing Cogeneration into an Existing Plant** MATTHEW J. PETERSON, Mgr., Facilities Maintenance & Utilities, Hoescnst Celanese Corp.	• 3:10–3:50 p.m. **An Integrated Approach to Providing Solutions for HVAC Systems (#48)** ELLEN NEWCOMB, Eng., Existing Building Services, The Trane Co.	• 3:10–3:50 p.m. **Efficient Lighting—A Solution to the Energy Challenges of the 1990s** HOWARD L. WOLFMAN, P.E., Mgr. of Industry Standards & Utilities, Motorola Lighting, Inc.	• 3:10–3:50 p.m. **Increasing Energy Awareness in the Department of Defense** MILLARD E. CARR, P.E., Assistant/Energy Policy, Office/Sec. of Defense	• 3:10–3:50 p.m. **Thermal Energy Storage—The Natural Way (#66)** KLAUS SCHIESS, P.E., CEM, KSEngineers	• 3:10–3:50 p.m. **Developing a Performance-Based Competitive Bid Specification for a Direct Digital Control System** RANDY G. PAQUETTE, Corporate Dir. of Facilities & Mgmt., McLaren Health Care Corp.
3:50–4:30 p.m. **Cogeneration Emissions Breakthrough (#82)** ROBERT H. WARREN, P.E., CEM, CCP, Sr. Vice President, Commercial Energy Systems Management Corp.	• 3:50–4:30 p.m. **Energy Savings in Computer/Data Centers (#49)** PAUL F. HUTCHINS, Ph.D., P.E., CEM, Dir. of Energy Programs, Reynolds, Smith and Hills, Inc.	• 3:50–4:30 p.m. **Lighting Retrofits: The Good, The Bad, and The Ugly (#59)** DAVID DOUBEK, Product Mgr., Cooper Lighting	• 3:50–4:30 p.m. **Exploring Energy & Environmental Opportunities: How the CFC Issues Can Work to Your Advantage (#94)** ERIC DUNHAM, Chief of Energy Div., General Services Administration	• 3:50–4:30 p.m. **Procedure for Analyzing Performance of a Thermal Energy Storage System Using an Energy and Demand Balance Approach (#67)** SHYLENDER REDDY, ACR Engineering, Inc.	• 3:50–4:30 p.m. **DDC Laboratory & Fume Hood Controls for More Safety and Less Energy** LARRY J. FISHER, President, ECT Services and RICHARD W. FISH, JR., Dir./Installed Systems & Services, American Auto-Matrix, Inc.
4:30–5:10 p.m. **State of Florida Capital Center Cogeneration Project (#83)** JAMES GEERS, President, PLM Technologies and CARL SVARD, President, Integrated Planning & Engineering, Inc.	• 4:30–5:10 p.m. **Implementing Energy Performance Standards in Commercial and Federal Buildings** CARLOS S. WARREN, Ph.D., P.E., CLEP, Vice President, Energy Services, Reynolds, Smith and Hills, Inc.	• 4:30–5:10 p.m. **Environmentally Responsible Disposal of Lighting Equipment (#60)** ROBERT A. PENNEY, P.E., CEM, Clearinghouse Lead Eng., Washington State Energy Office	• 4:30–5:10 p.m. **Why Should You Use DLA's Energy Efficient Product Services?** B. MONTAGUE INGRAM, Product Executive, Energy Efficient Lighting, Defense General Supply Ctr.	• 4:30–5:10 p.m. **Panel Discussion**	• 4:30–5:10 p.m. **Panel Discussion**

Exhibit Hours: 10:00 a.m-5:00 p.m.

5:15-6:30 p.m. NETWORKING ROUNDTABLE Room 167, West Concourse, Level 1

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MARTIN MOZZO

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ALAN STEWART

TABLE 8
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HARRY TAPLIN

TABLE 9
INDOOR AIR QUALITY
JERRY TAYLOR

(CASH BAR WILL BE AVAILABLE)

THE ENVIRONMENTAL TECHNOLOGY EXPO

Thursday Morning – October 28, 1993

ENVIRONMENTAL TECHNOLOGY CONFERENCE & EXPO

WORLD ENERGY ENGINEERING CONGRESS

A	B	C	D	E
IMPROVING INDOOR AIR QUALITY Chair: JERRY A. TAYLOR, A.I.A., P.E., CEM, President, Jerry A. Taylor Environmental	**RESOURCE CONSERVATION & RECOVERY** Chair: R. RANDOLPH FERGUSON, Project Dir., Roy F. Weston	**ENVIRONMENTAL MANAGEMENT** Chair: ELIZABETH HAGEN, P.E., CEM, Geomet Technologies, Inc.	**GLOBAL WARMING** Chair: HALIL GUVEN, Ph.D., Professor, Dept. of Mechanical Engineering, San Diego State University	**VERIFICATION OF SAVINGS—DSM** Chair: MARTIN A. MOZZO JR., P.E., CEM, CLEP, S. Project Mgr., KENETECH Energy Management, Inc
Room 202 - East Concourse	Room 203 - East Concourse	Room 204 - East Concourse	Room 205 - East Concourse	Room 260 - West Concourse
• *9:00–9:40 a.m.* **Gaseous Filtration for Prevention & Mitigation of Indoor Environmental Problems** H.F. "BARNEY" BURROUGHS, P.E., President, IAQ/Building Wellness Consultancy	• *9:00–9:40 a.m.* **Resource Conservation & Recovery—A Worldwide Call to Action in the War on Waste, Environmental Pollution and Hunger: A Unique Opportunity (#22)** J. PATRICK NICHOLSON, Chief Executive, N-Viro Energy Systems, Ltd.	• *9:00–9:40 a.m.* **Patent Laws: Help or Hindrance in Solving Environmental Problems (#24)** SCOTT R. FOSTER, ESQ., Lorusso & Loud	• *9:00–9:40 a.m.* **Energy Conservation Technologies for Global Warming Mitigation (#33)** HENRY A. COURTWRIGHT, P.E., Dir., Customer Systems Div., Electric Power Research Institute	• *9:00–9:40 a.m.* **DSM Measurement and Verification—Balancing the Scales** CHARLES COCCARO, Public Service Electric & Gas Co.
• *9:40–10:20 a.m.* **Control of Indoor Air Pressure for Protection of Health, Preservation of Buildings, and Conservation of Energy (#31)** JON E. TRAUDT, Exec. Dir./Environmental Engineering, Environmental Resource Services	• *9:40–10:20 a.m.* **Ground-Water Quality Statistical Analysis: Implementing the New RCRA Regulations** HENRY R. HORSEY, Ph.D., Intelligent Decision Technologies	• *9:40–10:20 a.m.* **Evaluating the Performance of Active Noise Control Systems in Industrial Applications (#25)** SUSAN DINEEN, Digisonix Commercial & Industrial Systems Group	• *9:40–10:20 a.m.* **Fuel Cells for Energy Generation at Medical Centers (#34)** THOMAS A. DAMBERGER, CEM, Energy Specialist, Kaiser Permanente	• *9:40–10:20 a.m.* **Turning Black & White into Green: Healthier Programs through Measuring & Monitoring (#110)** JOSEPH POLASKI, Measuring & Monitoring Services, Inc.
• *10:20–11:00 a.m.* **Indoor Air Quality & Energy—A Common Sense Approach (#32)** CHARLES F. WILES, President, Metro Environmental Co.	• *10:20–11:00 a.m.* **Brayton Cycle Solvent Recovery Heat Pump Technology Update** J.C. ENNEKING, Vice President, NUCON International, Inc.	• *10:20–11:00 a.m.* **Radon Prevention & Mitigation** KAISS K. AL-AHMADY, University of Florida	• *10:20–11:00 a.m.* **The Methodology and Model for Costing of the Environmental Impacts of Austin Energy Conservation/DSM Programs (#35)** YANG ZIMING, Engineering Associate III, City of Austin Environmental & Conservation Services Dept.	• *10:20–11:00 a.m.* **Ford Performance Contract Experience** JAMES KAMAN, Ford Motor Corp.
• *11:00–11:40 a.m.* **Synergistic Effects of IAQ Components** JERRY A. TAYLOR, A.I.A., P.E., CEM	• *11:00–11:40 a.m.* **Georgia Tech Experience and Plan in Environmental Science Technology and Policy (#23)** C.S. KIANG, Ph.D., Center for Int. Strategy, Tech. & Policy, School of Earth Science and Atmospheric Sciences, Georgia Institute of Technology	• *11:00–11:40 a.m.* **The Environmental Impact of Energy Efficiency** ALDEN M. HATHAWAY, Regional Sales Mgr./SE, EUA Cogenex Corp. • *11:40 a.m.–12:20 p.m.* **The Main Problems and the Prospect for the Year 2000 on China Energy, Environmental and Economic Development** WEI PINGZHONG, Central Coal Mining Research Institute	• *11:00–11:40 a.m.* **Strategic Targeting: Prioritizing Measures to Reduce Greenhouse Gas Emissions (#36)** CORY BERISH, Ph.D., Environmental Protection Agency Region IV and JEFF TILLER, Southface Energy Institute	• *11:00–11:40 a.m.* **New Developments in DSM Verification** MARTIN A. MOZZO, JR., P.E., CEM, CLEP

KEYNOTE LUNCHEON: Thursday, October 28, 12:30 p.m. – Room 314

1993 Hall of Fame Awards
Chair: HARRY TAPLIN, P.E., CEM, President, BTU Consultants

"International Linkage on Energy and the Environment"
WILLIAM U. CHANDLER, Dir., Advanced International Studies Unit, Battelle Pacific Northwest Laboratories, Washington, DC

NOTE: NUMBERS IN PARENTHESES FOLLOWING PRESENTATION TITLES INDICATE CHAPTER NUMBER IN BOUND PROCEEDINGS.

	G	H	I	J	K
)WER GENERATION :air: STEPHEN A.)OSA, Jerry A. Taylor & sociates	**ENERGY MANAGEMENT II** Chair: EDWARD MICELI, CEM, Miceli Engineering	**VARIABLE SPEED DRIVES** Chair: VERLE A. WILLIAMS, P.E., CEM, President, Verle A. Williams Associates, Inc.	**DOD ENERGY UTILIZATION** Chair: FREDDIE L. BEASON, P.E., Mechanical Eng., Systems Engineering, HQ AFEFC/DEMM, Air Force Engineering Services Center	**HVAC OPTIMIZATION II** Chair: JON HAVILAND, P.E., CEM, CLEP, Criterium-Haviland Engineers	**RENEWABLE ENERGY APPLICATIONS** Chair: WAYNE KIRSNER, P.E., Kirsner, Pullin & Associates
oom 261 - West Concourse	**Room 264- West Concourse**	**Room 265/266 - West Concourse**	**Room 267 - West Concourse**	**Room 268 - West Concourse**	**Room 269- West Concourse**
:00–9:40 a.m. **: Integrated Approach a Combined Cycle :powering Project** :LIP V. ZIMINSKY, Mgr., generation Projects, :we Engineering Corp.	*• 9:00–9:40 a.m.* **Industrial Efficiency in Industry and Agriculture: A North Carolina Experience (#44)** R. NEAL ELLIOTT, Ph.D., P.E., Research Associate, American Council for an Energy Efficient Economy	*• 9:00–9:40 a.m.* **Are You Certain You Understand the Economics for Applying ASD Systems to Centrifugal Loads? (#69)** WAYNE L. STEBBINS, Electrical Staff Eng., Hoechst Celanese Corp.	*• 9:00–9:40 a.m.* **Renewable Energy in the Department of Defense (#95)** GARYL D. SMITH, Chairman, DOD Photovoltaics Review Committee, Naval Air Weapons Station	*• 9:00–9:40 a.m.* **Electric Motor Do's and Don'ts (#73)** ROBERT K. HOSHIDE, CEM, CLEP, Project Mgr.-EM, Rockwell Int. Energy Technology Engineering Ctr.	*• 9:00–9:40 a.m.* **Emerging Renewable Energy Electric Applications: New Views of the Market (#50)** KEVIN DeGROAT, Renewable Energy Branch Dir., Meridan Corp.
:40–10:20 a.m. **wer Generation and the :ect of Cooling Water** :BERT BURGER, :sident, Burger Cooling :wer Co.	*• 9:40–10:20 a.m.* **A Facility Monitoring System: The Most Valuable and Cost-Effective Tool Available to an Energy Manager (#45)** WILLIAM A. HOLMES, P.E., CEM, President, Holmes Energy Services, Inc.	*• 9:40–10:20 a.m.* **Simple Solutions to VSD Pumping Measures (#70)** RICHARD R. VAILLENCOURT, P.E., Project Mgr., Energy Investment, Inc. **H2 CHILLED WATER SYSTEMS**	*• 9:40–10:20 a.m.* **120KW Lightweight Mobile Generator (#96)** THOMAS C. HARDY, P.E., Program Mgr., U.S. Air Force, Wright Laboratory	*• 9:40–10:20 a.m.* **Improving the Performance of Small Type Air Conditioners (#74)** ROGEH K. ALNAJJAR, Vice President, Aaron Environmental Co.	*• 9:40–10:20 a.m.* **Assessment of Renewable Energy Technologies in Arizona** PREM K. BAHL, Utilities Consultant-Utilities Div., Arizona Corporation Commission
0:20–11:00 a.m. **lar Thermal Electric chnologies for Power :neration (#84)** :NESH KUMAR, Sr. :alyst, DynCorp, Meridan :p.	*• 10:20–11:00 a.m.* **Improving Energy & Loss Efficiency: The Total Quality Way (#46)** V. VENKATESAN, Sr. Process Eng., Refineria Isla (Curazao) SA	*• 10:20–11:00 a.m.* **Evaluation of the Technical and Economic Performance of Energy-Efficient Engine-Driven Chillers (EDC) (#72)** DONALD ANDERSON, President, EnerSys, Inc.	*• 10:20–11:00 a.m.* **The Centralized Purchase of Natural Gas for DOD: The Details and Dollar Benefits to DOD (#97)** COL. JOHN J. CARR, Defense Fuel Supply Center	*• 10:20–11:00 a.m.* **Process Cooling Primary/Secondary System Renovation (#75)** KARL GERKEN, Facilities Eng., Storage Technology Corp. and CARL SVARD, P.E., President, Integrated Planning & Engineering, Inc.	*• 10:20–11:00 a.m.* **Solar Integrated Pumping Applications (#51)** STEPHEN C. TURNER, Energy Analyst, Florida Atlantic University
:00–11:40 a.m. **omass Energy :neration—Trends and :tlook in California (#85)** :. JOANTA H. GREEN, :g., R&D, Bechtel Group,	*• 11:00–11:40 a.m.* **The Development of Strategic Energy Management Planning at New Jersey Transit (#47)** RANSOME E. OWAN, Sr. Energy Analyst, Mgmt. Engr., New Jersey Transit-HQ *• 11:40 a.m.–12:20 p.m.* **Energy Saving in Coke Industry by Using DCS** DR. SAMIR EL-BARDISSI, Tabbin Institute for Metallurgical Studies, ECEP/USAID	*• 11:00–11:40 a.m.* **Industrial District Cooling Application Using Distributed Chilled Water Storage (#71)** DONALD P. FIORINO, P.E., Facility Eng., Texas Instruments, Inc.	*• 11:00–11:40 a.m.* **Central Energy Supply Planning for DOD Installations (#98)** MARTIN J. SAVOIE, U.S. Army Construction Engineering Research Labs	*• 11:00–11:40 a.m.* **Thermodynamic Analysis of a Combined Vapor Compression/Absorption Refrigeration System (#76)** S.A. SHERIF, Ph.D., Associate Professor, University of Florida	*• 11:00–11:40 a.m.* **Recent Advances in Microprocessor Control and Variable Speed Drive Strategies for Small Wood-Fired Boilers: A Case History (#52)** ROBERT M. CLUNIE, P.E., Project Mgr., Applied Engineering, Inc.

EXHIBIT HOURS **9:00 a.m.—12:30 p.m.**

16th WEEC / ETE TECHNICAL STEERING COMMITTEE

Appreciation is given to the following individuals for their help in developing the program:

Richard Aspenson
Consultant

Charles Beck
Kemron Environmental Services, Inc.

Bill Camp
Principal, Hydroscience, Inc.

Keith Davidson
Gas Research Institute

Douglas A. Decker
Johnson Controls, Inc.

Shirley Hansen, Ph.D.
Hansen Associates, Inc.

Jon R. Haviland, P.E. CEM
Criterium-Haviland Engineers

MaryAnne Lauderdale, P.E.
Energy Investment, Inc.

Konstantin K. Lobodovsky
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Synergic Research Corporation

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Richard K. Miller, CEM
Richard K. Miller & Assoc.

Harvey Morris
Independent Power Producers

Martin A. Mozzo, Jr. P.E.
Kenetech Energy Management, Inc.

Graham Parker
Battelle Pacific Northwest Laboratories

Patricia Rose
U.S. Department of Energy

Frank Santangelo, P.E., CEM
Consultant

Ron Smith
General Motors

Walter P. Smith, Jr.
Energy Technology Services Consulting

Joseph Surowiec
Environmental Science & Engineering

Harry Taplin, P.E., CEM
BTU Consultants

Albert Thumann, P.E., CEM
Association of Energy Engineers

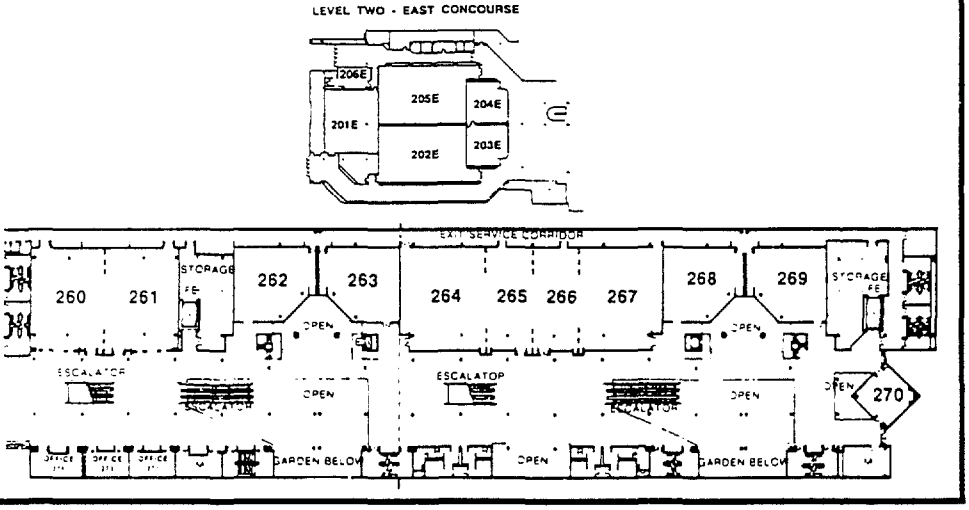
Wayne C. Turner, Ph.D., P.E., CEM
Industrial Engineering & Management

Richard A. Young
Pollution Engineering

MEETING ROOMS

***Please Note - Opening Session Auditorium/ East Concourse**

Speakers Room - 262
Press Room - 262
Registration & Expo - Hall G
Meeting Rooms - Level 2
East & West Concourse
Keynote Luncheon - Room 314B



CALL FOR PAPERS

You are cordially invited to submit a one-page abstract to be considered for our 17th WEEC & 4th ETE, December 7-9, 1994 at the Georgia World Congress Center, Atlanta, Georgia. Abstracts should include title of paper, a one-page summary, presenter's name, company address, and biography. The theme for the 1994 Congress is **ENERGY & ENVIRONMENTAL OPPORTUNITIES TO THE YEAR 2000.** Please submit abstracts by March 18 to:

Marilyn Jackson, Program Manager
17th WEEC & 4th ETE
4025 Pleasantdale Road, Suite 420
Atlanta, GA 30340

Thank you for your participation in this year's Congress. We hope to see you next year at the 16th WEEC, Georgia World Congress Center, Atlanta, December 7-9, 1994.

BAGGAGE AREA

A baggage area will be provided on Thursday under Escalator - Ballroom Entrance from 7:00 AM - 5:00 PM.

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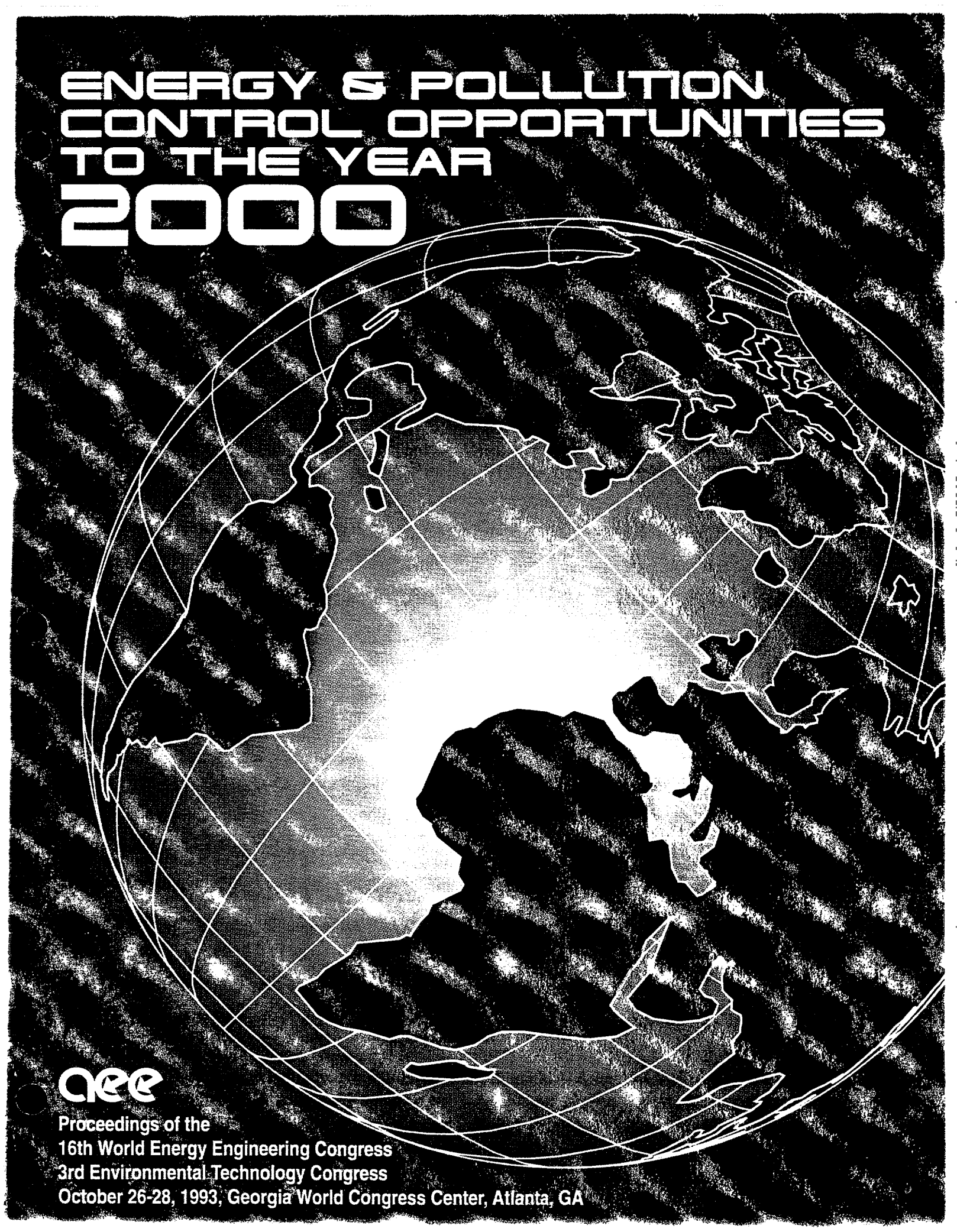
ENERGY & POLLUTION CONTROL OPPORTUNITIES TO THE YEAR 2000



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Proceedings of the
16th World Energy Engineering Congress
3rd Environmental Technology Congress
October 26-28, 1993, Georgia World Congress Center, Atlanta, GA

ENERGY & POLLUTION CONTROL OPPORTUNITIES TO THE YEAR 2000

PROCEEDINGS OF THE
16th WORLD ENERGY ENGINEERING CONGRESS
3rd ENVIRONMENTAL TECHNOLOGY EXPO

October 26-28, 1993

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R.H. Warren

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P.E. Conlan
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M.D. Haakenstad, R.M. Running
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APPENDIX J

DIRECTORY OF EXHIBITORS AT THE 16TH WORLD ENERGY ENGINEERING CONGRESS

DIRECTORY OF EXHIBITORS

16TH WORLD ENERGY ENGINEERING CONGRESS
1993 ENVIRONMENTAL TECHNOLOGY EXPO

OCTOBER 26-28, 1993

GEORGIA WORLD CONGRESS CENTER
ATLANTA, GA

WEEC

ETE®
THE ENVIRONMENTAL TECHNOLOGY EXPO
CONFERENCE AND EXPOSITION

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16TH WORLD ENERGY ENGINEERING CONGRESS

EXHIBITING COMPANY	BOOTH NUMBER(S)
Accu-Tech Corporation	930
Advance Transformer Company	1058
Advanced Control Technologies	1054
AEE Books	624, 626, 628, 630
AEE Exhibit Programs	618
AEE In-House Seminars	625
Alerton Technologies	954, 956
Alta Illumination	1018
Amtech Lighting Services	1063, 1065
Association of Energy Engineers	1012
Astralite / Division of Computer Power	759
Automated Logic Corporation	1017, 1019
Baltimore Aircoil Company	942, 944
Bec Controls Corporation	T7
Belimo AirControls, Inc.	958
Best Power Technology, Incorporated	1028, 1030
Bryant Electric, Inc.	923, 925
Building Operating Management	648
Burger & Associates, Inc.	748
Calmac Manufacturing Corp.	758
Cegelec Automation, Inc.	734
CEW Lighting	823
Chicago Bridge & Iron Co.	1023
Consulting-Specifying Engineer	846, 848
Control Pak International	918, 920
Controlotron	830
Cooling & Refrigerating Technologies	1127
Courtaulds Performance Films	727
CSI / Control Systems International	860, 862, 864
Diesel & Gas Turbine Worldwide	749
Dranetz Technologies, Inc.	737, 739
Duo-Gard Industries	945
E-Mon Corporation	825
E. Sam Jones Distributor	1128
Ecam Power Technologies, Inc.	959
Eclipse Technologies, Inc.	756
Electronic Ballast Technology	1026
Electronic Systems USA, Inc.	935, 937, 939, 941
EMCO	1149
Enchill by MKW	1034, 1036, 1038
Encyclopaedia Brittanica	1057
Energy & Environmental Action Cards	662
Energy & Environmental Journals	634, 636
Energy Focus	1147
Energy User News / Energy User News Digest	757
Engineer's Digest	839
Engineered Systems Magazine	828
EUA Nova	950
FAFCO, Inc.	963
Feit Electric Co., Inc.	1137
Flexiwatt Lighting	1154
Fulcircle Ballast Recyclers	1064
Future Technology Surveys	957
GE Demand-Side Management	1134
GE Drive Systems	1134
GE Fanuc	1134
GE Installation & Service Engineering	1134
GE Lighting	1134
GE Motors	1134
General Eastern Instruments	1142, 1144
Global Energy Efficiency Initiatives	660
GlobalCoat	1146, 1148
Hanson Energy Management Systems	966
Heath Commercial	962, 964
HI Solutions	724, 726
Holophane Company, Inc.	1024
Hubbell Inc. / Wiring Device Division	847
Hubbell Lighting, Inc.	849
HVQC Systems	664
Hy-Cal Engineering	1042, 1044
IllumElex Corporation	1050
Illuminating Engineering Society	1227
Integrated Energy Controls Corp.	827
International Air Filters, Inc.	T9
International Cogeneration / Energy Genius	1133, 1135
International Protective Coatings	640
Johnson Controls, Inc.	818
KW/2 Lighting Products	738, 740
Landis & Gyr Powers	932
Lighting Resources, Inc.	654
Lights of America	843
Lithonia Lighting	750
Ludeca, Inc.	1129
Lutron Electronics Company	1033
Magnetek	1112
Mamac Systems, Inc.	612
McGraw-Hill Energy Newsletters	T11
mCON*USA, Inc.	926
Measuring & Monitoring Services	735
Metallized Products	836
Metaloptics, Inc.	854, 856
Mitsubishi Heavy Industries America	1025, 1027
ML Systems	1061
Monitor Products, Inc.	753
The Mono-Tec Group, Inc.	733
Motorola Lighting, Inc.	761, 763
Paul Mueller Company	927, 929
Mytech Corporation	838
Natgun Corporation	747
National Lighting Supply	1041
National Meter Industries, Inc.	1126
Novar Controls Corporation	947, 949
Nutemp, Inc.	961
Omnicomp, Inc.	1141
Onicon, Incorporated	1123, 1125
Osram Sylvania, Inc.	853, 855, 857
Paragon Electric Co., Inc.	824, 826
Parke Industries, Inc.	744, 746
PDI Technologies	829
Peschel Energy, Inc.	834
Philips Lighting Company	912, 914
Pre Finish Metals, Inc.	953, 955
Prime Power Inc.	1029
PSI Energy Systems, Inc.	1011, 1013
Reagan Equipment / Waukesha Engines	723, 725
Reflect-A-Light, Inc.	754
Refrigerant Recovery Systems	928
Repro Products	650
Retro-Tech Corporation	845
Salesco Systems USA	1067
Silverlight Corporation	728
S K America	1143
Ssayesco	1068
Stewart & Stevenson Services, Inc.	817, 819
Supreme Corporation	844
Teletrol / Techtrol	835, 837
Temperature Control Specialties	968
Thermo Engineering, Inc.	1130
Thomas Industries	755
Toshiba America Consumer Products	1062
Trane Aftermarket	762
Trojan, Inc.	840
Turbo Refrigerating Company	850
U.S. D.O.E. / Institutional Conservation Programs	743
U.S. D.O.E. / Office Of Energy Efficiency & Renewable Energy	1047, 1049
U.S. D.O.E. / State Energy Programs	656, 658
U.S. E.P.A. Green Lights Program	1066
UE Systems, Inc.	1223, 1225
Ultrasonics of Florida	841
Union Carbide Corp. / Industrial Chemicals	736
Universal Energy Control, Inc. (Unenco, Inc.)	943
Vaisala, Inc.	729
Valmont Electric	730
Video Age Production	1055
Visonic Ltd.	1150
Water Technology of Pensacola	1229
The Watt Stopper	718, 720
Wheatstone Energy / Ecolite Manufacturing	1056
WSA Engineered Systems	924
Yokogawa Corporation	1124

ENVIRONMENTAL TECHNOLOGY EXPO '93

EXHIBITING COMPANY	BOOTH NUMBER(S)
Advanced Environmental Recycling Corp.	456
AEE Books	624, 626, 628, 630
AEE Exhibit Programs	618
AEE In-House Seminars	625
Air Purification, Inc.	627
Alliance for Responsible Atmospheric Pollution	635
American City & County	329
American Norit Company, Inc.	418
ARDL, Inc.	103
Atlantic Waste Services, Inc.	435
Bearings & Drives / Environmental Division	517
Ben Meadows Company	328, 330
Black Gold Corporation	527
Brown & Root Environmental	206
Canadian Consulate General	450
CFC Recovery Systems, Inc.	549
Chemical Engineering	218, 220
Cherokee Sanford Group	221
Classic Systems, Inc.	557
Clean Air Engineering / CAE	424
Coastal Netting Company	433
Cues, Inc.	412
Durr Industries, Inc.	313, 315
Earth Observation Magazine	554
Earth Observation Satellite Company (EOSAT)	309
Earth Resources Corporation	444
EcoImages	528
EEMI / Environmental Engineers & Managers Institute	617, 619
Elsevier Science Publishing	555
Entropy Environmentalists, Inc.	541
Environment Today	538
Environmental Business Journal	230
Environmental Protection Magazine / Stevens Publishing	459
Environmental Risk Information & Imaging Services (ERIIS)	223, 225
Envirosafe Sealing Systems Co., Inc.	441
Envotech Management Services	542, 544, 641, 643
ERM Computer Services	534
ESKO Industries Ltd.	633
Federal Environmental Services, Inc.	548
Fisher Industrial Service, Inc.	447, 449
Fisher-Rosemount, Inc.	214
Flair Environmental Products	426
Foxboro Company	228
Geoprobe Systems	208
Georgia Dept. of Industry, Trade & Tourism	213
Good Earth Recycling	529
W. L. Gore & Associates Inc.	305
H^+GCL	629
Harris Waste Management Group, Inc.	213
Houston Industrial Silencing	518
IMPO's Industrial Environmental Management	411, 413
Inchcape Testing Services / NDRC	520
Infodata Systems, Inc.	324
Inmark, Inc.	448
International Air Filters Inc.	523, 525
ISCO, Inc. / Environmental Division	210
JWC Environmental	530
JWI, Inc.	106
Landscape Architect & Specifier News	226
Law Environmental	224
Lear Siegler Measurement Controls	434
Logical Technologies, Inc.	429
LWD, Inc.	454
The Marley Pump Company	317, 319
McTighe Industries, Inc.	425
Richard K. Miller & Associates	556
Monex Resources, Inc.	442
S. D. Myers, Inc.	550
N-Viro Energy Systems	219
National Registry of Environmental Professionals (NREP)	217
OSHA-Soft Inc.	415, 417
Pease Development Authority	458
Perfect Cycle	549
Plastek Werks Inc.	543
Pollution Engineering Magazine	205
Pollution Equipment News	227, 229
Poly-Flex, Inc.	430
Protect America	637
Purgo, Inc.	524
Quantix / Agri-Diagnostics	101
R&D Magazine	436
Regulation Scanning	427
Relco / Remco	438
Resource Consultants	437
Rexon	314
Scanco Environmental Systems, Inc.	318
Schwarze / Aaplex	512, 611
Sensor Electronics Corporation	323
Shimadzu Scientific Instruments, Inc.	215
Skye/USA	549
Soils Magazine	455
Sonic Environmental Systems	647, 649
Specialty Vacuum, Inc.	423
Sphag Sorb, Inc.	428
Stalite Environmental	325, 327
Structural North America	419, 421
Tarmac Industries, Inc.	443
Thompson Publishing Group	536
U.S. Bureau of Mines	526
U.S. D.O.E. / Office of Technology Development	653, 655
U.S. E.P.A. Region 4 Headquarters	105, 107
U.S. E.P.A. / Technology Innovation Office	553
U.S. Environmental Engineering	548
Veeder-Root Company	533, 535, 537
Vista Environmental Information, Inc.	307
Von Roll, Inc.	310, 312
Vortox Company	547
Waste Business Magazine	326
Waste Tech News	457
Water & Wastes Digest / Scranton Gillette Communications	453
Welch Allyn, Inc. / Inspection Systems Division	623
Worldtec Industries	415, 417

WEEC & ETE EXPO HOURS

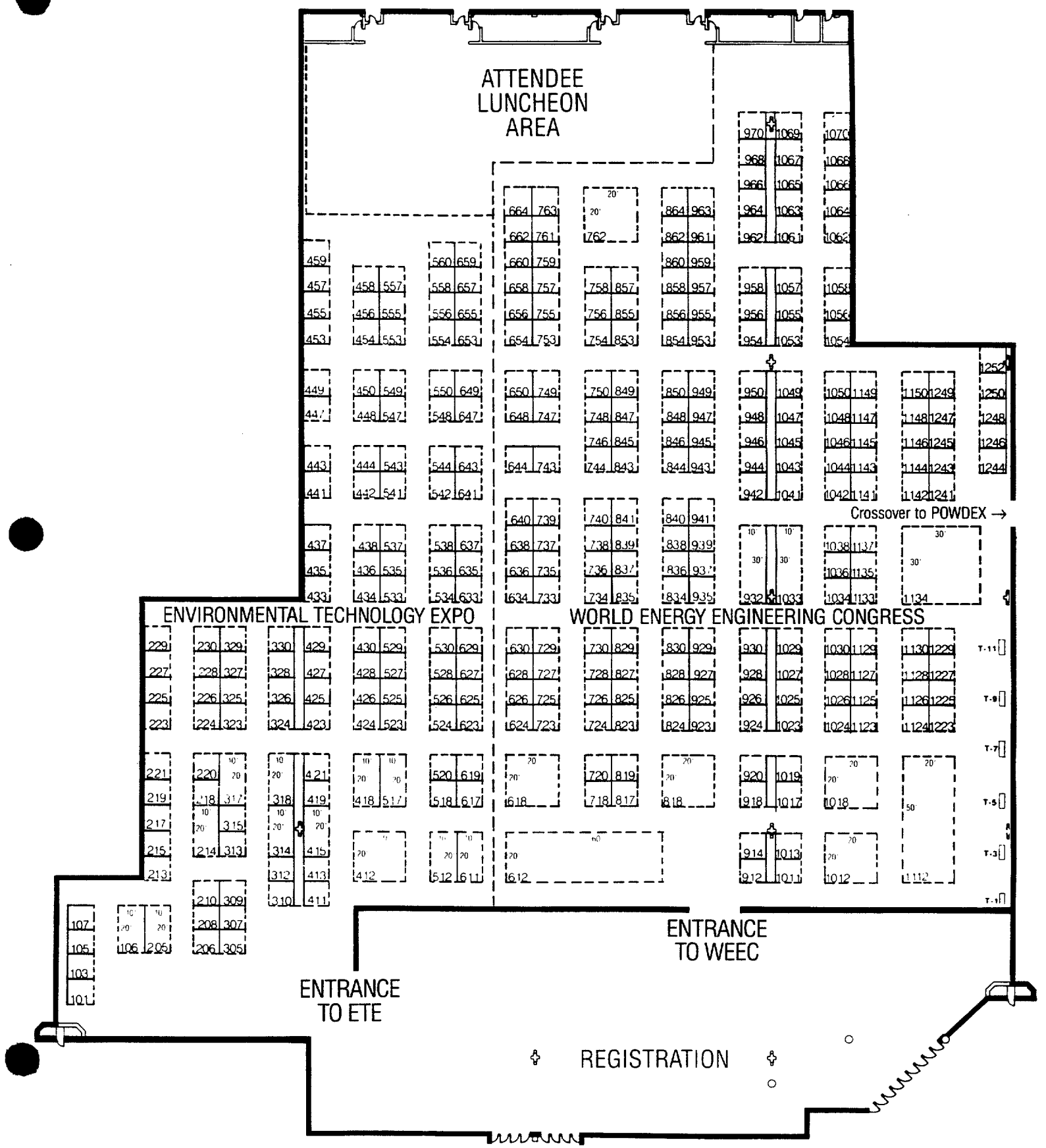
TUESDAY / October 26
10:00 am - 5:00 pm

WEDNESDAY / October 27
10:00 am - 5:00 pm

THURSDAY / October 28
9:00 am - 12:30 pm

FLOORPLAN OF 1993 EXHIBIT HALL

EXHIBIT HALL G / GEORGIA WORLD CONGRESS CENTER



APPENDIX K

AGENDA FOR MEETING AT RCG/HAGLER, BAILLY, INC.

The Energy Efficiency Consulting Business:

Secrets to Success

For the 1993 Eastern European
Energy Efficiency Market Development Delegation

RCG/Hagler Bailly, Inc.

October 29, 1993

9:00 - 9:30	*The Hagler Bailly Story* Henri-Claude Bailly, Chairman of the Board
9:30 - 10:00	*Staying Alive - The Early Years* Mary Harris, Vice President
10:00 - 10:30	*Raising Capital for a Consulting Business* Mort Gorden, Principal Consultant
10:30 - 11:00	*Diversifying into the Environmental Business* James Westfeld, Vice President
11:00 - 11:15	Break
11:15 - 11:45	*Relationship of Suppliers to Consulting Engineers* Joseph Vilardo, Director, Honeywell, Inc.
11:45 - 12:15	*The Keys to Making Money* Alain Streicher, Senior Vice President
12:15 - 12:45	*The Power of Information* Jean-Louis Poirier, Senior Vice President
12:45 - 1:15	Luncheon address: *Putting it All Together in Eastern Europe:* *What is Your Business and What Will It Be?* David Keith, Vice President
1:30	Bus to State Department for Meeting with A.I.D.
5:00	Reception hosted by Hagler Bailly

APPENDIX L

OVERHEADS FOR VARIOUS PRESENTATIONS AT RCG/HAGLER, BAILLY, INC.

TRADITIONAL CONSULTANTS ROLE FOR ENERGY EFFICIENCY PROJECTS

- Owner usually identifies energy waste
- Verifies and quantifies energy usage
- Selects technical solutions to improve efficiency
- Creates specification and bid documents to purchase solution competitively
- Supervises compliance with specification

TRADITIONAL SUPPLIER ROLE FOR ENERGY EFFICIENCY PROJECTS

- Provides technical information to consultant on energy efficiency products and systems
- Participates with consultant in preparing specifications
- Provides application engineering for speciality
- Installs speciality solution

PERFORMANCE CONTRACTING APPROACH FOR ENERGY EFFICIENCY PROJECTS

- Identify needs that lower the cost of operation of an owner's enterprise (make operation more competitive)
- Find solutions that achieve economic goals meeting payback criteria of the enterprise
- Ensure that systems are delivered and installed to meet technical requirements
- Finds financing
- Audit and guarantee results

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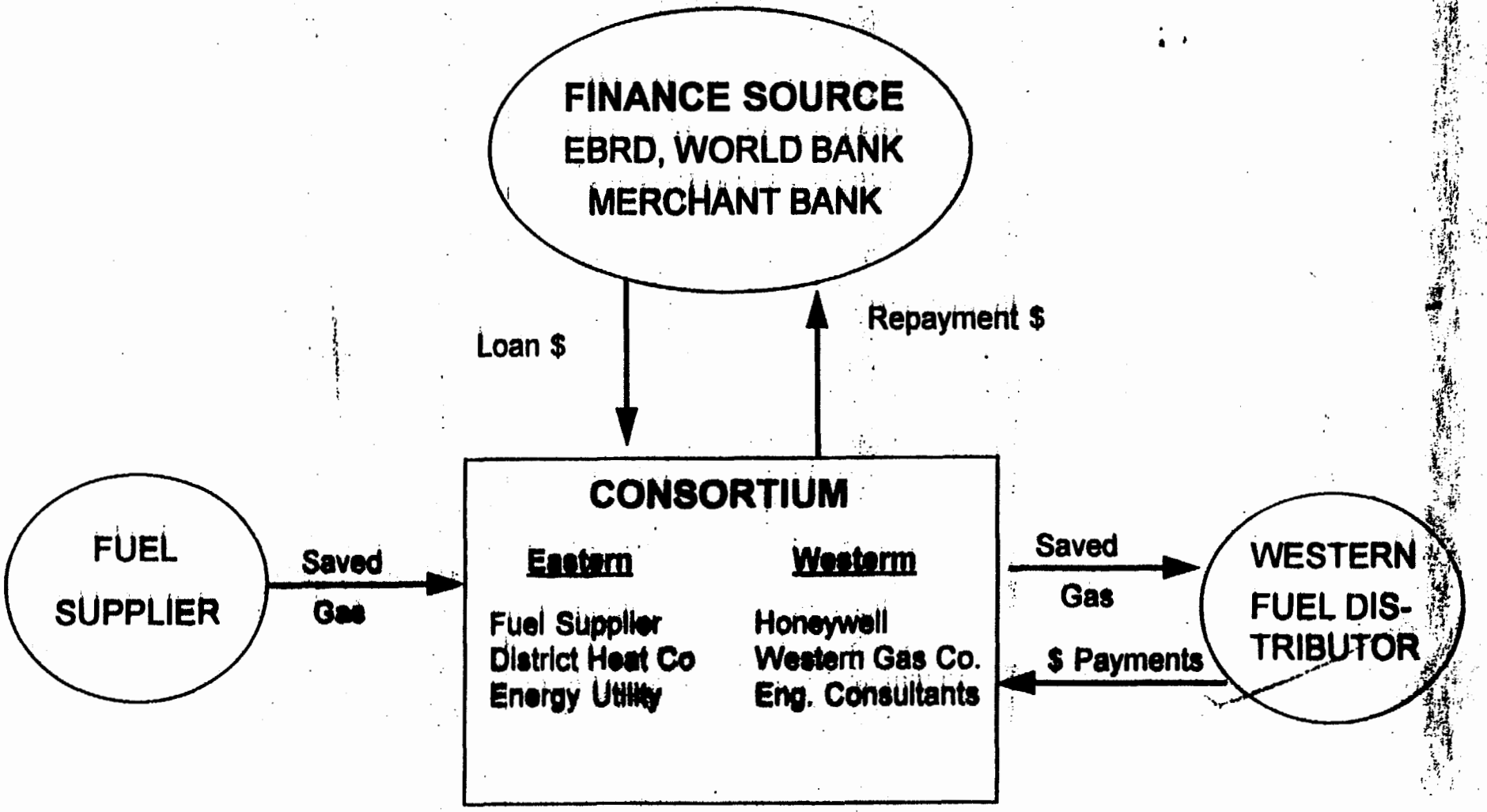
CONSULTANT OR SUPPLIER ROLE IN PERFORMANCE CONTRACTING RELATIONSHIP

- Assume complete responsibility for the performance contract
- Team member and perform only part of the functions
  - *Identify needs (energy audit)*
  - *Specify solutions*
  - *Supervise installation*
  - *Supply and install*

ENERGY EFFICIENCY IMPROVEMENTS
DISTRICT HEATING BUSINESS MODEL



- EFFICIENCY IMPROVEMENTS OF 40%
- NO UPFRONT CAPITOL
- REDUCED EMMISSIONS

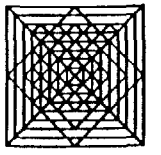
The Keys to Making Money

Presented to:

1993 Eastern European Energy Efficiency Market Development Delegation

Presented by:

Alain Streicher
RCG/Hagler Bailly, Inc.



Maximize Revenues

+

Minimize Costs

=

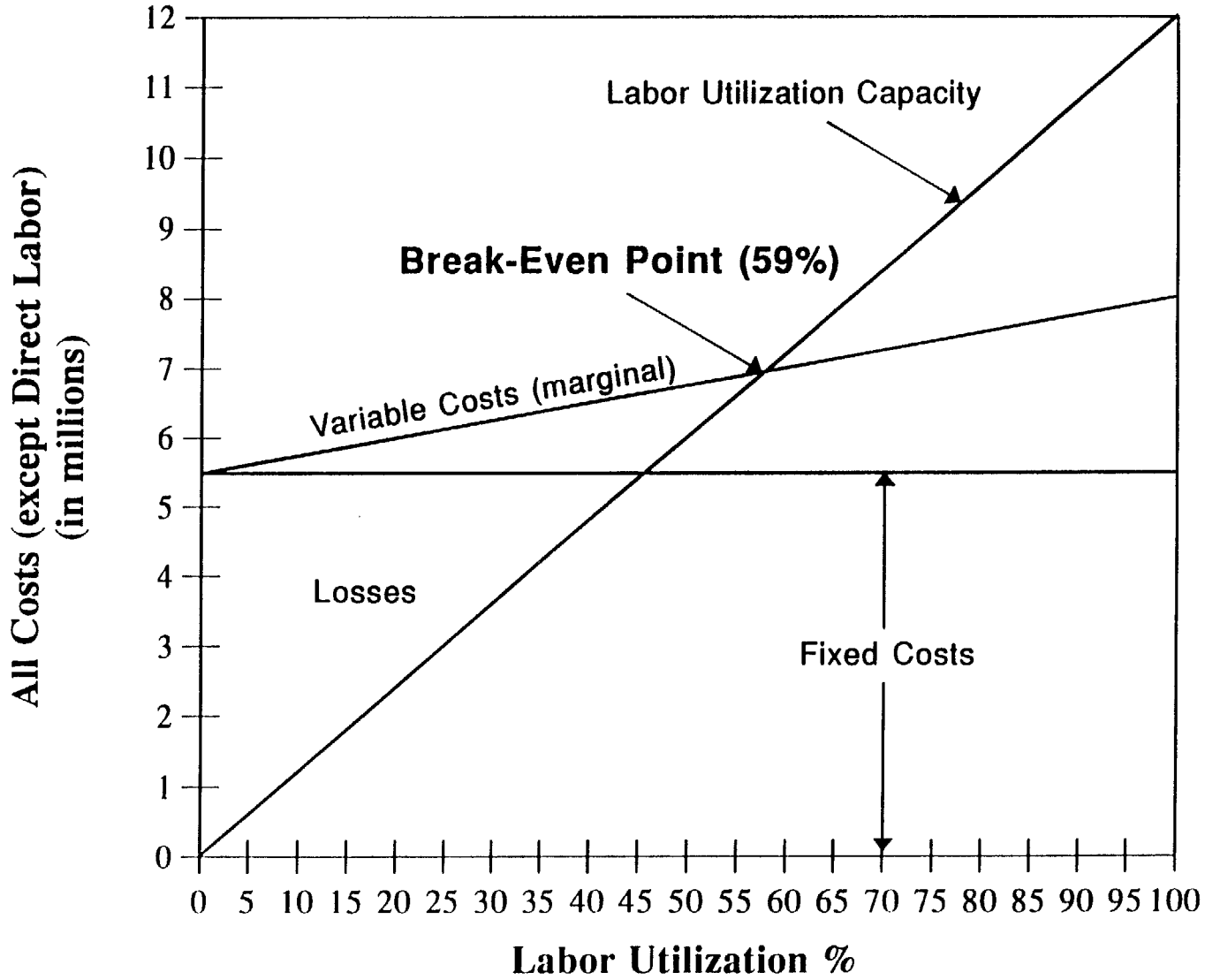
Making Money

Revenues = $\sum$ hours sold x hourly rates + σ markups

Costs = Everything else and made of:

- Fixed
- Variable

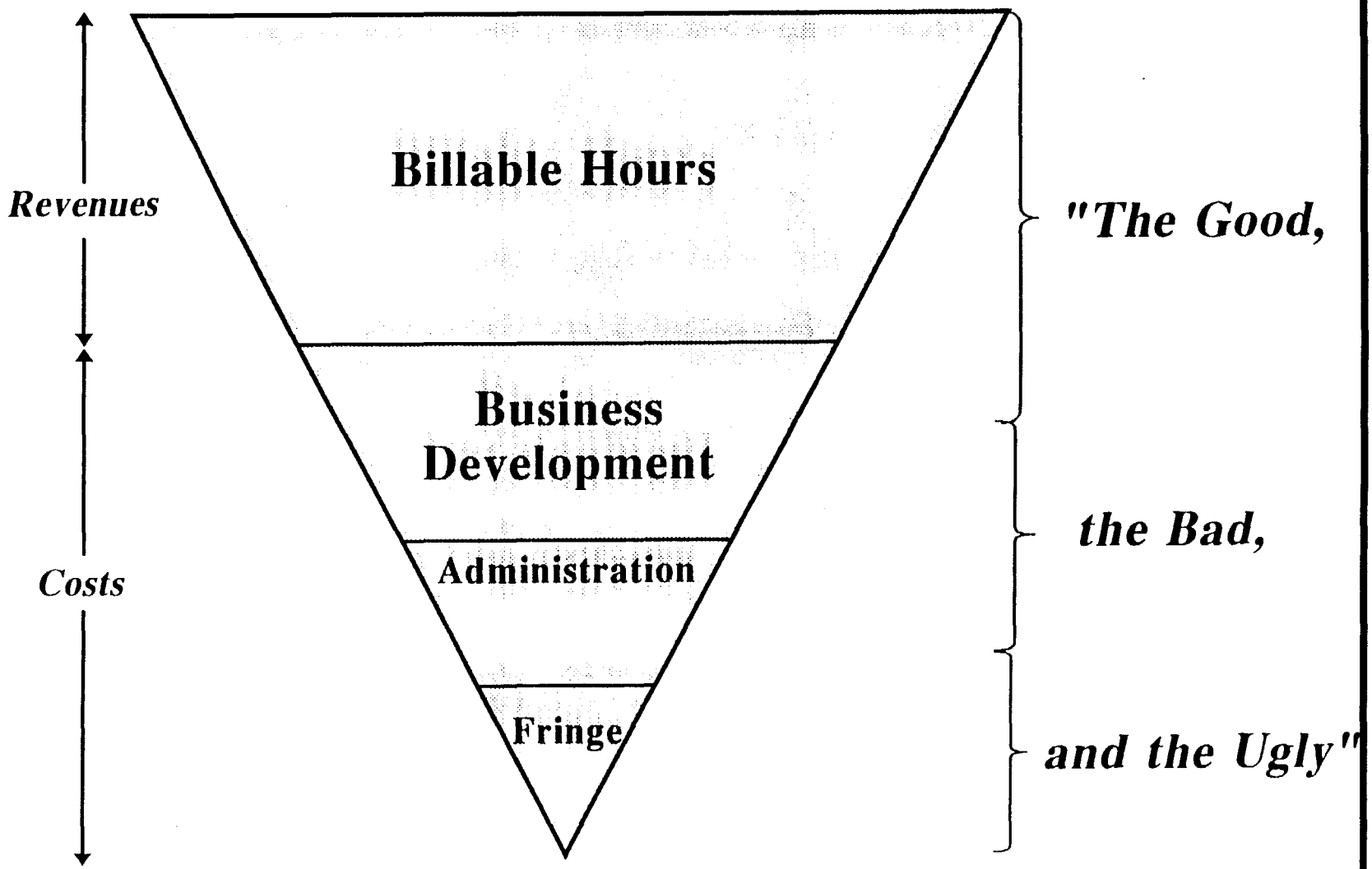
Labor Utilization Break-Even Chart (1993)



Key Recipes

Field	Activity
• *People*	Maximize applied rate Pay no more than market price for salaries
• *Operation*	Minimize fixed costs Control variable costs
• *Contracts*	Negotiate skillfully Manage tasks efficiently

After the Contract, the "Time Card" is the Most Important Piece of Paper:



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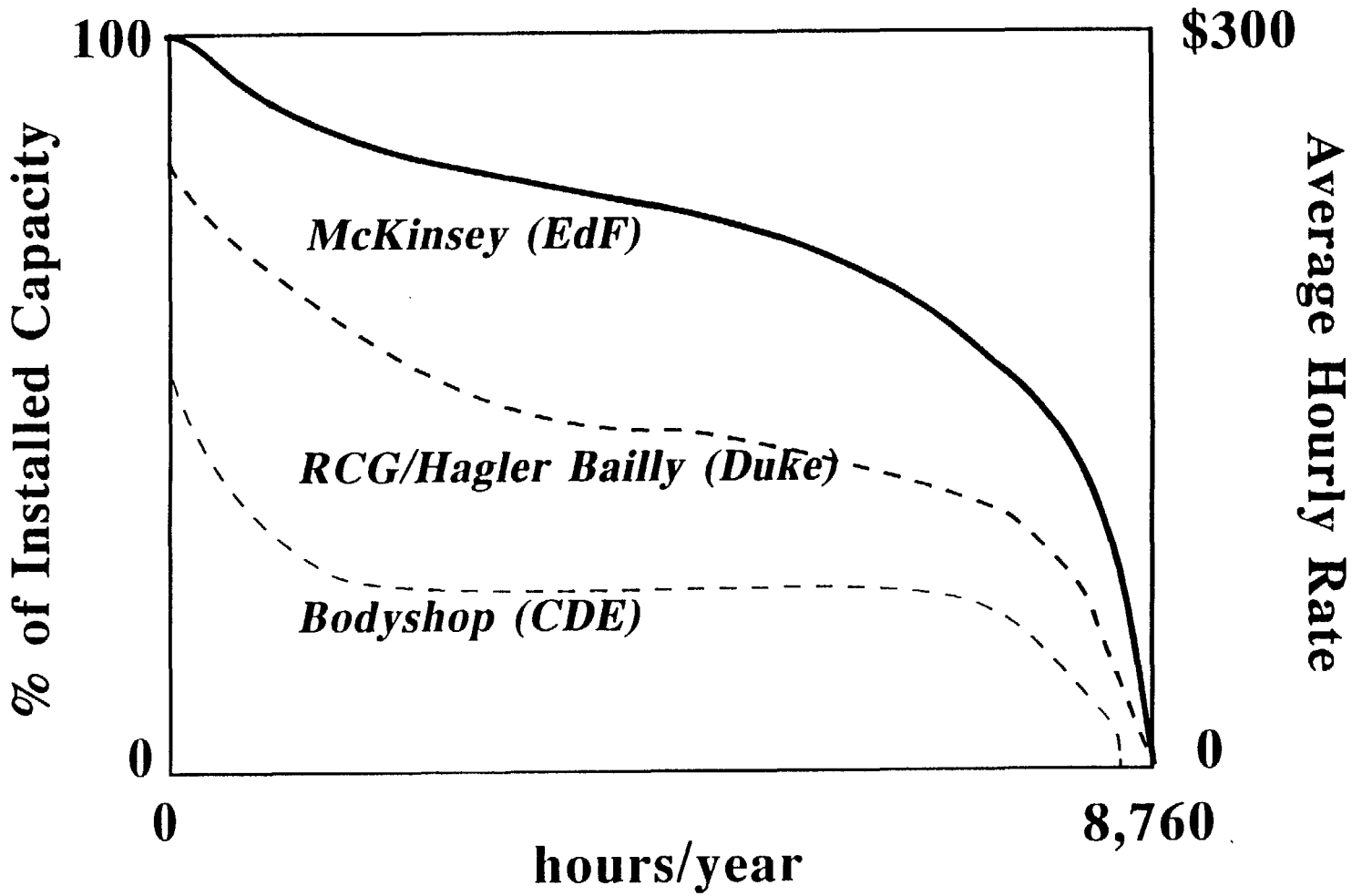
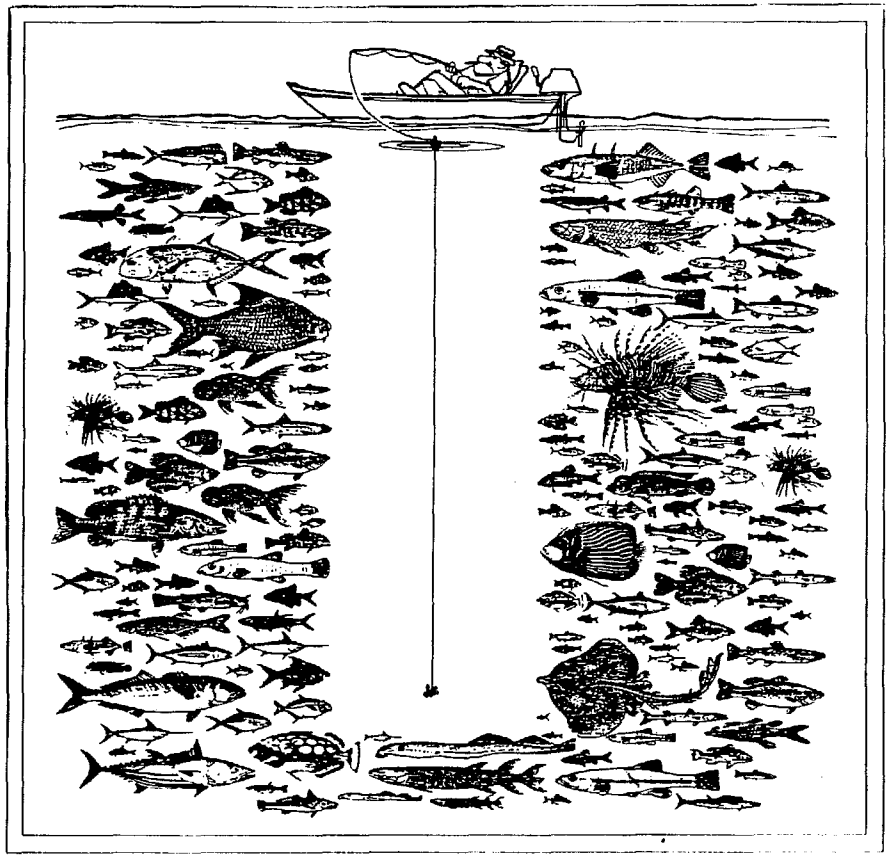
Finally, **Managing a consulting firm is very similar to managing any service activity, e.g. an electric utility** (next slide)

Revenues


100
$300
% of Installed Capacity
Average Hourly Rate
McKinsey (EdF)
RCG/Hagler Bailly (Duke)
Bodyshop (CDE)
0
0
0
8,760
hours/year

CONSULTING AND THE POWER OF INFORMATION



Prepared by RCG/Hagler, Bailly

October 1993

INFORMATION IN CONSULTING IS KEY TO KNOW

- YOURSELF (for pricing your services)
- YOUR CLIENTS (for good marketing)
- YOUR MARKETS (for increasing your value)
- YOUR COMPETITION (for best positioning)
- ABOUT NEW PRODUCTS, SERVICES AND IDEAS.

SOURCE: RCG/Hagler, Bailly

October 1993

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FROM INFORMATION TO VALUE ADDITION

- FIND THE RIGHT/USEFUL INFORMATION
- DEVELOP/MAINTAIN/ENRICH NETWORKS
- MEASURE/INCREASE THE VALUE OF INFORMATION
- KNOW HOW TO READ NEW INFORMATION
- DEVELOP YOUR OWN INFORMATION TOOLS
- BUNDLE AND PACKAGE INFORMATION

SOURCE: RCG/Hagler, Bailly

October 1993

A FEW STORIES FULL OF INFORMATION

- "We were able to answer right away... We said that we did not have any idea but we also knew that nobody else did."

  The value of a fact that nobody knows often is between null and zero.

- Reading yesterday's news with tomorrow's mind -- *mixing cold facts with hot tea leaves.*

- The Heisenberg principle of information gathering

- The path of least intelligence where the information runs in circles

- The bright data base that densified like a black hole

- The information that was so useful that it never got mentioned.

SOURCE: RCG/Hagler, Bailly

October 1993

APPENDIX M

16TH WORLD ENERGY ENGINEERING CONGRESS EVALUATION FORMS

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:

AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name PAUL ZARA PHD CEM Title GENERAL MANAGER

Company BUREAU OF INDUSTRY & TECHNOLOGY LTD

Address 77 ICOANEI STR BUCHAREST-1 72128 ROMANIA

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. What is your overall evaluation of the conference program?.....(A)
2. Overall presentations were:.....(A)
3. Organization and coordination of the Congress was:.....(A)
4. The services and meeting facilities were:.....(A)

5. What would you like to see included or excluded in future programs?

6. What do you see as the key energy issues/problems in the coming years?

= NUCLEAR FUSION PLANTS, ENERGY EFFICIENCY PROJECTS, NEW SOURSES OF ENERGY.

7. Please name the speaker and/or session you found most interesting and why?

SHIRLEY HANSEN & TOM DREESEN - PERFORMENCE CONTRACTING.

8. Please name the speaker and/or session you found least interesting and why?

9. YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:

AN EXCELLENT EVENT

10. If you liked this program, may we use your comments in future Congress literature?
X Yes ____ No

11. What is your primary area of responsibility? Engineering ___ Management X
Marketing ___

Other: CONGRATULATIONS FOR THE EXCELENT ORGANISATION. IN THE FUTURE PLEASE REPLACE THE OBSOLETE ROMANIAN FLAG AND IN THE LIST (ATTENDANCE LIST) THE NAME OF MY COUNTRY.

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:
AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name Valentin Vasile N. Cristescu Title Managing Associate

Company ECO-VEL SRL

Address 126 Iancului St., CP 39-122, Bucuresti 73200, Romania

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. What is your overall evaluation of the conference program?.....(A)
2. Overall presentations were:.....(A)
3. Organization and coordination of the Congress was:.....(A)
4. The services and meeting facilities were:.....(A)

5. What would you like to see included or excluded in future programs?

6. What do you see as the key energy issues/problems in the coming years?
World energy market. Dissemination of high technology and American expertise throughout the world for world resources and environment protection

7. Please name the speaker and/or session you found most interesting and why?
Performance contracting / Shirley Hansen, Tom Greesen / International Energy Opportunities / Suzanne Smith

8. Please name the speaker and/or session you found least interesting and why?

9. YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:
Congratulations for the excellent organization and our gratitude for the kindness toward Romanian delegation

10. If you liked this program, may we use your comments in future Congress literature?
X Yes ____ No

11. What is your primary area of responsibility? Engineering ___ Management X
Marketing ___
Other: For future events, replacing of the obsolete Romanian flag

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:
AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name MIHAIL ZDRAVCU Title Engineer

Company ARCON SRL

Address Romania, Bucharest, str Odobesti 1, Bl Z2, Ap 59

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. What is your overall evaluation of the conference program?.....(A)
2. Overall presentations were:.....(A)
3. Organization and coordination of the Congress was:.....(A)
4. The services and meeting facilities were:.....(B)

5. What would you like to see included or excluded in future programs?

6. What do you see as the key energy issues/problems in the coming years?
Industrial energy consumption to be reduced and new processes implementation

7. Please name the speaker and/or session you found most interesting and why?
Mr Frank Stewart and Henry A. Courtright

8. Please name the speaker and/or session you found least interesting and why?

9. YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:
O.K.

10. If you liked this program, may we use your comments in future Congress literature?
X Yes ____ No

11. What is your primary area of responsibility? Engineering X Management X
Marketing X
Other: ____

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:
AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name DR. BLUMBERGA Title B.V. EKODOMA, Ltd, Riga

Company PRESIDENT

Address Lenches str 12-49, Riga, LV 1069, LATVIA

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. What is your overall evaluation of the conference program?....(A)
2. Overall presentations were:....(B)
3. Organization and coordination of the Congress was:....(A)
4. The services and meeting facilities were:....(B)

5. What would you like to see included or excluded in future programs?

More about energy economy analysis methods

6. What do you see as the key energy issues/problems in the coming years?

Psychological issues in energy efficiency improvement in Latvia

7. Please name the speaker and/or session you found most interesting and why?

International Markets for Energy Efficiency Products and Services, SUZANNE SMITH

8. Please name the speaker and/or session you found least interesting and why?

Session: Structuring lighting retrofit project for success.

9. YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:

10. If you liked this program, may we use your comments in future Congress literature?
+ Yes ____ No

11. What is your primary area of responsibility? Engineering + Management ____
Marketing ____
Other ____

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:
AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name KAZYS ŽILYS Title HEAD OF R&D DEPARTMENT

Company MINISTRY OF ENERGY

Address 36 GEDIMINO AV, VILNIUS, LITHUANIA

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. What is your overall evaluation of the conference program?___(A)
2. Overall presentations were:.....(A)
3. Organization and coordination of the Congress was:.....(A)
4. The services and meeting facilities were:.....(A)

5. What would you like to see included or excluded in future programs?

EXTEND THE SECTION ON INTERNATIONAL ENERGY ISSUES

6. What do you see as the key energy issues/problems in the coming years?

FOR LITHUANIA: 1. SECURITY OF FUEL SUPPLY
2. BALANCE OF PAYMENTS

7. Please name the speaker and/or session you found most interesting and why?

OPENING CEREMONIES
MR. FRANK STEWART

8. Please name the speaker and/or session you found least interesting and why?

9. YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:

I HIGHY APPRECIATE THE ATTENTION HAS BEEN PAID TO EASTERN EUROPEAN DELEGATION

10. If you liked this program, may we use your comments in future Congress literature?
X Yes ____ No

11. What is your primary area of responsibility? Engineering X Management X
Marketing ____
Other: ____

K. Žilys

6.7

16th WEEC/ 3rd ETE

Fill in and return to REGISTRATION DESK or mail:
AEE, 4025 Pleasantdale
Suite 420
Atlanta, GA 30340
FAX: 404-446-3969

COMMENT SHEET

Name HEINAR NURSTE Title man. director

Company EnPro Engineers Bureau Ltd

Address Mustamäe tee 33, Tallinn EE0006, ESTONIA

Use a grade of "A" for excellent, "B" for average, and "F" for poor.
Please put the letter grade in the space provided ( ).

1. **What is your overall evaluation of the conference program?.....**(A)
2. **Overall presentations were:.....**(A)
3. **Organization and coordination of the Congress was:.....**(A)
4. **The services and meeting facilities were:.....**(A)

5. **What would you like to see included or excluded in future programs?**
May be more reviews and evaluations of trends in energy engineering field

6. **What do you see as the key energy issues/problems in the coming years?**
efficiency and environmental problems

7. **Please name the speaker and/or session you found most interesting and why?**
Loretta A Smith energy management sessions most informal for me

8. **Please name the speaker and/or session you found least interesting and why?**
This is hard to say. Just several sessions were away from my immediate interests, & it was not possible to visit all of them

9. **YOUR OVERALL REACTION/EVALUATION/ADDITIONAL COMMENTS:**
The Congress covered wide range of energy and environmental topics and that was very valuable to receive as wide as possible overview what is happening. I collected all available information ~~as~~ which may be useful in consulting business and also many contacts were identified or established

10. **If you liked this program, may we use your comments in future Congress literature?**
X **Yes** _____ **No**

11. **What is your primary area of responsibility? Engineering** (X) **Management** X **Marketing** X
Other: To make my company a successful one

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APPENDIX N

INVITATIONAL TRAVEL EVALUATION FORMS

Ministry of Energy | Republic of Lithuania

To: Laurent Pommier
Company: RCG/Hagler Bailly
Phone: 1 703 351 0327
Fax: 1 703 351 0342

From: Kazys Žilys
Research and Development Department
Phone: 370 2 61 18 84
Fax: 370 2 62 68 45

Date: 93.11.02
Pages including this cover page: 2

Dear Mr. Pommier:

Please accept and extend to Mr. David Keith and all the staff of RCG/Hagler, Bailly, Inc. my cordial thanks for the very well organized visit to the World Energy Engineering Congress in Atlanta and beautiful reception in Washington.

Warm handshakes of kind people we met and astonishing pictures of city Washington we remember forever.

Thank you very much again for your care of.

Hereby I enclose the comment sheet.

Sincerely,

Ministry of Energy | Lithuania

To: Laurent Pommier
Company: RCG/Hagler, Bailly, Inc.
Phone: 1 703 351 0300
Fax: 1 703 351 0342

From: Kazys Žilys
Research and Development Department
Phone: 370 2 61 18 84
Fax: 370 2 62 68 45

no 962 fax

Date: 21/11/93
Pages including this cover page: 7

Dear Mr. Pommier,

Thank you for the fax on November 18, 1993. Please excuse me for delay.

Working on the preparation of the Evaluation Form I had a pleasure to be again with the members of your company and remember those beautiful days I spent not so far ago in Atlanta and Washington. Hereby I append the Form you asked me.

Using opportunity I would like to express my gratitude to Mr. David Keith for the invitation and for covering the expenses and to you personally for well done job.

Looking for the further collaboration.

Yours sincerely,

Mr. Žilys

USAID REGIONAL ENERGY EFFICIENCY PROGRAM

Invitational Travel:
16th World Energy Engineering Congress

October 24 - 31, 1993

Organized by: RCG/Hagler, Bailly, Inc.

POST-VISIT EVALUATION FORM

In order to improve the quality of this program RCG/Hagler, Bailly and USAID request that you complete and return this evaluation form. Please return it to Mr. Laurent Pommier before your departure or send it back to him before November 15 at RCG/Hagler, Bailly, Inc., 1530 Wilson Boulevard, Suite 900, Arlington, VA 22209, Fax; (703) 351-0342 or Telex: 710-822-1150

Your cooperation is greatly appreciated.

NAME: KAZYS ŽILYS
TITLE: HEAD OF R&D DEPARTMENT
COMPANY: MINISTRY OF ENERGY
ADDRESS: 36 GEDIMINO AV.
2600 VILNIUS LITHUANIA
TEL: 370 - 2 - 61 18 84
FAX: 370 - 2 - 62 68 45
TELEX:

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

ADEQUATE

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Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

AEE ACTIVITIES
OPENING CEREMONIES
INTERNATIONAL ENERGIE OPPORTUNITIES

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

MY IMPRESSION — IT WAS ADDRESSED MAINLY TO U.S. MARKET.

What were your overall impressions of the trade exhibition?

IT WAS VERY WELL ORGANIZED IN ACCORDANCE WITH THE BEST AMERICAN TRADITIONS

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

I AM NOT CONFIDENT I SAW EVERYTHING.

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

YES

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

YES

Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

YES

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

YES. IT WAS FIRST-HAND INFORMATION FROM THE PRIVATE COMPANY TO THE PRIVATE COMPANY. IT WAS EMOTIONAL AND ABSOLUTELY NECESSARY. IT IS NOT POSSIBLE TO READ ABOUT IT IN WRITTEN PAPERS.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

VERY POSITIVE. HIGH QUALTY. BEING ENERGY ENGINEER I ENRICHED MY KNOWLEDGE ABOUT THE PROBLEMS OF USA. ENERGY COMPANIES

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

GOOD.

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

TOLERABLE.

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Did you attend the session on ABB Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

YES

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

YES

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

YES IT WAS. THE TOPICS WERE IMPORTANT. ALL SPEAKERS WERE FRANK AND OPEN-HEARTED.

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

IT WAS A PRIVIEGE TO MEET MR. R. ARCHER AGAIN.
I HIGHLY APPRECIATE HIS WILLINGNESS TO ASSIST BALTIC COUNTRIES.

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

MORE ATTENTION TO INTERNATIONAL ACTIVITIES.

Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

YES

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

MY INTEREST IS TO ACTIVATE AND PROMOTE THE COLLABORATION BETWEEN LITHUANIA AND U.S. COMPANIES IN ENERGY FIELD.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

What was the *most* informative part of the trip?

CONGRESS AND EXHIBITION

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What was the *least* informative part of the trip?

?

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

YES THEY ARE.
I AM READY TO ASSIST PREPARING THE LIST.

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

YES I DO.
LAURENT ANTICIPATED EVEN LITTLE NOTHINGS OF LIFE.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

IT WAS BUSY. IT HAS TO BE BUSY.

What did you think of the social events and tours organized?

EXCELLENT!
EVEN HEAVY RAIN IN WASHINGTON D.C. COULD NOT SMOTHER THE AMAZING IMPRESSION.

Do you have any additional comments or recommendations?

IT WAS WONDERFUL COMBINATION:
* CONGRESS
* EXHIBITION
* MEETINGS
* DISCUSSIONS
* SOCIAL EVENTS

NOTHING TO RECOMMEND.

THANK YOU. SINCERELY,
1993.11.21.

ECO-VEL S.R.L.
126 Iancului St., Sector 2
P.O. Box 39-122, 73200 Bucureşti, ROMÂNIA
Tel. 401.653.71.58, Fax 401.312.79.56

November 10, 1993

Mr. David Keith
RCG/Hagler, Bailly, Inc.
1530 Wilson Boulevard, Suite 900
Arlington, VA 22209-2405
USA

Dear Mr. Keith:

I thank you very much for your kindness and the sustained effort of RCG/Hagler, Bailly team, especially Mr. Laurent Pommier, during my visit to United States, attending the 16th World Energy Engineering Congress.

No more less I appreciate all the other meetings and visits, with Mr. Robert Archer, Deputy Director AIR/AUR/EI/DR and the manegement of Dean Oliver&Associates and Southern Company, Georgia Power/SEI.

I am very greatful for the occasion to meet special people on the evening of October 27 and at the reception in your office on October 29.

The last but not the least the tour of Washington D.C. led by Mrs. Jan Paper of Sarah Cooper Associates was a wonderful event of the visit.

Thank you again for your kindness.

With best regards.

Sincerely,

Valentin Vasile Cristescu
Managing Associate

Enclosed: Post-Visit Evaluation Form

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USAID REGIONAL ENERGY EFFICIENCY PROGRAM

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Your cooperation is greatly appreciated.

NAME Valentin Vasile Cristescu
TITLE Managing Associate
COMPANY ECO-VEL SRL
ADDRESS 126, Iancului St. P.O. Box 39-122
73200 Bucharest Romania
TEL (401) 653-71-58
FAX (401) 213-79-56
TELEX

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

The package of informations of the technical sessions is extremely valuable and therefore adequate.

Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

Performance Contracting.
Most related to our problems.

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

No.

What were your overall impressions of the trade exhibition?

Very good. Also Powdex and Paint Industries' Show.

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

No.

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

Yes.

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

Yes.

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Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

Yes.
(Professor Walter Johnston and) Mr Lawrence Good and Mr Martin Mozzo were the guests of a very interesting exchange of informations.

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

Being present also Mr. Walt Lowthian.
Excellent
Very interesting and very useful.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

Very good.
Interesting and useful.

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

Very good
Very interesting and useful

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

Excellent
Very interesting and very useful
PER method is a very interesting approach

Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

Yes.
Very interesting and very useful

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

Excellent.
Very interesting and very useful.

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

Excellent
Very interesting and very useful

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

I think the feedback presented by the members of the delegation was interesting. Also the proposals for the future steps of the project could be of interest.

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

Informations about U.S. regulations regarding energy market.

632

Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

Yes

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

Yes
Act as representative in my country and provide local consulting services

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

Process energy reduction.
The method aims at changing how the process is done so that the demand is less.

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

Relationship of Suppliers to Consulting Engineers
Financing innovative solution

What was the *most* informative part of the trip?

16th World Energy Engineering Congress & Expo.

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What was the *least* informative part of the trip?

Georgia Power Company.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Yes.
Romanian AEE members.

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

Yes. Plenty of support.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

It was very busy, but I think we could have managed even a busier schedule.

What did you think of the social events and tours organized?

Very pleasant and interesting. I am sure all the participants had a great time.

Do you have any additional comments or recommendations?

Many thanks to RCG/Hagler, Bailly Team for their effort and kindness during our Travel.

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USAID REGIONAL ENERGY EFFICIENCY PROGRAM

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16th World Energy Engineering Congress

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Organized by: RCG/Hagler, Bailly, Inc.

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Your cooperation is greatly appreciated.

NAME TIBOR NAGY
TITLE CONSULTANT
COMPANY CONTROLL QUALITY CONSULTING LTD.
ADDRESS 34/B RADVÁNY STR.
BUDAPEST 1118, HUNGARY
TEL 36-1-267 1101, 36-1-267 1102, 36-1-166 1902
FAX 36-1-161 2040
TELEX —

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

GENERALLY, THE INFORMATION PRESENTED AT THE TECHNICAL SESSIONS WAS ADEQUATE, BUT SOMETIMES LOOKS TOO COMPLEX.

635

Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

UPGRADING LIGHTING SYSTEMS FOR EFFICIENCY IMPROVEMENT
↳ LOT OF NEW TECHNICAL INFORMATION

INTERNATIONAL ENERGY OPPORTUNITIES
↳ WE GOT INFORMATION ABOUT THE OTHERS EXPERIANCES

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

I DID NOT FIND.

What were your overall impressions of the trade exhibition?

THE NUMBER OF EXIBITORS WERE FEW. I WOULD BE INTERESTED ~~BUT THE~~ IN ENERGY EFFICIENT EQUIPMENT AND MACHINES. BUT THE EXISTING EXIBITORS GAVE TECHNICAL INFORMATION AND WAS READY TO SELL THEIR PRODUCT. NOBODY DOES PERFORMANCE CONTRACTING

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

NO, I THINK WAS NOT

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

YES, I COULD.

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

YES, I WAS.
I WAS A LITTLE BIT DISAPPOINTED BECAUSE THE FEW NUMBER OF INDIVIDUALS AND COMPANIES. I WOULD EXPEC MORE INTERESTING FROM THE AMERICAN BUSINESS REPRESENTATIVES SIDE.

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Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

NO, I DIDN'T.

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

IT WAS TOO BASIC. HE DIDN'T GIVE ANY SPECIFIC INFORMATION, HE JUST FOCUSSED ON THE CONNECTIONS WE WOULD EXPECT MORE MANAGEMENT INFORMATION.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

THEIR PRESENTATION WAS INTERESTING, I ENJOYED THESE. THE TARIFF DATES AND THE COSTUMER TARIFF MANAGEMENT & INFORMATION SYSTEM IS VERY INTERESTING

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

HIS LECTURE INCLUDED VERY MUCH INFORMATION. I VALUATED IT AS A CLEVER MARKETING PERSON WHO BECOME TO BUILD HIS EUROPEAN BUSINESS.

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

YES, THEY SHOWED THE METHOD OF PROCESS ANALYZING AND IT WAS A NEW WAY TO DO ENERGY AUDIT FOR ME. IT WOULD BE NICE TO GET MORE TEC. INF. FROM THE PROCESS ANALYZING PROGRAM (SOFTWARE)

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Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

NO, I AM SORRY.

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

WE HAVE ALREADY KNOW ~~AB~~ THE INFORMATION GIVEN BY THEM. WHEN I ASKED CONCRETE INFO FROM THEM, I DIDNT GET REALLY ANSWER, BECAUSE IT IS THEIR BUSINESS.

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

IT WAS INTERESTING AND SOME OF THEM WAS USEFUL (FOR EXAMPLE: HONNIVEL AND THE LAST LECTURER (INFORMATION QUESTIONS)

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

IT LOOKS VERY HELPFULL PERSON, HE CONSTRUCTIVE AND BRIGHT MEN, THE CONVERSATION WAS GOOD AND FRIENDLY. WE RECOMMED HIM SEVERAL IDEA, I HOPE THAT HE WILL REALISE THEM.

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

YES, IT WAS.
↳ MEETING WITH REPRESENTATIVES OF BIG MANUFACTURERS WHO ACCEPTING THE PERFORMANCE CONTRACTING.
↳ MEETING WITH REPRESENTATIVES OF EXIM BANK.

638

Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

YES, I COULD.

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

YES, I AM PLANNING

↳ PURCHASE PRODUCT, LOOK FOR FOUNDING, CONTRACT FOR SERVICES FROM HUNGARY TO US.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

→ FINANCIAL POSSIBILITIES → WE CAN START TO SAVE ENERGY.

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

→ INFORMATION ABOUT TURBINES AND GENERATORS.

What was the *most* informative part of the trip?

CONFERENCE

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What was the *least* informative part of the trip?

THERE IS NO LEAST PART.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

YES, I GOT.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

IT WAS NOT BUSY ENOUGH.
WE FINISHED TO EARLY. DURING THE CONFERENCE.

What did you think of the social events and tours organized?

THE BIG MISTAKE WAS THE WEATHER ON SATURDAY.
OTHERWISE IT WAS OK.
THANK YOU

Do you have any additional comments or recommendations?

FOR THE NEXT GROUP PLS PREPARE THE BUSINESS MEETING TOGETHER WITH THE INVITATION PAPER.

Σ: I ENJOYED THIS TRIP VERY MUCH.
THANK YOU

95. 11. 04.

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SOCIETATEA COMERCIALĂ
AUTOMATIZĂRI
ORION SRL
Certificat inmatriculare nr. J29/921/1991

PLOIEŞTI ✧ ROMÂNIA
str. Basarabi nr.14
tel. 097/15.02.00 097/12.13.11

Cod fiscal : 1 3 5 9 7 5 5

Ploieşti November 5

For Mr. David A. Keith, P.E.
Vice President

Dear David,

Hello from Romania!

I am looking through numerous papers that I brought from USA and each name reminds me of the interesting and wonderful people, at the same time, about the unforgettable days that I spent in your marvelous country.

This very busy but too short week of october, was certainly a great one. I think it was the best of my life, it was unique. Once again I am gratiful for your invitation, for this very pleasant and instructive visit to Atlanta and washington, where I was impresed by your warmly reception. Many, many thanks for all!

It was really a wonderful experience for me and I hope that our endeavours for our approaching will be successfully.

Best of luck in your future activities!

yours sincerelly

Simona Pârvu

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Your cooperation is greatly appreciated.

NAME SIMONA PÂRVU
TITLE ENGINEER / ASSOCIATE MANAGER
COMPANY AUTOMATIZĂRI ORION SRL
ADDRESS ROMANIA 2000 PLOIESTI 14 BASARABI STR.

TEL 4097155799 & 4097121311
FAX —
TELEX —

1. **World Energy Engineering Congress (Atlanta, Ga.)**

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

Overall impression – excellent! The level of the sessions was adequate. However, in Romania we are at the first paths in energy management and, of this point of view, some sessions were too complex for us, even putting unknown problems. A small example: the Air Conditioners are very recently (after 1989) introduced in our country.

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Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

Hard to choose! However, of the sessions I attended, I put on the first place the Mr. C. Kane's conference: „Managing the Risks of Performance Contr." as a very useful in our first steps in the selection of our clients for energy audits. I want to give emphasis to Mr. Hardin's conf. „Turn out those lights! Here Comes the Energy Patrol." as a very useful one and easy to put in practice. *

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

I don't think so. But, the problem of Eastern Europe level of energy efficiency and the possibilityes for the Americans buisness men to make money in our countryes, this problem should be put in a separate session, held perhaps by RCG/Hagler Bailly.

What were your overall impressions of the trade exhibition?

Very good. It is there I made many contacts with individuals and companyes for future business.

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

It wasn't represented the electrical sector for houses cleaning. In Romania we keep also the broom in any house. It's energy efficient, for sure, but it isn't for the 20th century!

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

I didn't know before so much about the american energy companyes because I am a beginner in this branch. But, I have met a lot of people and companyes interested in contacts with my firm. I am satisfyed of the contacts I have made.

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

Yes. I have met a few individuals and firms, but there were a small ones. Once again, I wish to express that it was maybe much useful for us, in this action, an involvement of an officiae on behalf of AEE.

* The book of proceedings of the Energy Engineering Congress is very useful, a true encyclopaedia of energy management and technologies.

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Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

No.

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

Overall impression - good. I am very pleased that I have got from Dean Oliver & Associates the documentation about them and it is very useful indeed.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

It was an interesting meeting and visit. The discussions and the visit have incited me to start to read the papers that I have gotten from Georgia Power Company.

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

YES

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

So, so.

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Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

NO, I am sorry!

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

So, so. Too short time for a round table with 20 participants! . . .

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

I was really impressed by your hospitality and by the professional explanations about your activities. I was also impressed by the presence of the important men in the company. I appreciate, in this case too, the documentation relating to your business. It was missing a lot of questions I didn't ask for, but I hope that I shall do this in the future, by letters.

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

Excellent! The USAID is really interested to help us! I saw this talking with Bob Archer Friday afternoon. It is very helpful and so exciting for me!

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

We didn't have enough time to explain our problems. Maybe we don't even know them so well ... We aspect you in Romania for a longer discussion.

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Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

The time wasn't enough to develop the relation ships right there, but we have made many contacts and we hope put in practice in the closed future much as possible of those contacts. It's up only to us. You held out your hand to us and now, it's our turn to reply.

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

Yes, yes, of course! The most interesting as financial benfits, would be to act as distributor/representative of an american company in Romania. I intend too, to keep contact with RCG/Hagler Bailly for follow up our energy audits and to develop in my company the branch of energy management.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

In my opinion, the first and easyer step in Romania is the lighting problem, in houses as well as schools and other buildings. Then, another important problem for our plants, but much more difficult to solve, is the thermal centrales with their old and wasteful boilers. My energy audits are centred upon this issue.

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

What was the *most* informative part of the trip?

About this trip to USA, I said all the time: „Where you look, you can find something new and interesting." However, the most informative was certainly the congress and the exhibition.

What was the *least* informative part of the trip?

The least informative part of the trip was, perhaps, the visit to Georgia Power, because we are not energy producers, but consumers.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Certainly. But I can not specify now.

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

I wasn't enough prepared for this trip, and I regret this, but it wasn't your fault. Certainly, Romania is very far from USA, in all directions.... I hope that, in the future, this huge distance can be shorted. Now, I know much more things about USA and about its good intentions, about Atlanta and its instructive wonderful congress.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

The overall schedule was busy, but very well organized. I wasn't tired. No problem! But, it was certainly too short time to see all the miracle of Atlanta and Washington. Many thanks to Laurent Pommier for being a wonderful host!

What did you think of the social events and tours organized?

All the reception was great! Many, many thanks! Thank you for the nice evening at „Dante's". / It was missing a tour of Atlanta with guide. The Washington's tour was very instructive and marvelous. Thank you also for the lovely evening reception to RCG/Hagler Bailly. However, I would prefered around table with all 16 delegates and the RCG hosts, a friendly meeting, with questions, answers, songs, wit, delight and your delicious meals!

Do you have any additional comments or recommendations?

This visit to USA was for me an excellent lesson and a great pleasure. Thank you again for your hospitality, for your very good ideas and realisations about this. / The romanian delegation I intend to propose to the other membres, an european meeting in Bucarest or Budapest with the 16 delegates for discuss about our own energy problems. It would be a great honor for us to invite members of RCG Hagler Bailly to joint us. See you soon in Europa!

Thank you again!

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POLISH POWER
GRID COMPANY

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tel. 21-49-04; 693-21-17
tlx. 814611 b pdm pl
fax.6285964

Warsaw, November 12, 1993

TELEFAX TRANSMISSION

To:
Mr. Laurent Pommier
RCG / Hagler, Bailly, Inc.
fax: (703) 351 0342

From:
Maciej Lenczewski

Number of pages:
1 + 6

Dear Laurent

Please find attached filled out my evaluation form. I'm sorry for delaying with sending it to you. I hope I'm not the last one. Apart from this, once again your organization of trip was excellent. Comment Sheet on 16th WEEC I've sent to their Program Manager office.

As you know during week 15 to 19 November David Wolcott will be in Poland. If you need to send him an information and have any problem, please contact with me.

Best regards

Maciej Lenczewski

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USAID REGIONAL ENERGY EFFICIENCY PROGRAM

Invitational Travel:
16th World Energy Engineering Congress

October 24 - 31, 1993

Organized by: RCG/Hagler, Bailly, Inc.

POST-VISIT EVALUATION FORM

In order to improve the quality of this program RCG/Hagler, Bailly and USAID request that you complete and return this evaluation form. Please return it to Mr. Laurent Pommier before your departure or send it back to him before November 15 at RCG/Hagler, Bailly, Inc., 1530 Wilson Boulevard, Suite 900, Arlington, VA 22209, Fax: (703) 351-0342 or Telex: 710-822-1150

Your cooperation is greatly appreciated.

NAME MACIEJ LENCZEWSKI
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00-496 WARSAW, POLAND
TEL 693 13 26
FAX 628 04 96
TELEX 0196 11 B PDM PL

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

INFORMATION HAS CONCERNED SITUATION IN ENERGY INDUSTRY IN U.S. PRIMARILY.
I COULD FIND THERE ENOUGH DETAILED INFORMATION
I FEEL THERE WERE NO GENERAL PRESENTATIONS OF NEW IDEAS IN ENERGY MANAGEMENT

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Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

THE MOST IMPORTANT INFORMATION I'VE GAINED THROUGH SESSION ON DSM BIDDING and PLANNING

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

I THINK TECHNICAL SESSIONS COVERED ALL IMPORTANT TOPICS ON ENERGY EFFICIENCY

What were your overall impressions of the trade exhibition?

IT WAS STRICTLY TRADE EXHIBITION – RATHER EQUIPMENT AND SERVICES INDIRECTLY RELATED TO PRODUCTS WERE PRESENTED THAN WHAT I'D BEEN INTERESTED IN GLOBAL SOLUTIONS FOR PROBLEMS IN ENERGY EFFICIENCY

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

I THINK TECHNOLOGIES FOR INDUSTRIAL PROCESSES MANAGEMENT WERE POORLY REPRESENTED

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

YES

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

I WAS NOT PRESENT AT THIS SESSION

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Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

I ATTENDED ROUND TABLE ON DSM BIDDING and PLANNING INFORMATION IS USEFUL - I'VE LEARNED ABOUT DETAILED PROBLEMS IN BIDDING PROCESS

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

IT GAVE GOOD IMAGE HOW SMALL COMPANIES WORK IN U.S.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

OVERLOOK OF GEORGIA POWER COMPANY ACTIVITIES WAS INTERESTING FOR ME - ESPECIALLY INFORMATION ON DSM PROGRAMS.

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

THEY GAVE COMPREHENSIVE DESCRIPTION OF EFFICIENCY IN INDUSTRIAL PROCESSES. INFORMATION USEFUL FOR SPECIALISTS AND FOR NON SPECIALISTS (LIKE ME) - I'VE LEARNED ABOUT POTENTIALS AND REQUIREMENTS FOR COMPETENT IMPROVEMENT IN INDUSTRIAL PROCESSES

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Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

NO I DID NOT

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

VERY IMPORTANT FOR ME WAS INFORMATION ON ENERGY SERVICE COMPANIES

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

THIS MEETING DELIVERED ESSENTIAL INFORMATION ABOUT COMPANY'S ACTIVITIES AND ITS BUSINESS PHILOSOPHY

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

THIS MEETING WAS SUBSTANTIAL - IT GAVE SOME INSIGHT IN U.S. GOVERNMENT POLICY CONCERNING SUPPORT TO ECONOMY DEVELOPMENT

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

I THINK QUESTIONS RELATED TO INSTITUTIONAL CHANGES IN POST COMMUNIST COUNTRIES SHOULD BE BETTER ADDRESSED

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Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

YES, I WAS ABLE

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

OBJECTIVE WITH CONTACTS I'VE MADE IS TO PROVIDE CONSULTING SERVICES

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

I THINK APPLICATIONS RELATED TO IMPROVEMENT IN INDUSTRIAL SECTOR WILL BRING THE GREATEST RESULTS. THAT'S BECAUSE SECTOR IS ENERGY INTENSIVE AND THERE IS ALOT OF SIMPLE RESERVES THAT CAN BE EXPLORED WITH LOW CAPITAL INVOLVEMENT.

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

I THINK THAT IT'S VERY IMPORTANT TO SPREAD INFORMATION AMONG POTENTIAL PARTICIPANTS TO THE ENERGY EFFICIENCY MARKET. ALSO DELIVERY OF KNOW HOW TO EXISTING ONE IS IMPORTANT

What was the *most* informative part of the trip?

THE MOST INFORMATIVE WAS WEEC AND ASSOCIATED MEETINGS

What was the *least* informative part of the trip?

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

ORGANIZATIONS WITH ITS PURPOSE IN IMPROVEMENT OF EFFICIENCY COULD BENEFIT:
- FOUNDATION FOR ENERGY EFFICIENCY (FENE)

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

INFORMATION AND SUPPORT WERE EXCELENT BOTH ON THE START AND DURING ALL VISIT

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

OVERALL SCHEDULE WAS BUSY ENOUGH

What did you think of the social events and tours organized?

SOCIAL EVENTS HELPED TO BUILD UP CONTACTS AND TO RELAX TOURS AND ~~THEN~~ ALL THE TRIP ORGANIZATION WERE EXCELLENT

Do you have any additional comments or recommendations?

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TELEFAX MESSAGE

To: Mr. Laurent Pommier
RCC/Hagler, Bailly, Inc.
1530 Wilson Boulevard
Suite 900
Arlington, VA 22209-2406
USA
Fax: (703) 351 0342

Date: November 4, 1993

From: Heinar Nurste

Total number of pages: 1

E n P r o Inseneribüroo OÜ

E n P r o Engineers Bureau Ltd

Mustamäe tee 33 Tallinn EE 0006

☎ +372 2 52 86 06 Fax +372 2 52 84 07

Dear Laurent:

Thank you very much for your hospitality during the visit to US. That trip was informative and useful for me, for my company and by the way I hope a little bit to Estonia also. I retain the best remembrance of this unique itinerary.

I wish you success and luck and hope that we will have interesting and useful contacts in the future.

Best regards,

Heinar

USAID REGIONAL ENERGY EFFICIENCY PROGRAM

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Your cooperation is greatly appreciated.

NAME HEINAR NURSTE
TITLE man. director
COMPANY EnPro Engineers Bureau Ltd
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TALLINN EE0006, ESTONIA
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FAX 372 2 528407
TELEX

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

By my opinion the presentations were orientated for practical purposes and adequate

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Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

Effective energy management – this is most acute in Estonia

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

economical questions

What were your overall impressions of the trade exhibition?

well organized and covering wide areas of equipment

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

District heating – but this is not widespread in US

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

yes, quite many useful contacts

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

yes, but maybe not too big interest was shown up to Estonia, but this is understandable

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Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

~~yes~~ no

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

yes, they promised later to ~~sed~~ send us information, concerning pressurized air system audits

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

That was interesting visit, information was useful to understand how the company operates and manages energy efficiency

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

Meeting was informative and useful for me

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

~~yes~~ very friendly meeting and useful for me

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Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

Yes I am thinking about the starting a Chapter in Estonia

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

yes, the information was useful.

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

RCG/HB looks impressive and effective. The information was useful but I feel that there is still much to learn how the successful consulting company works and that requires ~~special~~ more time and being inside — maybe there is possibility to organize training courses or better — to work for some time in a team of HB

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

very good impressions — he is well informed and interested in gaining results

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

This is hard to say in the spot

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Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

I believe that I did my best to contact all possibly interesting and useful companies and persons

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific. yes, of course

provide local consulting services and later may be internationally.
contract for services (cooperation in projects)
other objectives are not excluded, provided there will be opportunity and demand

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

for us – energy audits business
for Estonia – end use consumers – to put them right

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

financial and economical questions – they determine the demand on energy efficiency market

What was the *most* informative part of the trip?

I fail to say, maybe Friday in HB office

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What was the *least* informative part of the trip?

while sleeping

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

our competitors

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

yes, everything was superbly organized – great thanks!

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

Quite busy and that was good

What did you think of the social events and tours organized?

they were excellent – great thanks!

Do you have any additional comments or recommendations?

I would like to thank very much RCG/Hagler, Bailly for organizing this trip and especially express my gratitude to Mr. Lawrence Pomeroy, David Keith who made this trip so memorable and useful

My prime interest is to make my company a successful one and thus I am interested in all technical and managerial know-how, which will support our competitiveness

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USAID REGIONAL ENERGY EFFICIENCY PROGRAM

Invitational Travel:
16th World Energy Engineering Congress

October 24 - 31, 1993

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Your cooperation is greatly appreciated.

NAME	DR. DAGNIJA BLUMBERGA
TITLE	PRESIDENT
COMPANY	D.V. EKODOMA, Ltd RIGA
ADDRESS	ZENTENES STR 12-49, RIGA, LV 1069, LATVIA
TEL	419853
FAX	011 - 371 - 8830067 (USAID in RIGA)
TELEX	

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

All types I are in technical sessions:
adequate (some)
too complex (some)
too basic (some)

17-11-93 08:28 USAID LATVIA ID=35849103454 P.03

Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

International Energy Opportunities
I saw possibility to use our energy problems like our country (Latvia, Lithuania, some others.)

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

It was hard to visit all technical sessions which I wanted to hear. Therefore this question is...

What were your overall impressions of the trade exhibition?

Very big amount of exhibition, large range of devices and small interest in cooperation with East Europe

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

Only one "cogeneration unit" producer company

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

Yes!

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

I met some individuals and representatives from companies, we changed business cards but I don't hope in future collaboration with them

17-11-93 08:30 USAID LATVIA ID=3584810345 4 P.04

Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

Yes. I can't find answer on some questions connected with arrangement AEE Chapter of Latvia. I am looking forward to know about such kind of opportunity, importance ...

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

It was interesting, but I don't see usefull implementation for Latvia in nearly future. Perhaps after one, two years ...

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

Yes, it was very important for me. I made decision for further activities and way for company B.V. EKODOMA. Thank you for serious secret!

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

Thank you for possibility to visit State Department! It is always great to meet Mr. Robert Archer!

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

I didn't feel interest in contacts from USA manufacturers side. They don't see needs in market of energy saving in East Europe

17-11-93 08:31 USAID LATVIA ID=35849103954 P.06

Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

No, I was in exhibition hall and after that in CNN center.

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

Yes, thank you for opportunity to meet Mr. Richard Watkins.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

At first it was very interesting from methodological viewpoint. We are possibility to use that in lecture course at Riga Technical University.

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

Yes, it was very interesting. We changed business cards and I see good opportunities to contact with him in future.

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

I like to know about new energy analysis method (system) - Power energy reduction (PER). Unfortunately I didn't have answer about criteria used for this analysis. My impression - PER is black box with input and output. Who says about output - right or not so...?

17-11-93 08:30 USAID LATVIA ID-35848103454 P.06

Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?

Yes.

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.

I have proposals for some USA companies, but at first I would like to discuss about them with my college (Proposals: both purchase products, finding joint venture...)

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?

Energy economy analyses methods (energy audits, optimization, new equipment) - management. We are need to start in Latvia with energy management

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?

It is hard to say because energy economy in Latvia are starting with big reconstruction of structure.
(My opinion - first step is measurements in energy sector)

What was the *most* informative part of the trip?

Day in RCG/Hagler, Bailly office

17-11-93 08:32 USAID LATVIA ID=35842810364 P.07

What was the *least* informative part of the trip?

Thursday, October 28th in Atlanta (last day of conference)

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

My college: Dr. Ivars Veidenbergs, Dr. Saulis Bartkevičs
Other PhD student: Ivars Kreituss
Our Master degree students: Edgars Dankalnis, Ilmars Kasiks, Dainis Ozolniks, Kaspars Rozens

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

Yes, thank you! It was the best arrangement. I felt care both from RCG/Hagler, Bailly, Inc. and USAID in Riga.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

It was very busy week

What did you think of the social events and tours organized?

It was my first visit to USA and for me were real and interesting: Receptions and Banquets, excursions in Atlanta and meetings-too.
It was really great!

Do you have any additional comments or recommendations?

I am very thankfull for such great opportunity to be inside every business of USA

17-11-93 08:32 USAID LATVIA ID=35849103454 P.08

USAID REGIONAL ENERGY EFFICIENCY PROGRAM

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Your cooperation is greatly appreciated.

NAME MIHAIL ZDRAVCU
TITLE GRAL MANAGER
COMPANY ARCON SRL
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TEL 4-01-6736081
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TELEX

1. World Energy Engineering Congress (Atlanta, Ga.)

Was what your overall impression of the information presented at the technical sessions. For example, was it adequate, too complex or too basic?

ADEQUATE

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Of the different technical sessions you attended, which one did you find the most interesting and useful? Why?

OPENING CEREMONY - MR FRANK STEWART, H.A. COURT RIGHT, W. NITZE
PERFORMANCE CONTRACTING
VARIABLE SPEED DRIVEES
DEAN OLIVER ASSOCIATES INC; Southern Electric International Atlanta Georg

Were there any important topics relating to energy efficiency that you feel were not addressed by the technical sessions? Please specify.

- COGENERATION
- EASTERN COUNTRIES MATERS FOR ENERGY CONSERVATION

What were your overall impressions of the trade exhibition?

O.K.

Were there any important technologies relating to energy efficiency that you feel were not represented at the trade exhibition? Please specify.

AT ALL THER WERE NOT TECHNOLOGIES PRESENTATION (REFINERIES, GLASS FACTORIES, BOYLERS ETC).

Were you able to meet the individuals and companies that you wanted to meet at the Congress?

ROUND TABLES and EXHIBITION.

Were you present at the networking session organized on Wednesday afternoon for the US companies to come meet your delegation? Were you able to meet the individuals and companies that you were hoping to meet there?

PERFORMANCE CONTRACTING
ROUND TABLE

600

Did you attend any of the round-tables on Wednesday evening? Was the information exchanged interesting and useful to you?

CONTRACTING PERFORMANCE
SMALL INTEREST BUT IT WILL COME ON FUTURE.

2. Meetings in Atlanta, GA

What were your overall impressions of the meeting with Richard Watkins, President of Dean Oliver & Associates (Monday morning)? Was the information exchanged interesting and useful to you?

VERY INTERESTING AND I. AM INTENDING TO DO BUSINESS WITH THEM.

What were your overall impressions of the meeting with Ed Fischler and Kim Berry, from Georgia Power Company (Monday morning)? Was the information exchanged interesting and useful to you?

IMPRESSIVE FOR THER COMPETENCE AND I THINK THAT FOR ANY MATER FOR COGENERATION I CAN ASK THEM FOR FUTURE COOPERATION.

What were your overall impressions of the meeting with Arthur Skinner, from SEI (Monday afternoon)? Was the information exchanged interesting and useful to you?

HIGH LEVEL
INTERESTING AND USEFUL INFORMATIONS.

What were your overall impressions of the meeting with Walt Lowthian and Paul Wilson, from Dean Oliver & Associates (Monday afternoon)? Was the information exchanged interesting and useful to you?

VERY INTERESTING
I HAVE ASKED TO SEND MORE INFORMATIONS ABOUT A MICRO-WAVE FURNACE, A FULL PROCESS LINES FOR MINERAL WOOL, CERAMIC WOOL, FIBRE GLASS TEXTURE ETC.

Did you attend the session on AEE Chapter Leadership (Monday afternoon)? If so, was the information exchanged interesting and useful to you?

YES. I FOUND IMPRESIVLY THAT DISCUSSIONS WERE OPENLY. WE FOUND THAT WE CAN BE A CHAPTER ACCEPTED BY AEE. THIS WAS A BIG HONOR FOR ME WHEN MR THOMAS HAS INTRODUCED US TO GRAND CHAPTER ETC.

What were your overall impressions of the meeting with Terry Singer, Thomas Dreessen, and Shirley Hanson (Tuesday evening)? Was the information exchanged interesting and useful to you?

VERY INTERESTING. ON THE FUTURE WE CAN CONTRIBUTE WITH OUR ERPERIENCE IN THIS FIELD.

3. Washington, D.C. portion

What were your overall impressions of the meeting at RCG/Hagler, Bailly (Friday morning)? Was the information exchanged interesting and useful to you?

VERY USEFUL. MORE INFORMATIONS WE FOUND. RCG IS A BIG COMPANY BUT I DO NOT KNOW IF THEY WISH TO GO IN BUSINESS WITH ROMANIA OR THEY ARE INTENTING TO WORK ONLY FOR USAID PROGRAM

What were your overall impressions of the meeting with Robert Archer at the State Department (Friday afternoon)?

FRIENDLY, OPENLY AND HIGH LEVEL WHICH WAS MOST ENCOURAGEMENT TO ME.

Were there any important topics relating to energy efficiency market development that you feel were not addressed by the meetings in Atlanta and Washington DC? Please specify.

- PRACTICAL EXAMPLES WERE MISSING
- ENVIRONMENTAL MATERS (TESTING, EXAMPLES ETC)
- AS PER MY OPINION AMERICAN BUSINESS PEAPLE SHOULD KNOW CENTRAL AND EASTERN COUNTRIES ENERGY STATUS IN ORDER TO INCURAGE TO GO INTO THE BUSINESS WITH MORE CURAGE.

PRIVATE Co and CEM-S CAN HELP AND GUARANTY THE SUCCES.

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Were you able to meet the individuals and companies that you wanted to meet at the meetings in Atlanta and Washington DC?
YES. EXCEPT MR MICHAEL ELLIS FROM RCG/ HAGLER, BAILLY, Inc.

4. General

Are you planning on following up with any contacts made in the United States? What is your objective with these contacts: purchase products, contract for services, act as distributor or representative in your own country, provide local consulting services, look for funding...? Please be specific.
I hope that contacts which I made at exhibition will be with positive results. I want to purchase, to make contracts for services (to represent two or three firms in Romania), both as distributor and representative in Romania, to look for funding for investment.

In your opinion, what energy efficiency applications that you discussed while in the United States would achieve the greatest results in your country? Why?
- New processes USA method for energy audits (combustion processes optimization variable speed drives, automation of combustion, environmental new processes for wast water treatment, icinaration etc.

In your opinion, what business issues that you discussed while in the United States are most important for the development of a successful energy efficiency market in your country? Why?
- Speed drives, automation of combustion processes, audit methods, energy management, TPM, 6σ quality assurance, environmental processes, filtration methods. lighting fluorescent tubes new processes for mineral wool, glass & fibre and ceramic fibres processes, infrared temperature control, ultrasonic and rotameter flowmeters

What was the most informative part of the trip?
Exhibition and RCG Head Quarters.

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What was the *least* informative part of the trip?

Up to date process technologies. This should be a future program.

I wanted to make in the future a training on RCG on computers for energy audits methods. To work some time for them for a specific job in third country.

Are there other individuals in your country who may benefit from this type of program? If so, what are their names and positions?

Private companies and specially the Energy manager from the factories/we examined MR. Dan Iordescu from Matizol Ploiesti, MR Gheorghe Stanga from STIROM, MR CHIRITA from Petrotel Refinery Ploiesti. etc. and the remaining 12 CEM's as per list which is known by RCG.

Do you feel you received enough information and support prior to the beginning of this trip (schedules, visas, etc...)?

Yes.

What did you think of the overall schedule? For example, was it too busy, or not busy enough?

To busy.

What did you think of the social events and tours organized?

In Atlanta Georgia O.K.

In Washington - OK. Perfect.

Do you have any additional comments or recommendations?

- USAID should approve all audits in helping with amount promised in order to push commissioning of the installations proposed with high efficiency.
- The existing list for testing equipment shall be supplemented with equipment for environmental testings.
- Exchanging of the technical informations shall continue in both sides. Informations should be up to date.
- Participation on future Energy congresses will be very helpfull.

We would like to thank very much to RCG/Hagler, Bailly, Inc and to USAID Bureau for Europe for helping us to participate on WEEC-1993 and to visit Atlanta and Washington DC.

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