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IN-COUNTRY SEMINARS
(ENGLISH LANGUAGE)

NIS Institutional Based Services Under the Energy Efficiency and Market Reform Project
Contract No CCN-Q-11-93-00152-00

CAR Regional Energy Trade, Electricity Contracting and Pricing Reform
Delivery Order No 11

Final Report

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
1530 Wilson Boulevard
Suite 400
Arlington, VA 22209-2406
(703) 351-0300

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Interconnection of Power Systems of the Baltic States Facts in Brief, 1995 Printed in color by DC Baltija in May 1996

- English only DC Baltija did not prepare a Russian language version The English version is included in the Russian-language seminar materials

Power Pool Operation Presentation by David Thornton, CMP International Consultants

- Russian + English

"Enerex" Power Pool Agreement

- Russian only

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- Russian + English

Interconnection Agreement between Hydro-Quebec and the New England Power Pool, 1983

- Russian + English

Interconnection Agreement between Hydro-Quebec and Central Maine Power Company, 1995

- English only

ELECTRICITY CONTRACTING AND PRICING REFORM
CENTRAL ASIAN REPUBLICS

The U S Agency for International Development (USAID) has been requested to assist the Central Asian Republics to develop and operate their electric power systems on the basis of international contracts which will ensure the reliability of electricity supply and will provide a basis for long-term planning and investment in the power sector Therefore, USAID has requested that Hagler Bailly Consulting, Inc implement the technical project

Summary Description of Task

This program is designed to provide assistance to the five Central Asian Republics -- Kazakhstan, Kyrgystan, Tajikistan, Turkmenistan, and Uzbekistan -- to address regional trade issues in contracting and pricing for international sales of electricity Such assistance will enhance the reliable operation of the regional grid, promote the economic dispatch of power plants, and facilitate the sale of electricity at prices that reflect the true economic cost of electric power generation and transmission A series of seminars will be held separately in each country, followed by a seminar in Riga, Latvia to review the Baltics experience and by a series of regional workshops to provide assistance to a regional electricity working group to be formed The power companies and energy ministries of the five Central Asian Republics will participate in the program

Objectives

The broader objectives of this program are

(1) To work with the five Central Asian Republics (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) 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 Central Asian Republics regarding the choices that are available regarding electric power pooling arrangements, contracting arrangements, and tariff structure

(4) To help the Central Asian Republics reach agreement on key issues involving power contracting and pricing

The program is designed to facilitate a process in which the Central Asian countries negotiate (1) agreements on methods of establishing responsibility for reserve capacity, (2) agreements on general principles for pricing capacity and energy and (3) contracts for the sale of capacity and energy If the Central Asian countries participate fully in this process the ultimate results

will be signed agreements and international power contracts These agreements would provide a foundation for other types of international power purchase agreements, including wheeling transactions and power purchase and sale transactions involving such countries as Russia, Afghanistan, Pakistan, and Turkey

WEEK-BY-WEEK SCHEDULE

CAR ELECTRICITY CONTRACTING AND PRICING REFORM

July 8, 1996

Dates	*Events*
July 15 26	Preparation of first in-country seminar (agenda papers logistics, etc) Translate papers and handouts
August 1 3	Arrival of seminar training team in Almatv Preparation of materials for distribution
August 5-23	Conduct first set of in-country seminars in all five CAR countries (See Attachment 1) Emphasize the development of the CAR Electricity Contracting Working Group
August 26-30	Prepare trip reports and recommendations for future activities
September 2 6	Prepare for the second set of in-country seminars (agenda papers logistics etc)
September 9 20	Translate papers and handouts Preparation of materials for distribution
September 19-20	Arrival of seminar training team
September 23 - October 11	Conduct second set of in-country seminars Maintain same travel schedule as first go-around
October 14-18	Prepare trip reports and recommendations for future activities
October 21 - November 1	Plan and prepare for Baltic seminar and study tour
November 4 8	Translate papers and handouts
November 11-15	Conduct Baltic seminar and study tour with Working Group in Riga Latvia
November 18 22	Prepare trip reports and recommendations for future activities
November 25 December 13	Plan and prepare for regional conference Preparation of the reports and papers for distribution Make logistical arrangements Additional trips to the republics to meet members of the Working Group may be needed
January 13 14 1997	Conduct regional conference on technical issues (Location to be determined)
January 16-24	Prepare reports
January 27 31	Prepare model agreements and contracts Conduct logistics for the second regional conference on legal issuers
February 3-14	Discussion of contract models with the Working Group Additional trips to CAR to meet with Government officials may be needed
February 17-18	Conduct regional conference on legal issues (Location to be determined) In the best case scenario - hold signing ceremonies of the agreements and contracts
February 20 28	Discussion of the results
March 3 31	Memorandum on key issues in power contracting and pricing reform
April 1 15	Draft final report on the Project

EXPERIENCE OF U S AND BALTIC PARTICIPANTS

David H Thornton

David Thornton is the Director of Transmission and System Control Services at CMP International Consultants (CMPI), a company located in Winthrop, Maine, USA CMPI is a subsidiary of Central Maine Power Company, the largest electric utility company in the state of Maine, and Mr Thornton has 26 years of experience at Central Maine Power Mr Thornton now provides technical consulting services for clients of CMPI Before joining CMPI in April 1995, Mr Thornton was the Project Manager for the purchase and installation of a new Dispatch Energy Management System for Central Maine Power Other duties during his career at Central Maine Power include electrical engineering studies for a high-voltage direct-current (HVDC) interconnection with Canada, substation design, and Supervisory Control and Data Acquisition (SCADA) applications

Mr Thornton holds a Bachelor of Science in Electrical Engineering from the University of Maine

Charles F Zimmermann

Charles F Zimmermann is a Manager at Hagler Bailly Consulting, Inc , an energy and environmental consulting firm based in Arlington, Virginia, USA with offices in several countries, including Russia, Ukraine, Kazakstan, Armenia, Georgia, and Latvia Dr Zimmermann is the company's representative in Riga, Latvia He is an economist with expertise in pricing of energy commodities, including electricity, natural gas, crude oil, coal, and petroleum products He has worked in Hungary, Croatia, Serbia, and most of the former Soviet republics During 1991-92 he managed a program of technical assistance in Estonia and Latvia on international natural gas contracts, district heat pricing, and other energy price issues, and during 1992-93 he managed a series of seminars on electricity contracting in the Baltic countries He conducted a study of electricity tariffs in Egypt in 1995 and at present he is conducting a study of electricity tariffs in Kazakstan He has worked as a consultant at Hagler Bailly since 1982 and at Foster Associates, an oil and gas consulting firm, in 1978-79 and 1981-82 He worked as an economist for the U S government Council on Environmental Quality in 1979-81

Dr Zimmermann has a Ph D in Resource Economics from Cornell University and a Bachleor of Arts degree in Architecture and City Planning from Brown University

J Michael Biddison

J Michael Biddison is the Central Asian Republics Regional Manager for Hagler Bailly Consulting, Inc From an office in Almaty, Mr Biddison manages several technical cooperation projects funded by USAID in the oil, gas pipeline transportation, and electric sectors of the five central Asian countries From 1990 to 1995 Mr Biddison was a Member of a regulatory agency in the state of Ohio called the Public Utilities Commission This commission supervised the activities of private companies in the electric sector, the natural gas distribution sector, the telephone and telecommunications sector, the water distribution sector, and the transportation sector Prior to 1990 Mr Biddison was the Director of the Oil and Gas Regulatory Agency of the State of Ohio This agency supervised the activities of private companies in the oil and gas exploration and production sector Mr Biddison also worked in oil and gas exploration and production companies for over nine years

Mr Biddison has a Master of Business Administration degree from Kent State University and a Bachelor of Science degree in Geology and Mineralogy from The Ohio State University

Inese Eglite

Inese Eglite is a translator and legal specialist with experience in translation of different types of contracts in the electric sector She has worked as the primary translator for nearly all of the technical cooperation programs between Dispatch Center "Baltija" and foreign organizations, including the program of technical cooperation on electricity pricing and contracting conducted in 1992-1994 under USAID funding She is a resident of Riga, Latvia and is fluent in English, Swedish, Latvian, and Russian

Ms Eglite has a master's degree in Foreign Languages from Riga University She completed courses at the Higher School of the Labor Movement in Moscow, where she conducted research on the Swedish model of democratic socialism

Information on *DC Baltija* participation in international projects and international cooperation in 1992 - 1996

Joint venture of three Baltic States *DC Baltija* was founded in 1992 and is responsible for control the operation of the entire 330 kV network in Baltics and with neighbouring IPS of Russia and Belarus, providing energy balance for the Baltic power system and reliability standards in normal and emergency conditions During the period 1992 - 1996 experts of *DC Baltija* has involved in following international activities concern future development of Central and Eastern Europe power systems in new conditions after collapse of FSU

1 **"Analysis of the transmission grid in the Baltic Region "**
A Joint Study between *DC Baltija* Vattenfall AB, IMATRAN VOIMA OY and PSE SA (Polish Power Grid Company) 1993 - 1994
From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin

2 "The TACIS and PHARE **"Technical study of the interface between the extended West-European power system and its Eastern neighbours"**
Consortium PreussenElektra, RWE, Bayern-Werk, EDF
06 1995- 06 1996
From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin

3 EU TEN Study **"Baltic Ring Electricity Interconnections"**
Consortium Vattenfall AB, PreussenElektra, IMATRAN VOIMA OY, SK Power 10 1995 - 10 1997
From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Janis Ositis, Karlis Brinkis, Tatjana Ovsjukova

4 Project **"East-West High Power Transmission System"**
A Joint Study between PreussenElektra, RAO EES Rossii, Ministry of Energy Belarus, PSE SA, VEAG 1994 - 1996
From *DC Baltija* in 1995 - 1996 involved in Technical Group activity Vilnis Kreslinsh, Youri Pervoushin

5 Project **"Baltic Regional Energy Development Program"**
A joint study between Baltic Power systems, *DC Baltija* and "Electrotek Concept, Inc " (USA) sponsored by USAID 1994 - 1996
From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Janis Ositis Maija Martinsone

6 EU Copernicus Program project **"Computer - Aided Energy Management and Process Control Function for Stabilization the Interconnected Power System of the Baltic States"**
A joint project between *DC Baltija* Fraunhofer Institut Informations and Datenvererbeyting (Germany) Instituto de Engenharia de Systemas e Computodires (Portugal) and Institut of Energetic Estonia 1995 - 1996
From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Karlis Brinkis Ivar Zeidmanis

7 Five seminars **sponsored by USAID and arranged by Hagler/Bailly Inc (USA) and *DC Baltija* on contract, pricing, agreement in power energy sector** 1992 - 1993

From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Metcheslav Vonsovich, Karlis Brinkis

8 Svenska Krafnat (Sweden) -- *DC Baltija* meeting and seminar **on issues concerning dispatching of power systems, frequency control and other technical problems** 1995

From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Karlis Brinkis, Janis Ositis, Janis Shtamers

9 **"Program of upgrading control centres in in Baltic power systems and *DC Baltija*"** and two seminars **on power pooling issues** sponsored by USAID and provided by "Electrotek Concept,Inc" (USA)

1995 - 1996

From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Janis Ositis, Janis Shtamers, Karlis Brinkis

10 **Seminar on modern ABB simulation software for power system control**

Arranged by "ABB Network Control" and *DC Baltija* for Baltic power systems

1995

From *DC Baltija* took part Vilnis Kreslinsh, Youri Pervoushin, Longin Eigouss, Karlis Brinkis, Janis Ositis, Janis Shtamers

11 According to the agreement with representatives of "Landis and Gir" (Switzerland) two seminars in September - October 1996 will be arranged by *DC Baltija* and "Landis and Gir" for Baltic power systems **on time of - use rate system and modern metering equipment**

12 According to the agreement between *DC Baltija* and "Fraunhofer - Institute of Information and Data Processing" (Germany) in October - November 1996 will be arranged seminar in *DC Baltija* **on software applications utilized in VEAG control centre in Germany and *DC Baltija***

Director of *DC Baltija* *Vilnis Kreslinsh*

Proposed Reports by DC Baltija Experts for the Conference on Exchange of Experience on International Electric Power Agreements

Part 1 International agreements on parallel operation of power systems, on active power (capacity) reserves, and on the wheeling of power

1 1 Agreements on parallel operation among the power systems of the Baltic states and also with the interconnected power system of the CIS

1 1 1 Formation of the Baltic Energy Council, ownership and legal structure of Dispatch Center Baltija, procedure for negotiating international agreements in the electric power sector, organizations authorized to sign agreements

1 1 2 The existing circuit schemes of power systems and actual operational schedules

1 1 3 The existing agreements with the Central Dispatch Center of Russia and Dispatch Center of Belarus on assistance in the technical implementation of operational schedules within the framework of the parallel operation

1 1 4 Principles of commercial sale of electric energy within the power systems of the Baltic countries and power systems of neighboring countries

1 2 Principles of maintenance of generating capacity reserves in the power systems of the Baltic countries

1 2 1 The actual allocation of generating reserves among the Baltic power systems during the year

1 2 2 The existing agreements with regard to generating reserves within the power systems of the Baltic states and neighboring power systems of CIS

1 2 3 The possibilities of future contracts on generating reserves among all the participants(power systems) having parallel operation (Baltic power systems and respective CIS countries)

1 3 Problems related to the wheeling of power in the interconnected power systems

1 3 1 The operation of the power systems of the Baltic states in the circuit 330 kV-750 kV

1 3 2 Experience in international wheeling of electric energy Power transit to the Yantar power system (Kaliningrad) through power systems of the Baltic states

1 3 3 Problems related to the wheeling of power in the framework of anticipated interconnection with NORDEL and UCPTE

The reports will be prepared by V Kreslinsh He will analyze documents submitted by power systems of Central Asia and assess the current situation in these countries

Part 2 Maintenance of reliability, regulation of reactive power and voltage, and application of anti-emergency protection devices

2 1 Provision of reliability and stability of operation in the interconnected system

2 1 1 Problems related to the provision of stability of the main circuit of the Baltic interconnected system during parallel operation with the circuits of the interconnected systems of the CIS

2 1 2 Problems of transition from the stability criteria applied in the former USSR to the new Western European criteria and requirements

2 1 3 Improvements of planning methods(calculation) and operation analysis

2 2 Regulation of reactive power and voltage in the main circuit of the high-voltage network of the Baltic power system

2 2 1 Excess of reactive power in the main transit lines of 330kV of the Baltic interconnected system

2 2 2 Comparison among methods of compensating for reactive power in the Baltic interconnected system and in NORDEL

2 2 3 Regulation of reactive power flows in the power systems and payments for reactive power compensation in a market economy

2 3 Anti-emergency protection devices of the interconnected power system in the present stage of development

2 3 1 Interdependency of power systems in providing effective anti-emergency management - a consequence rooted in the original formation of these power systems as one system in the earlier period

2 3 2 Improvement of anti-emergency management to meet Westeuropean standards

2 3 3 Account of damage incurred to another party as a result of the application of anti-emergency management

Reports will be prepared by Yuri Pervushin He will analyze documents presented by power systems of Central Asia and assess the present situation in these countries

Part 3 Direct and indirect methods of load management in power systems

3 1 Load profile in the power systems of the Baltic states

3 1 1 Changes in load profile in the interconnected power system in the latest years

3 1 2 Economic effect of shifts in load profile shown on the example of one power system

3 2 Time-of-use metering of electric power

3 2 1 Transition to two-part tariffs for electric energy in the Baltic power system

3 2 2 Technical devices in use in the Baltic interconnected system at present and in the future

3 3 Direct load management (Demand side management)

3 3 1 Application of demand side management at present in the power systems of the Baltic states

3 3 2 The possibilities for the future use of DSM

Reports will be prepared by Yuri Pervushin He will analyze documents presented by power systems of Central Asia and assess the present situation of these countries

INITIAL DRAFT OF AN INTERCONNECTION AGREEMENT

Prepared for

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

Control Center of the Baltic Power Systems Ltd
1 Shmerla Street
Riga 226006 Latvia

Prepared by

Charles F Zimmermann
RCG/Hagler, Bailly, Inc
1530 Wilson Boulevard, Suite 900
Arlington, VA 22209-2406

Supported by

Bureau for Europe
U S Agency for International Development
Washington, D C 20523

December 1992

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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 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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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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

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

Reliability Planning

David Thornton
CMP International Consultants

Basis for Reliability Planning in North America

- 5 16 p m , November 9, 1965 - The Great Northeast Blackout
- Caused by an improperly set protective relay in Ontario, Canada
- 30 million people without power
- 600,000 people stranded on trains
- 10,000 stranded in New York City subways
- Restoration took up to 25 hours
- Instigated the formation of reliability

A MIS-SET RELAY NEAR THE NIAGARA GENERATING COMPLEX TRIPPED A TRANSMISSION LINE, AND THE OUTAGE CASCADED TO THE POINT WHERE THE ENTIRE NORTHEASTERN US AND EASTERN CANADA WERE WITHOUT POWER

THE FEDERAL GOVERNMENT CALLED AN INQUIRY INTO THE MATTER AND RECOMMENDED THAT A NATIONAL ELECTRIC RELIABILITY COUNCIL (NERC) BE FORMED

THE US ELECTRIC POWER INDUSTRY CONVINCED THE GOVERNMENT THAT THE INDUSTRY HAD AS MUCH, IF NOT MORE, AT STAKE IN THE MATTER THAN THE GOVERNMENT, AND THEY WERE ALLOWED TO FORM A JOINT US-CANADIAN RELIABILITY COUNCIL, THE NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL, STILL KNOWN AS NERC

Reliability

Can be assessed by two measures

- Adequacy
- Security

Adequacy

The ability of the bulk power electric system to supply the aggregate electric power and energy requirements of the consumers at all times, taking into account scheduled and unscheduled outages of system components

ADEQUACY

- IS THERE ENOUGH POWER AVAILABLE TO MEET THE DEMAND?
- IS PROPER PLANNING BEING DONE TO ASSURE THAT FUTURE LOADS WILL BE MET?
- RETIREMENT OF OLD UNITS?
- MAINTENANCE OF UNITS?

Security

The ability of the bulk power electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system components

SECURITY

- ANALYSIS OF RISKS OF OUTAGE
- PROBABILITY OF OUTAGES
- DEVELOPMENT OF TOOLS TO ASSESS SECURITY

Hierarchy of Bulk Power System Planning in USA

- North American Electric Reliability Council (NERC)
- Regional Coordinating Councils (Northeast Power Coordinating Council)
- Power Pools (New England Power Pool)
- Electric Utility Companies

EACH OF THE ORGANIZATIONS ABOVE THE UTILITY COMPANIES THEMSELVES ARE COMPOSED OF PERMANENT STAFF PLUS COMMITTEES OF REPRESENTATIVES OF THE CONSTITUENT ORGANIZATIONS

North American Electric Reliability Council

- Coordinates the planning of 9 North American reliability areas
- Membership of a reliability area in NERC is voluntary
- NERC establishes high-level planning criteria for use by the reliability councils
- Policies are established by committees of utility experts who represent their reliability areas

THE FEDERAL GOVERNMENTS OF USA AND CANADA DO NOT HAVE VOTING RIGHTS ON ANY MATTER BEING CONSIDERED BY NERC, ALTHOUGH THEY MAY EXPRESS THEIR VIEWS ON ISSUES

NERC RECOGNIZES THAT THERE ARE MANY REGIONAL SPECIFIC NETWORK ISSUES WHICH ARE NOT COMMON THROUGH THE ENTIRE N AMER REGION, SO THEY PERFORM A CONTINENTAL FUNCTION, AND LEAVE REGIONAL ISSUES TO THE REGIONAL AREA RELIABILITY GROUPS

North American Reliability Areas

- East Central Area (ECAR)
- Electric Reliability Council of Texas (ERCOT)
- Mid-Atlantic Area Council (MAAC)
- Mid-America Interconnected Network (MAIN)
- Mid-Continent Area Power Pool (MAPP)
- Northeast Power Coordinating Council (NPCC)

Northeast Power Coordinating Council Planning Functions

- Adopts NERC Guidelines
- NPCC ensures that the northeastern region of North America is designed and operated to ensure security, efficiency and reliability
- Through work of committees, NERC establishes criteria for planning and operation of the area
- Through committees and task forces, the Council conducts regional and interregional

THE NPCC AREA WAS MOST DIRECTLY INVOLVED WITH THE 1965 BLACKOUT, AND WAS THE FIRST VOLUNTARY AREA RELIABILITY COUNCIL IN NORTH AMERICA ITS MEMORANDUM OF AGREEMENT WAS SIGNED 1/19/66, LESS THAN TEN WEEKS AFTER THE BLACKOUT THE NPCC AGREEMENT PREDATED THE FORMATION OF NERC

THE NPCC COORDINATES THE ESTABLISHMENT OF PLANNING CRITERIA FOR THE AREA, TAKING INTO CONSIDERATION THE OVERALL GUIDANCE OF NERC AND THE PARTICULAR NEEDS OF THE UTILITIES IN THE NPCC AREA

WITHIN THE NPCC AREA, GROUPS OF UTILITIES HAVE ALSO FORMED ALLIANCES CALLED POWER POOLS, TO GAIN EFFICIENCY OF OPERATION THRU SCALE THE CONSOLIDATED OPERATION THROUGH A POOL ALSO MEANS THAT PLANNING MUST BE COORDINATED AMONG THE POOL MEMBERS TO ENSURE THAT THE SYSTEM CAN RELIABLY SUPPORT THE CONSOLIDATED OPERATION

DETERMINATION OF SAVINGS

The Concept of Own-Load Dispatch

For each Participant a production simulation model is run on an hourly basis to determine what the Participant's generation pattern would have been if its assets had not been dispatched by the Pool. An hourly "Own-Load" dispatch is prepared using each Participant's own generation assets (including unit and system contract purchases) to meet its stand-alone load plus operating reserves. A comparison is then made between the actual dispatch of each asset and its own-load dispatch in that hour If an actual dispatch exceeds the own-load dispatch, that is considered a delivery to the Pool If own-load exceeds actual dispatch, it is considered a receipt from the Pool

Planning Functions of New England Power Pool

- Generating Capacity
- System Stability Studies
- Inter-Pool Transfer Studies
  - Normal transfers
  - Emergency transfers
- Studies of Possible but Improbable Contingencies
- Evaluation of Special Protection Systems

Organization of NEPOOL

- Management Committee
- Executive Committee
- Policy Planning Committee
  - Load Forecasting
  - DSM Planning
  - Power Supply Planning
  - Transmission Planning
- Operations Committee
- Task Forces

NEPOOL STAFF SUPPORTS ALL OF THESE ACTIVITIES, BUT POLICY IS SET BY THE UTILITY COMMITTEE REPRESENTATIVES

Reliability Standards for NEPOOL

Reliability is assured through coordination of system planning, design and operation

Reliability Standards apply only to those elements of an individual utility's system that is a part of the New England interconnected bulk power supply system

Reliability Criteria and Procedures for Operations

Operating Procedures for

- Action During a Capacity Deficiency
- Action in an Emergency
- Operating Reserve
- Voltage and Reactive Control
- Action During Energy Deficiency
- Transmission Operation for Normal and Emergency Conditions

Contingencies

- Reasonably foreseeable contingencies

  Abnormal system occurrences which can be reasonably expected to occur and must be planned for

- Possible but improbable contingencies

  Abnormal occurrences which, although possible, are unlikely to occur Studied for impact and mitigation only

Resource Adequacy

Resources are planned and installed so that the probability of disconnecting noninterruptible load due to resource deficiency will be not more than once in ten years

Factors Considered in Planning for Resource Adequacy

- Errors in load forecasting due to weather variations
- Appropriate forced outage rates for mature and immature generating units
- Seasonal adjustments
- Maintenance requirements
- Available operating procedures
- External interconnections

Area Transmission Requirements

- Stability Assessment - Bulk system shall remain stable following the contingencies stated below without manual system adjustments
  - Permanent 3-phase fault (normal fault clearing)
  - Simultaneous permanent phase-to-ground faults on different phases of two adjacent circuits on same tower (normal clearing)
  - Permanent phase-to-ground fault (delayed clearing)

Area Transmission Requirements

Steady State Assessment

- Adequate reactive capacity shall be installed to maintain voltages within normal limits for predisturbance conditions, and within emergency limits for system conditions following contingencies for stability requirements
- Line loadings shall be within normal limits (predisturbance) and within emergency limits (postdisturbance) following contingencies for stability requirements

Emergency Transfer Conditions

Under emergency transfer conditions, the bulk power supply system shall remain stable under either of the following conditions

- Permanent three-phase fault on any single system element (normal fault clearing)
- Loss of any element without a fault

Extreme Contingency Assessment

Possible but Improbable Contingencies

- Effects studied, but not protected against
- Possible mitigations studied

- Loss of entire capability of a generating station
- Loss of all lines from generating station, switching station or substation
- Loss of all transmission circuits in a

THE ROLE OF DISPATCH CENTERS OF THE FORMER UNIFIED POWER SYSTEM

Charles Zimmermann
Hagler Bailly Consulting

In any power system it is necessary to operate a dispatch center so that voltage and frequency are stabilized and the grid is protected against the risk of power supply disruptions caused by the sudden failure of a transmission line or generating unit These basic functions of a dispatch center are not closely linked to economic or political issues In some countries dispatch centers are also responsible for other functions, such as the management of electricity purchases and sales in a wholesale market

When the Soviet Union was replaced by a group of independent republics, many of the dispatch centers had to continue their operations under difficult conditions - in particular, economic problems associated with non-payment for fuel and non-payment for electricity, and political problems associated with the desire of neighboring countries to achieve independence in the sphere of electric power production and transmission Different countries developed different approaches to the question of how the power sector should be restructured and how the dispatch centers' role should be defined

The purpose of this paper is to provide some information on the experience of the dispatch centers in the Baltic countries and Ukraine, from an American perspective, to provide a background for discussion of the future roles of dispatch centers in Central Asia

Dispatch Center Baltija

The control center of the Northwest Interconnected Electric System of the USSR was built in Riga, Latvia and operated the high-voltage network over a region including the Baltic republics, Belarus, and a large portion of European Russia including the Kola peninsula, Keralia, St Petersburg, Pskov, a few oblasts west of Moscow, and Kaliningrad The power stations in the Baltic republics were designed to operate in a large grid in which power would be "imported" and "exported" by different republics linked by a 330 kV grid A large nuclear station was built in Lithuania, for example, to provide electricity for Belarus and Latvia as well as Lithuania

After the August 1991 coup in Moscow, the Baltic countries declared their independence and in September they received international recognition as independent countries The Soviet Union continued to function in the period from September through December 1991, and the Unified Power System was managed by the control center in Moscow Therefore the dispatch center in Riga continued to operate according to earlier (Soviet) procedures even after the Baltic countries became independent The dispatch center faced two major challenges

- to redefine the geographic area of its responsibility, according to the desires of the five governments located in the area of the Northwest Interconnected Electric System

- to become a new international organization providing dispatch services to the power systems of independent countries, instead of an organization giving instructions under a command economy in one country

In April 1992 the dispatch center was assigned a new geographic area of responsibility and a new structure The geographic area was "officially" limited to Estonia, Latvia, and Lithuania, although unofficially it might be stated that the Riga dispatch center continued to control the power flows in the high-voltage grid of Kaliningrad as well The dispatch center of Belarus was in effect promoted to the level of national dispatch center, but it was able to work closely with the Central Dispatch Administration (CDA) in Moscow because of the close political relationship between Moscow and Minsk The dispatch center in Lenenergo faced a more difficult challenge, it had to restructure its activities so that it took charge of a large part of European Russia rather than the St Petersburg region alone At first, there was a shortage of experts in the St Petersburg dispatch center with experience in managing interconnected systems The management of grid stability in the Kola peninsula and Karelia region is particularly difficult because there is no power loop and there is a load center (the pulp and paper industry of Karelia) that is located a great distance from the generating stations The CDA in Moscow had always assumed the role of a coordinator among regional dispatch centers, however, and therefore it took responsibility for managing the Belarus and St Petersburg dispatch centers as well as international electricity trade and interconnections between Russia and the Baltic countries

The dispatch center became a joint-stock company organized under Latvian law and owned by three equal shareholders Eesti Energia, Latvenergo, and the Lithuanian State Power System It was given a new name, Dispatch Center "Baltija " It was subjected to a management board called the Baltic Energy Council - an organization containing representatives from the three power companies and the three energy ministries The budget for the dispatch center was established through transfers from the three national power companies A three-country agreement on parallel operation among the three Baltic countries was signed in late 1991 or early 1992, but it was not a detailed contract and did not resolve electricity pricing and payment issues

The offices of DC Baltija provided a convenient location at which the three power companies could hold meetings to discuss revisions to the agreement on parallel operation, to negotiate an informal agreement on wheeling of power from Russia to Kaliningrad, and to discuss power sales agreements The chiefs of the dispatch centers in Eesti Energia, Latvenergo, and the Lithuanian State Power System participated in seminars at DC Baltija and negotiated a new agreement on parallel operation in April 1994 The Baltic Energy Council usually holds its meetings at DC Baltija Occasionally the ministers or deputy ministers of energy hold meetings at DC Baltija Various foreign power companies and organizations established programs with DC Baltija to conduct studies of the interconnection of the Baltic grid with Finland, Poland, and other countries

DC Baltija had no ability to settle non-payment issues among power systems Fortunately, the governments of the Baltic countries were able to resolve their non-

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pavment problems very quickly - in about 12 months after national independence was declared The introduction of the Latvian ruble and the Estonian kroon provided an important contribution to the resolution of non-payment problems because inflation was rapidly devaluing the Russian ruble Later the introduction of the Latvian lat and Lithuanian lit further reduced the influence of the Russian ruble

During 1991-92 there were major disputes over electricity prices The power systems of the three countries negotiated the prices and quantities of electricity to be imported and exported, on a monthly basis, and then submitted their proposals to the energy ministries DC Baltija provided technical support in developing monthly forecasts of production, import, export, and consumption There were a few occasions when the electricity continued to flow after the 1st day of the month but no agreement on the price of this electricity was reached until several days later At one point in 1992, the energy ministry of Estonia threatened to disconnect the Estonian power grid from the Latvian power grid as a result of a dispute over the price of electricity sold to Latvia Subsequently Estonia conducted tests of system stability under an isolated mode of power svstem operation but did not choose to maintain this mode of operation Estonia has practically no hydroelectric generation and has no gas turbines for meeting svstem peak loads

DC Baltija continues to act as the dispatch center responsible for maintaining the energy balance of the 330 kV grid in the Baltic countries and responsible for ensuring the reliability of the 330 kV grid, which has 4092 km of lines There are no 500 kV or 750 kV lines in the Baltic countries, and there is only 572 km of 220 kV lines DC Baltija plans the electric energy balance for each of the three countries on a daily, weekly, monthly, and annual basis Each country fulfills its obligations to generate electricity according to this energy balance and Latvia and Lithuania operate hydro facilities to meet customer demand during peak hours Each country operates the 110 kV grid within its borders, as well as the networks at 35 kV, 10 kV, 6kV, and 0 38 kV There are no hourly prices and no hourly targets for the electric energy balance, but hydroelectric facilities in Latvia and Lithuania are used to meet the daily load curve of all three countries These hydro facilities (2148 MW) include three stations on the Daugava River in Latvia, one station on the Nemunas river in Lithuania, and a pumped storage plant located in Kruonis, Lithuania

Because Latvia has a deficit of generating capacity, Latvia is strongly opposed to any proposal to eliminate electricity imports and exports among Baltic countries The idea of electricity independence - that is, zero net import - is not taken seriously in any of the Baltic countries None of these countries have gas or coal production, and oil production is at a very low level and is located only in Lithuania

Some power system representatives have suggested that DC Baltija be abolished and have proposed a system of direct communication and coordination among the three national dispatch centers This viewpoint is particularly popular in Estonia Bilateral negotiations on power interconnection - for example, Estonia-Finland and Lithuania-Poland - have occasionally been held without the participation of DC Baltija On the other hand, western European power system specialists typically establish technical cooperation with DC Baltija so that interconnections between the 330 kV grid and other grids can be planned according to western European reliability standards The individual power systems of the Baltic countries are not capable of meeting reliability standards under isolated operation The frequency of the Baltic grid is normally

6d

determined by interconnections with the Unified Power System of Russia, and DC Baltija maintains frequent communications with the Central Dispatch Administration in Moscow as well as the dispatch center in Minsk A small portion of European Russia, including Pskov and Kaliningrad, is dependent on the Baltic countries for power supply and as a result of load flow patterns it is not possible for a single Baltic country to provide Russia with a guarantee of reliable supply of power to these regions The three Baltic countries have five borders with eastern countries Estonia-Russia, Latvia-Russia, Latvia-Belarus, Lithuania-Belarus, and Lithuania-Kaliningrad

In summary, DC Baltija acts as the operator of the high-voltage grid because the Baltic countries are too small to operate their high-voltage grids independently and manage their interconnections with Russia and Belarus independently It is not practical for such small countries to eliminate an existing organization which provides the most efficient method of managing imports, exports, and interconnections with countries to the east and to the west The technical obstacles to independent operation have prevented the Baltic countries from attempting to achieve complete independence in the electric power sector

Ukraine

During the Soviet period the dispatch center located in Kiev managed the Southern Interconnected Electric System, which included eight regional dispatch centers plus Moldova In 1992 the dispatch center in Kiev became the National Dispatch Center Ukraine exported power to Hungary and Poland in the 1980s, and today Ukraine has fuel deficits but no deficit of installed generating capacity All parts of the country are interconnected by the high-voltage grid Ukraine possesses hydroelectric facilities along the Don and the Dniepr which can be used to meet peak loads Therefore Ukraine is capable of operating as a single energy system under the control of the dispatch center in Kiev

The privatization and restructuring program of the power sector of Ukraine has been developed on the basis of advice from the World Bank, USAID, EU TACIS, and other donors In 1995 a number of joint stock companies were formed, including generation companies, a national grid company, and 27 regional supply companies with low-voltage networks and CHP plants The National Dispatch Center is now in the process of transformation into the Energomarket System Enterprise (ESE) The basic idea of the restructuring program is that there should be a wholesale market for electricity, using electricity produced by Ukrainian generating companies, and the price of electricity should vary in each hour of the day according to the results of a competitive bidding system The ESE is a monopolist which buys all of the wholesale power from generating companies and sells all of the wholesale power to local electricity suppliers and to "independent electricity suppliers" which arrange power supplies for large industrial consumers

The evolution of the Kiev dispatch center is therefore completely different from the Riga dispatch center, because the Ukraine is a large, integrated electric grid that can operate with a relatively small level of international electricity flows In Kiev the dispatch center is placed in the middle of an economic and political reform process that involves a lot of activities outside the basic functions of a dispatch center The ESE (the successor to the national dispatch center) is the most important organization

responsible for determining electricity prices in each hour, collecting money from electricity supply companies, and making payments to generating companies (under the official role of Settlement System Administrator) The ESE does not play an important role in making energy policy decisions, but it plays a very important role in implementing the market reforms adopted by the national government

The Kiev dispatch center is involved in the negotiation of electricity imports and exports from Russia, but it does not operate under the management of the Central Dispatch Administration Electricity imports and exports from Russia are not as important in Ukraine as in Kazakstan The Ukrainian power sector restructuring program is not based on the Russian program, and there are many western advisors involved in the commercialization and privatization of the Ukrainian power sector

The future role of the eight regional dispatch centers in Ukraine is unclear They are regional offices of the ESE, but they no longer serve eight regional power companies The eight large power sector enterprises of the early 1990s owned generation, transmission, and distribution facilities, now they have been replaced by many smaller companies which are not vertically integrated Decisionmaking is still concentrated in Kiev All power sector enterprises want to have direct communications with ESE in Kiev The greatest strengths of the regional dispatch centers are their communications and computer facilities There is a shortage of money available to set up new dedicated phone lines and computer centers according to the new ownership structure of the power industry Therefore the regional dispatch centers are used by the ESE to send and receive information and instructions from Kiev

Because there are severe non-payment problems in Ukraine, and because voltage and frequency fluctuations are generally too large to enable the whole of Ukraine to operate in parallel with the power systems of western Europe, the ESE has not played a major role in negotiating interconnections with central European countries such as the Centrel group (Hungary, Poland, Czech Republic, Slovak Republic) The disadvantages of parallel operation with Centrel appear to outweigh the advantages, in the next few years Therefore a small portion of western Ukraine operates independently of the rest of the country, and exports power to Poland In other words, a small portion of Ukraine is actually part of the Centrel grid In the long term, perhaps in ten years, the whole of Ukraine might operate in parallel with Centrel This is not a pressing issue, however, and it does not demand a lot of attention from the ESE

During the December 1994 peak period there were severe shortages of electricity, and the Ukrainian grid was divided into three independently operating high voltage grids (in addition to the Centrel grid) Such situations are abnormal The intent of the market reforms is to create a single wholesale market for all of Ukraine, without major transmission constraints A system of nodal pricing for different parts of the grid has been proposed, but large price differences across regions are not expected to develop in the wholesale market

In the transition to a market economy Ukraine has replaced a central planning system with a centralized spot market for buying and selling electricity The "center" has moved from Moscow to Kiev, but it is still very strong and it is subject to a single energy ministry and a single national government If non-payment problems can be solved, the electricity market of Ukraine should become very competitive The

national dispatch center will continue to play a key role in setting up this market system

Russia

Among the countries of the former Soviet Union, Russia's power sector is in a unique situation because of its vast size and because Russia inherited the Central Dispatch Administration in Moscow The Unified Power System continues to link several Integrated Power Systems - the Northwest, the Central region, Middle Volga, and Urals The interconnection between Urals and Siberia is maintained by transit through Kazakstan according to agreements between Kazakstanenergo and the Central Dispatch Administration Therefore the high-voltage grid is managed by the Central Dispatch Administration as well as the regional dispatch centers The interconnection between the Center and Kaliningrad is maintained by transit through the Baltic countries according to agreements between DC Baltija and the Central Dispatch Administration

As a result of political transformations in Russia the power sector has been transformed into a large number of joint stock companies under the control of a holding company Large blocks of shares have been privatized The wholesale market does not operate according to hourly competitive bidding, as in Ukraine, but there is some competition among the larger generating stations in the wholesale market The situation is quite complicated and the topic of dispatch center operation in Russia is beyond the scope of this paper

Other countries

The diagrams accompanying this presentation show the ownership structure of the electric power sector in several countries of the former Soviet Union, including Belarus and Moldova Belarus operates almost as a branch of the Unified Power System under the principles established during the Soviet period Moldova has a very small power grid which is connected to Ukraine Moldova has been disrupted by political disputes and has very serious non-payment problems in the electric sector In the countries of the former Soviet Union, wholesale markets exist only in Ukraine and Russia, and the most sophisticated programs of interconnection with western Europe exist in the Baltic countries

Capital investment

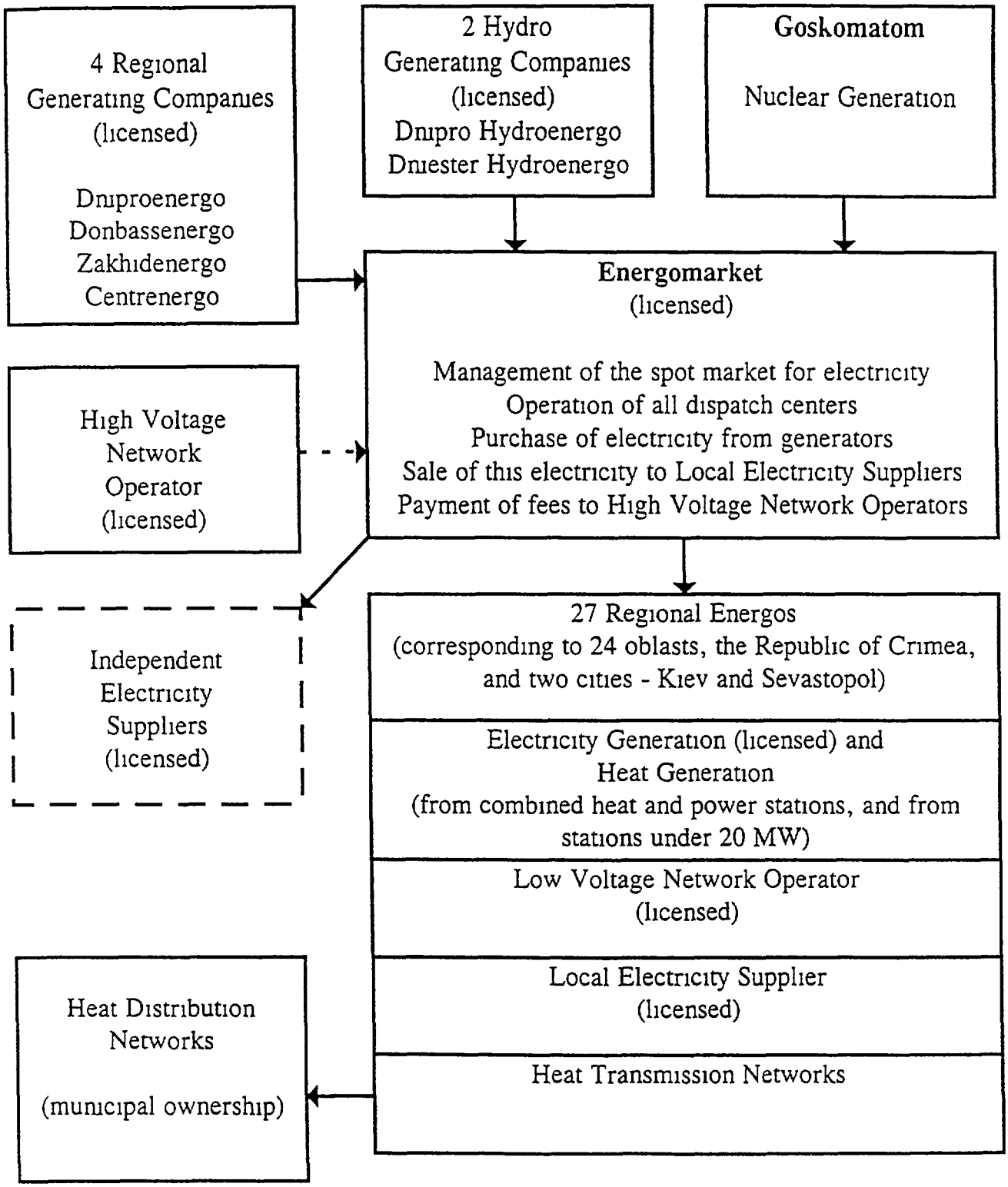
In most of the countries of the former Soviet Union there is a shortage of capital available for the construction of new power plants, new transmission lines, and new substations None of the dispatch centers discussed in this paper has any control over investment programs For this reason it is likely that the role of dispatch centers will evolve further, so that some sort of planning function is assigned to the dispatch centers There is a good chance that this role will be limited to high-voltage transmission system planning The problem is not the lack of technical expertise to develop plans, but the lack of money for major new investments Where east-west connections are involved, the funds may come from western European power

companies Although a large number of design institutes existed during the Soviet period, it appears that the dispatch centers are now considered by western investors to be the most reliable sources of information on transmission system needs With regard to technical cooperation with western European power companies, DC Baltija is probably the most advanced dispatch center in the former Soviet Union

This summary of recent developments has been prepared from an American perspective on the basis of information available to Hagler Bailly Consulting We hope that this will provide a useful basis for discussion of the role of dispatch centers in Central Asian republics

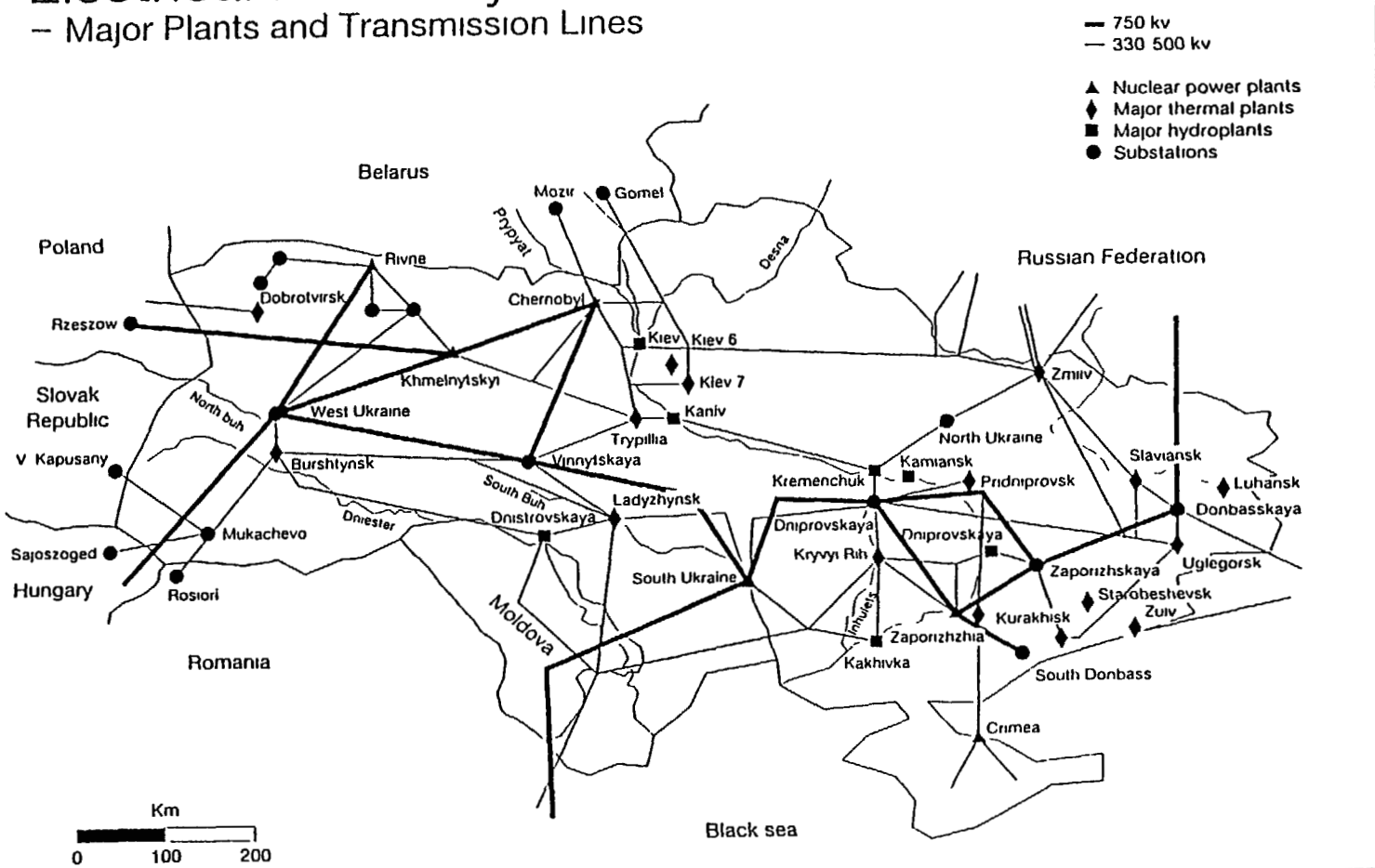
Ukraine

1993 installed capacity 51,369 MW



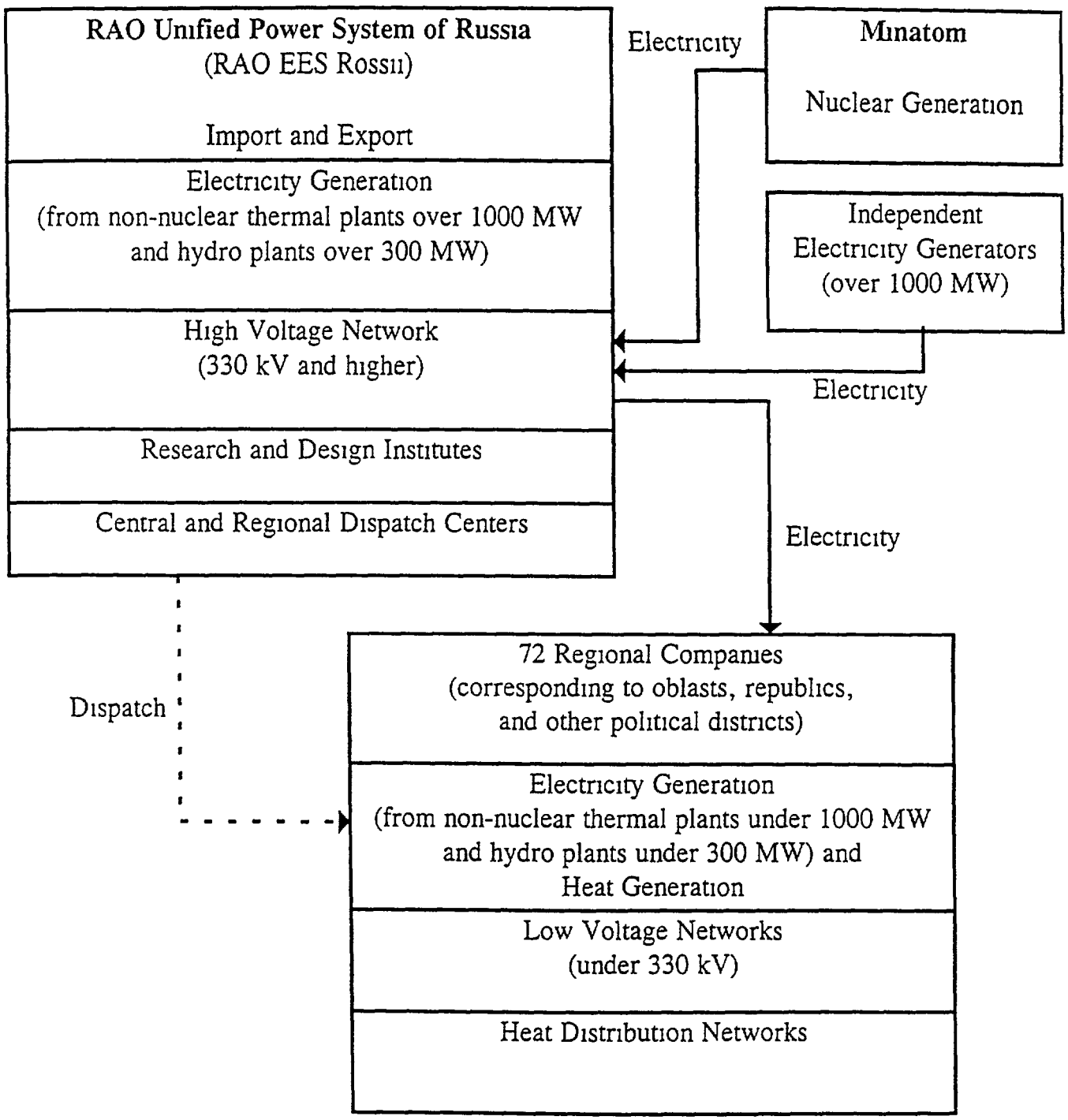
Electrical Power System of the Ukraine

– Major Plants and Transmission Lines

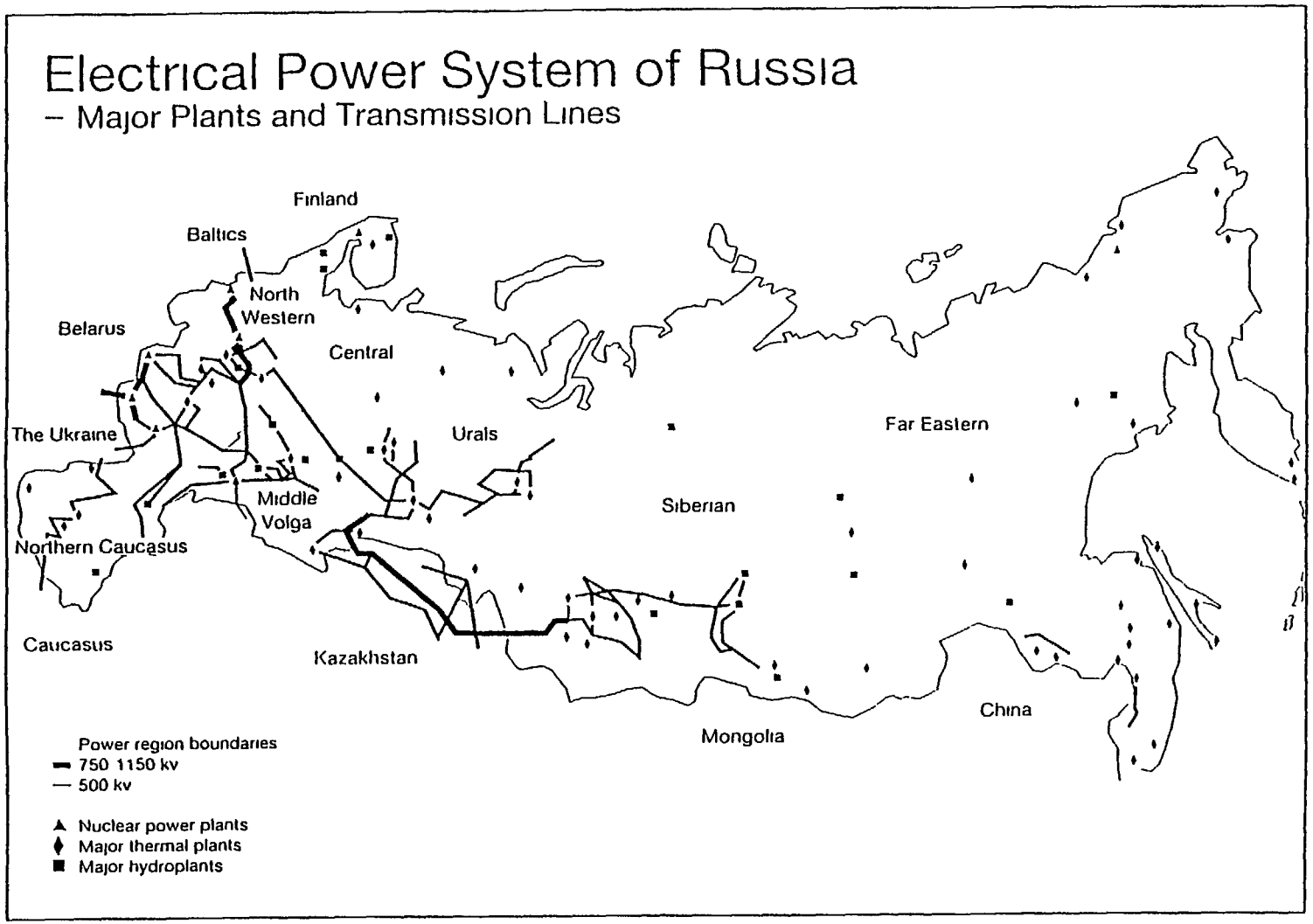


Russia

1990 installed capacity 213,309 MW



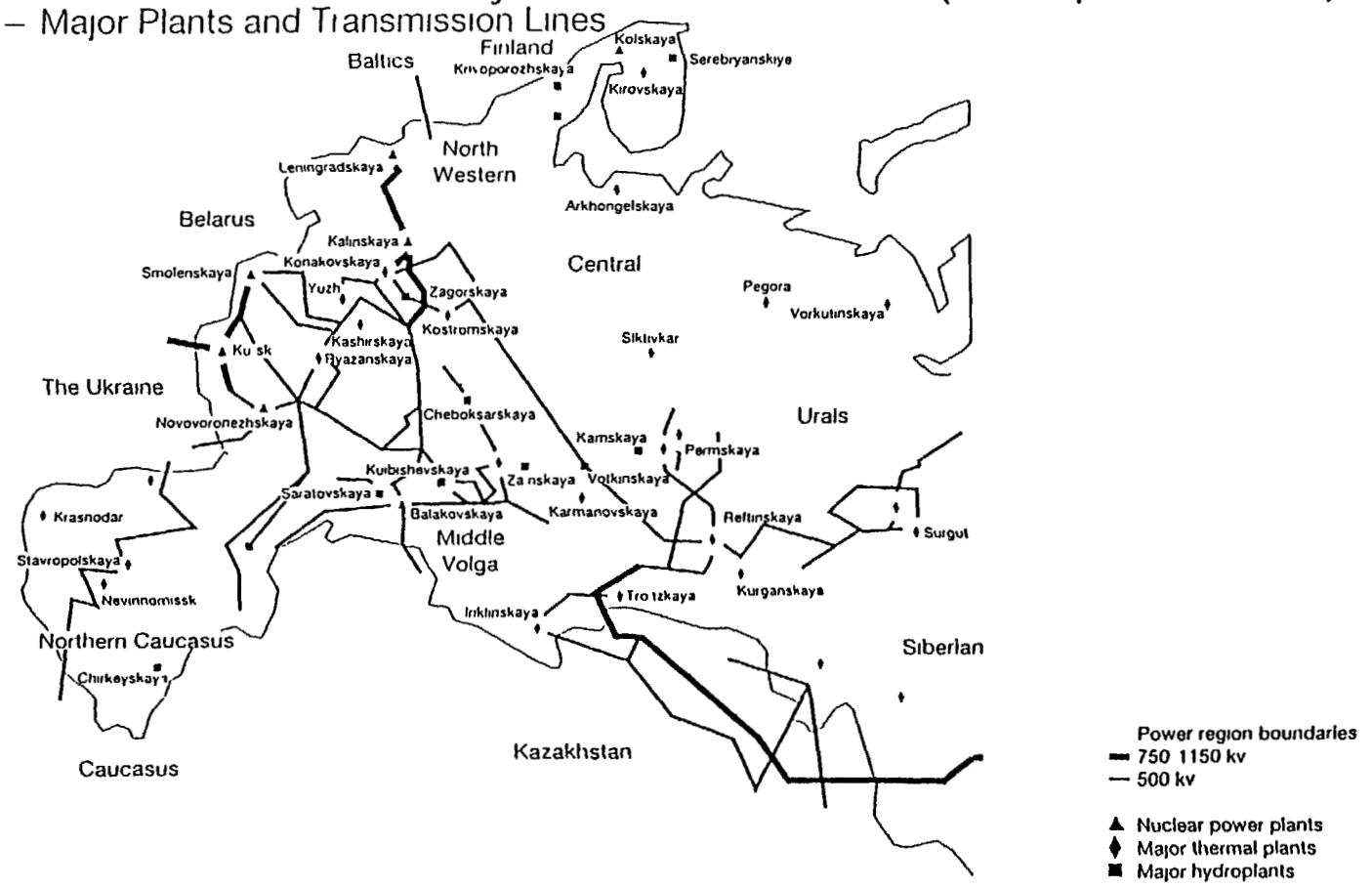
RAO EES Rossii owns 49 percent of the shares of each regional company The Government Property Committee owns 51 perceent of the shares of RAO EES Rossii


Electrical Power System of Russia
– Major Plants and Transmission Lines
Finland
Baltics
North Western
Belarus
Central
The Ukraine
Urals
Far Eastern
Middle Volga
Siberian
Northern Caucasus
Caucasus
Kazakhstan
China
Mongolia
Power region boundaries
750 1150 kv
500 kv
Nuclear power plants
Major thermal plants
Major hydroplants

72

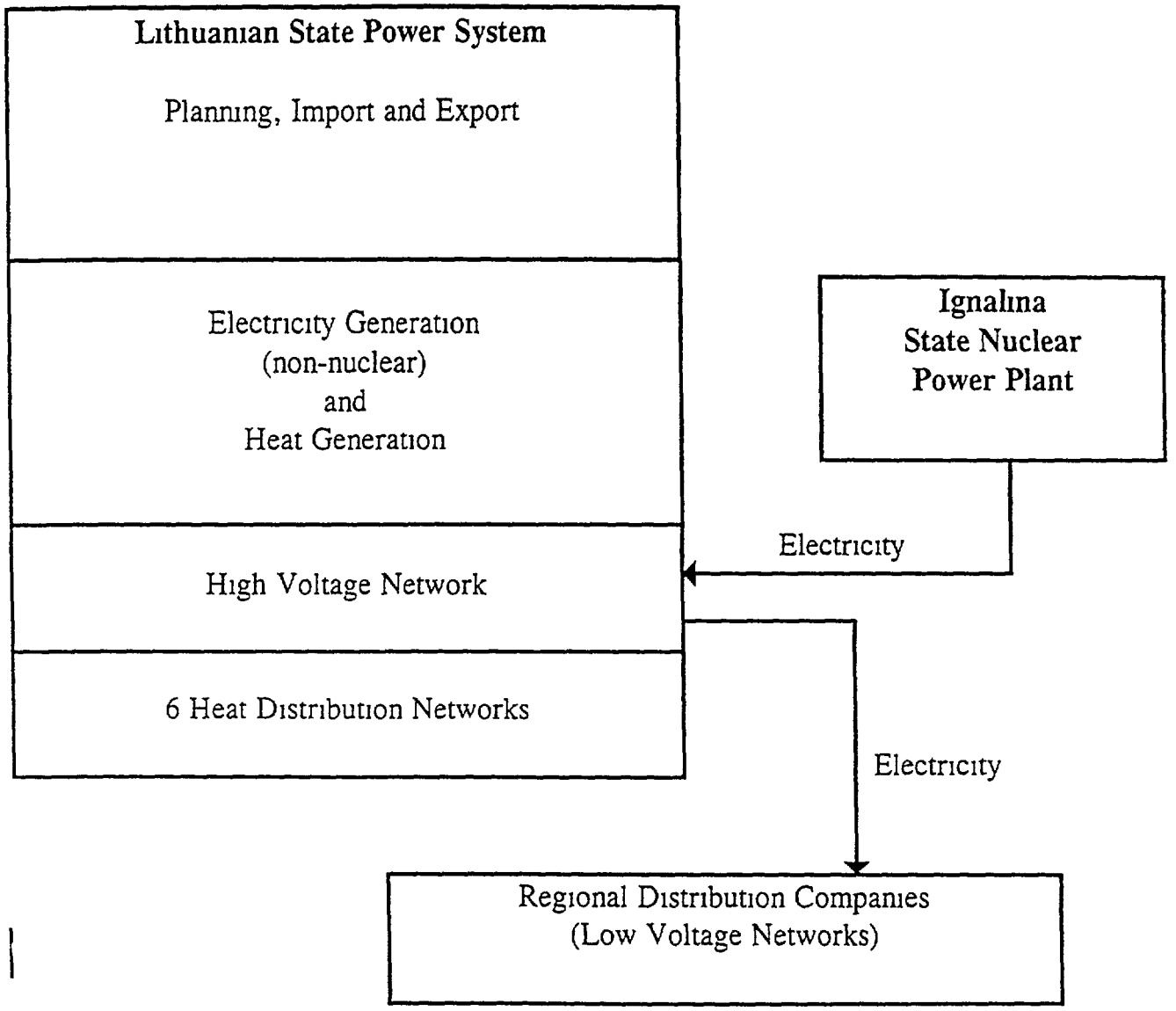
Electrical Power System of Russia (European Part)

– Major Plants and Transmission Lines

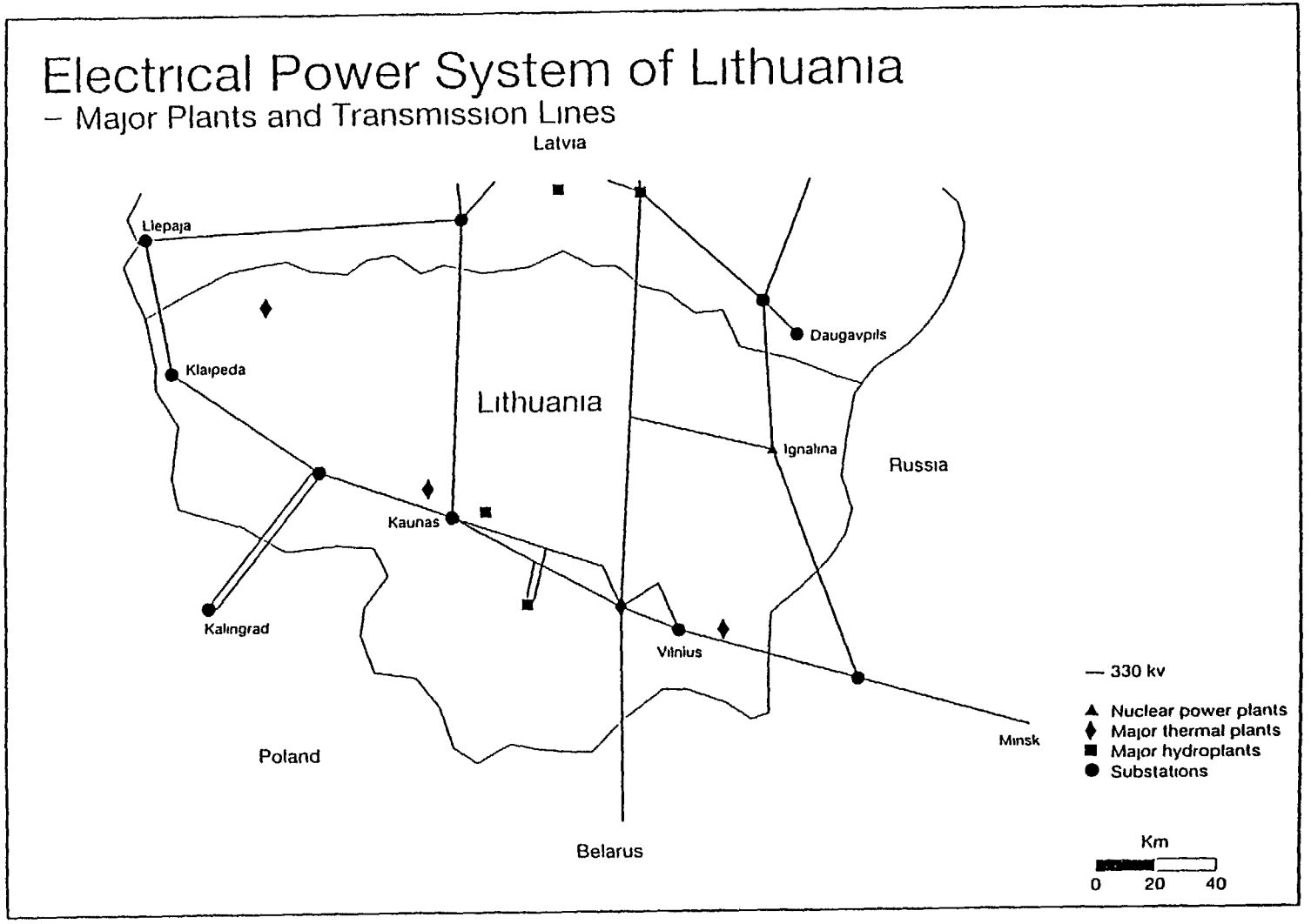


Lithuania

1993 installed capacity 6,130 MW Dec 1993 peak load 2,155 MW

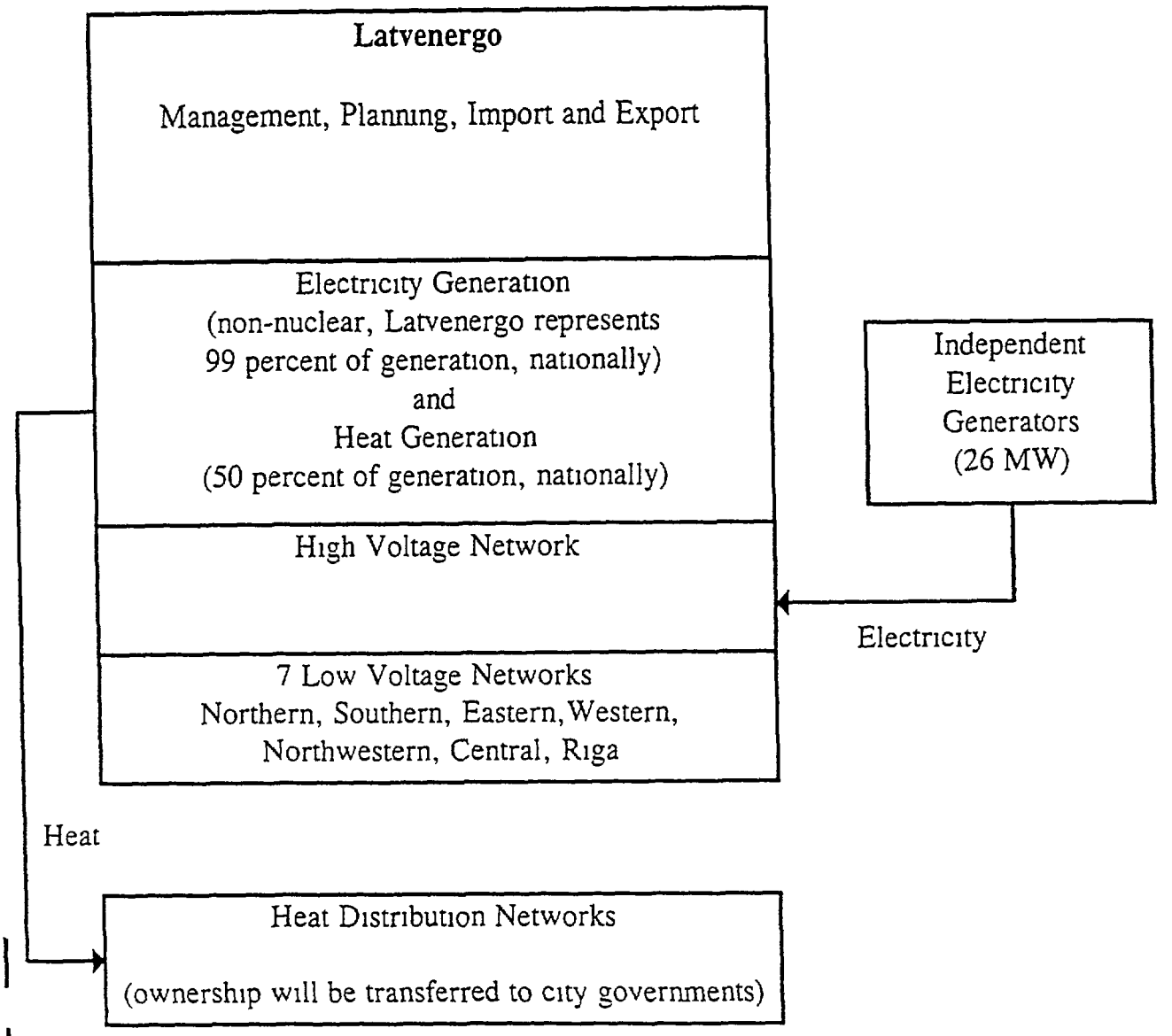


Transfer prices between the Ignalina State Nuclear Power Plant and LSPS and transfer prices between LSPS and the distribution companies are regulated by the Ministry of Energy Electricity prices to end users are proposed by the Ministry of Energy, in cooperation with power production enterprises, and approved by the Cabinet of Ministers Nuclear generation was 78 percent of 1992 generation


Electrical Power System of Lithuania
– Major Plants and Transmission Lines
Latvia
Liepaja
Klaipeda
Lithuania
Daugavpils
Ignalina
Russia
Kaunas
Kaliningrad
Vilnius
Minsk
Poland
Belarus
— 330 kv
Nuclear power plants
Major thermal plants
Major hydroplants
Substations
Km
0
20
40

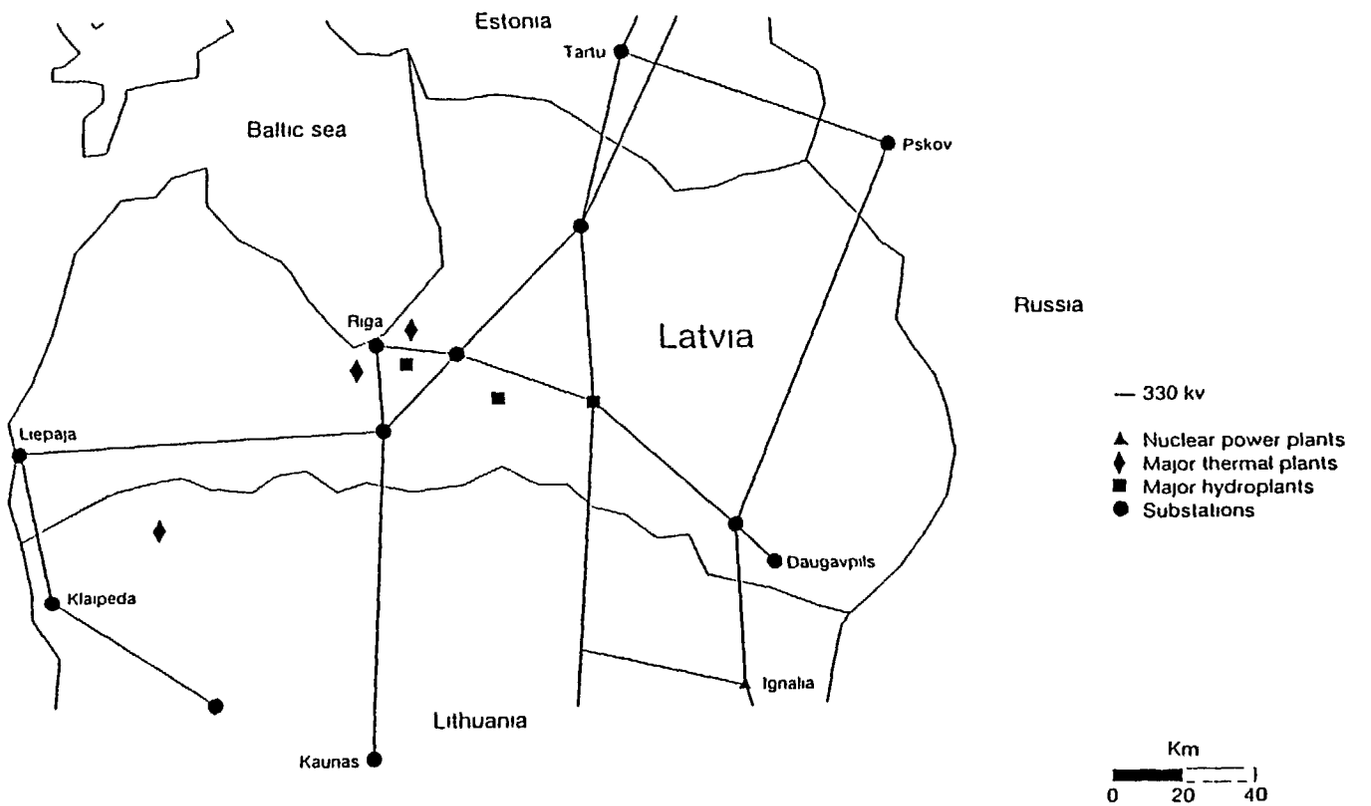
Latvia

1993 installed capacity 2,050 MW Dec 1993 peak load 1,210 MW



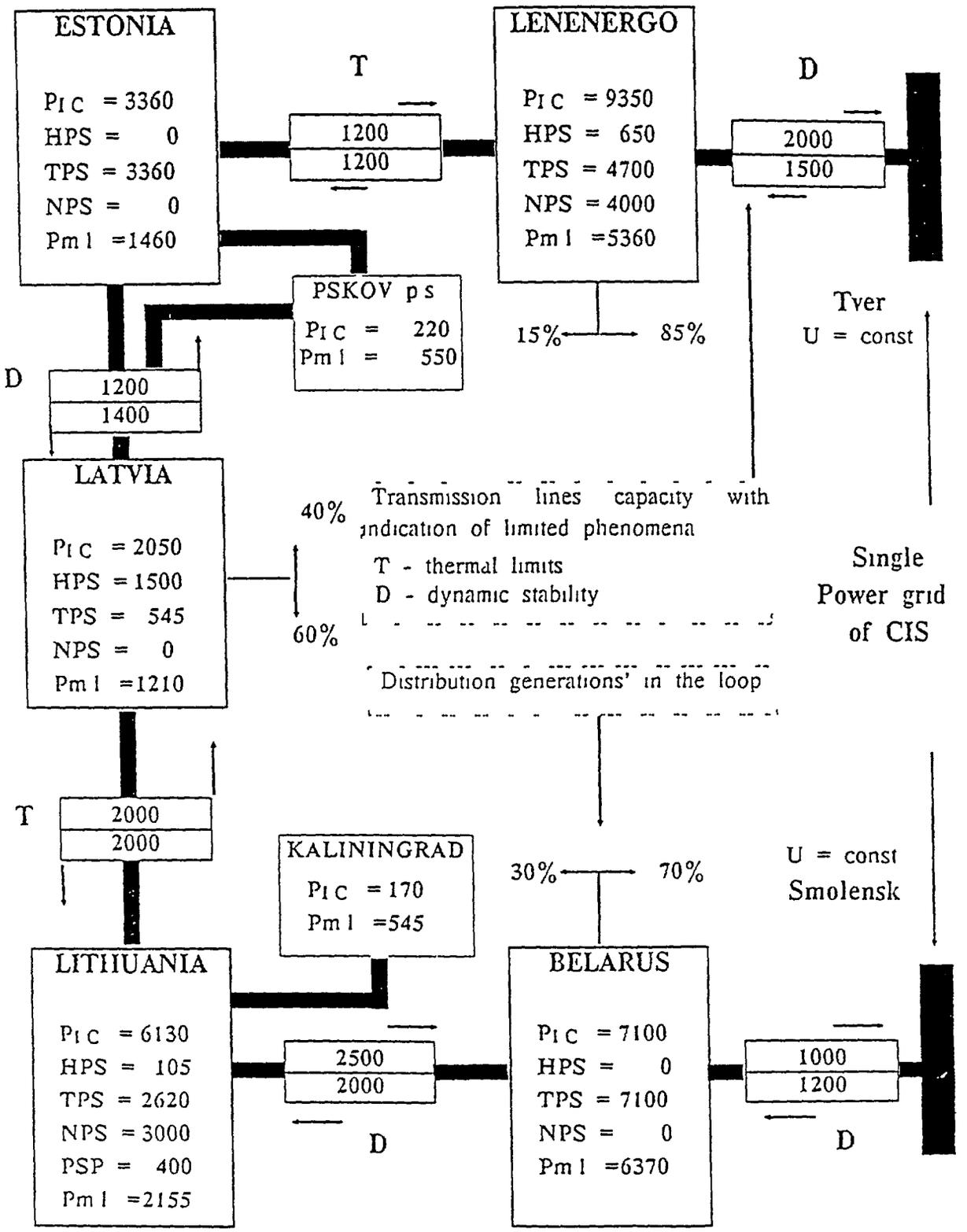
Transfer prices are not published Electricity prices to end users are proposed by Latvenergo and approved by the Cabinet of Ministers In 1993, 39 percent of the national power supply was imported The cost of electricity is therefore affected strongly by border prices

Electrical Power System of Latvia
– Major Plants and Transmission Lines



POWER LOOP RUSSIA-BALTIJA-BELARUS-RUSSIA
state on December 1993

(All power stations' and lines' capacities given in MW)

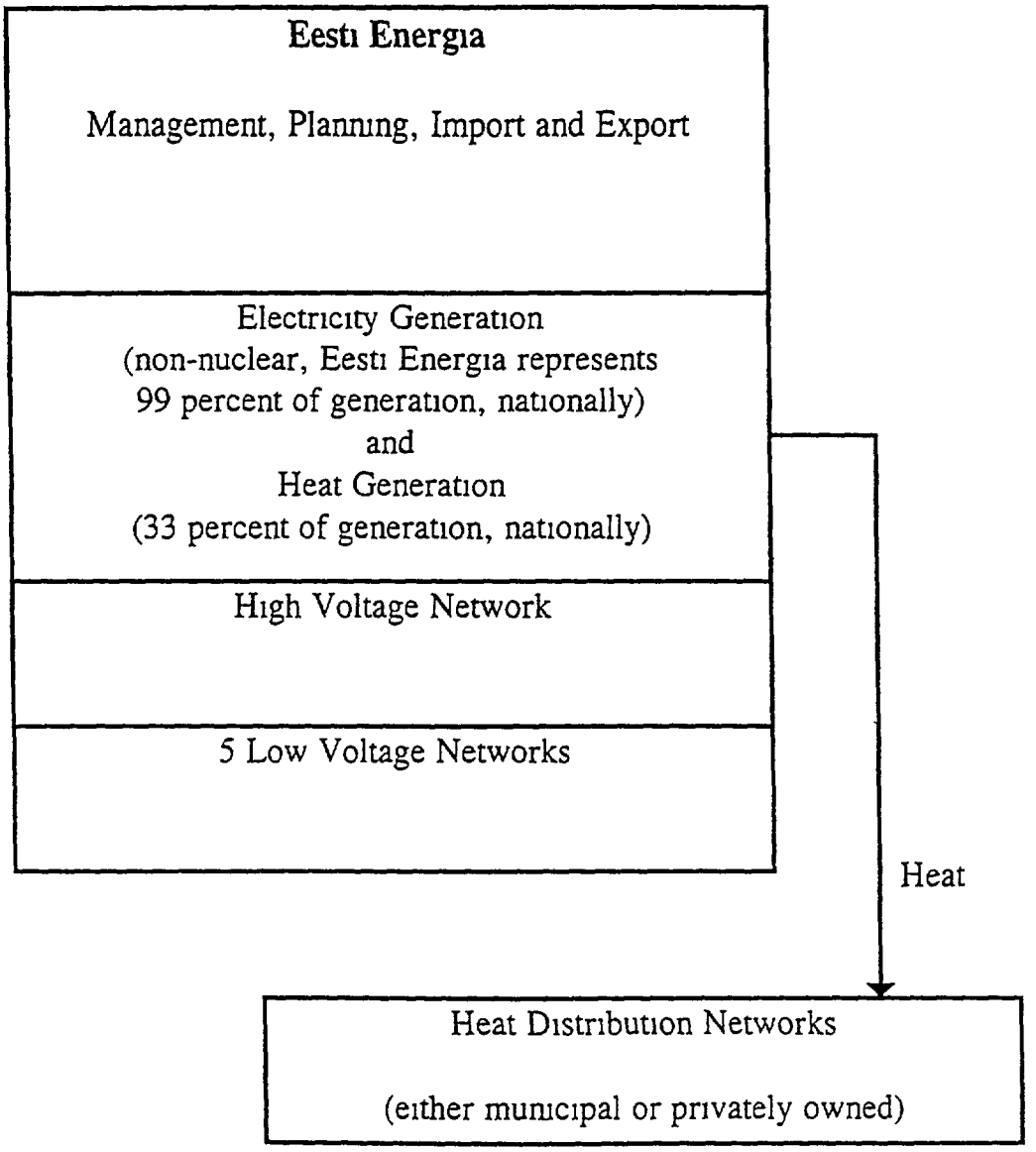


Notes

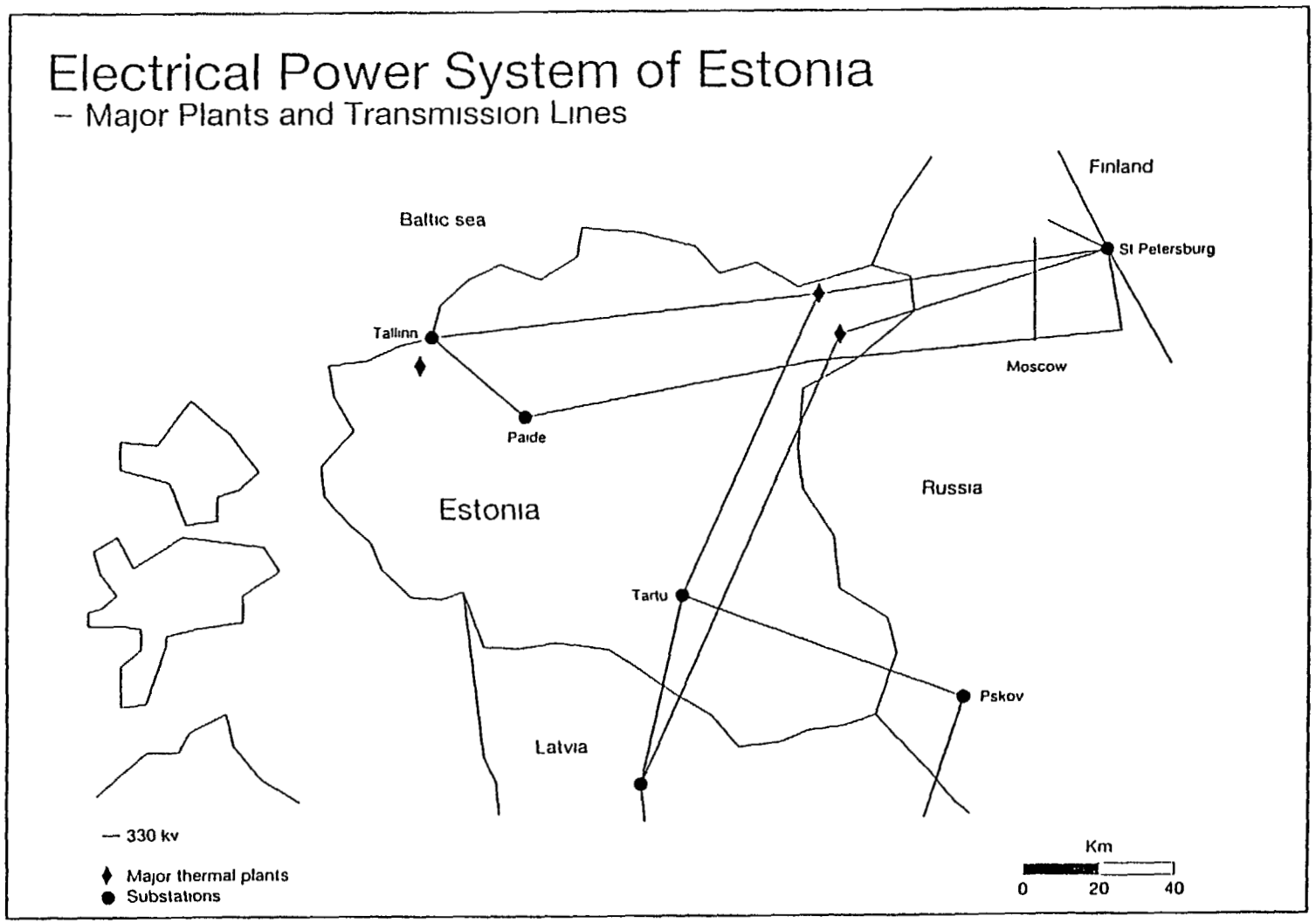
PI C –Total installed capacity power stations', HPS–Hydro, TPS–Thermal, NPS–Nuclear PSP–Pump storage, Pm l –Morning peak load December 1993

Estonia

1993 installed capacity 3,360 MW Dec 1993 peak load 1,460 MW



Transfer prices are not published Electricity prices to end users are proposed by Eesti Energia and approved by the Ministry of Economy The cost of electricity is sensitive to the price of oil shale Privatization of the low voltage networks has been proposed, but Eesti Energia would like to retain these networks


Electrical Power System of Estonia
– Major Plants and Transmission Lines
Finland
Baltic sea
St Petersburg
Tallinn
Moscow
Paide
Russia
Estonia
Tartu
Pskov
Latvia
— 330 kv
Major thermal plants
Substations
Km
0
20
40

80

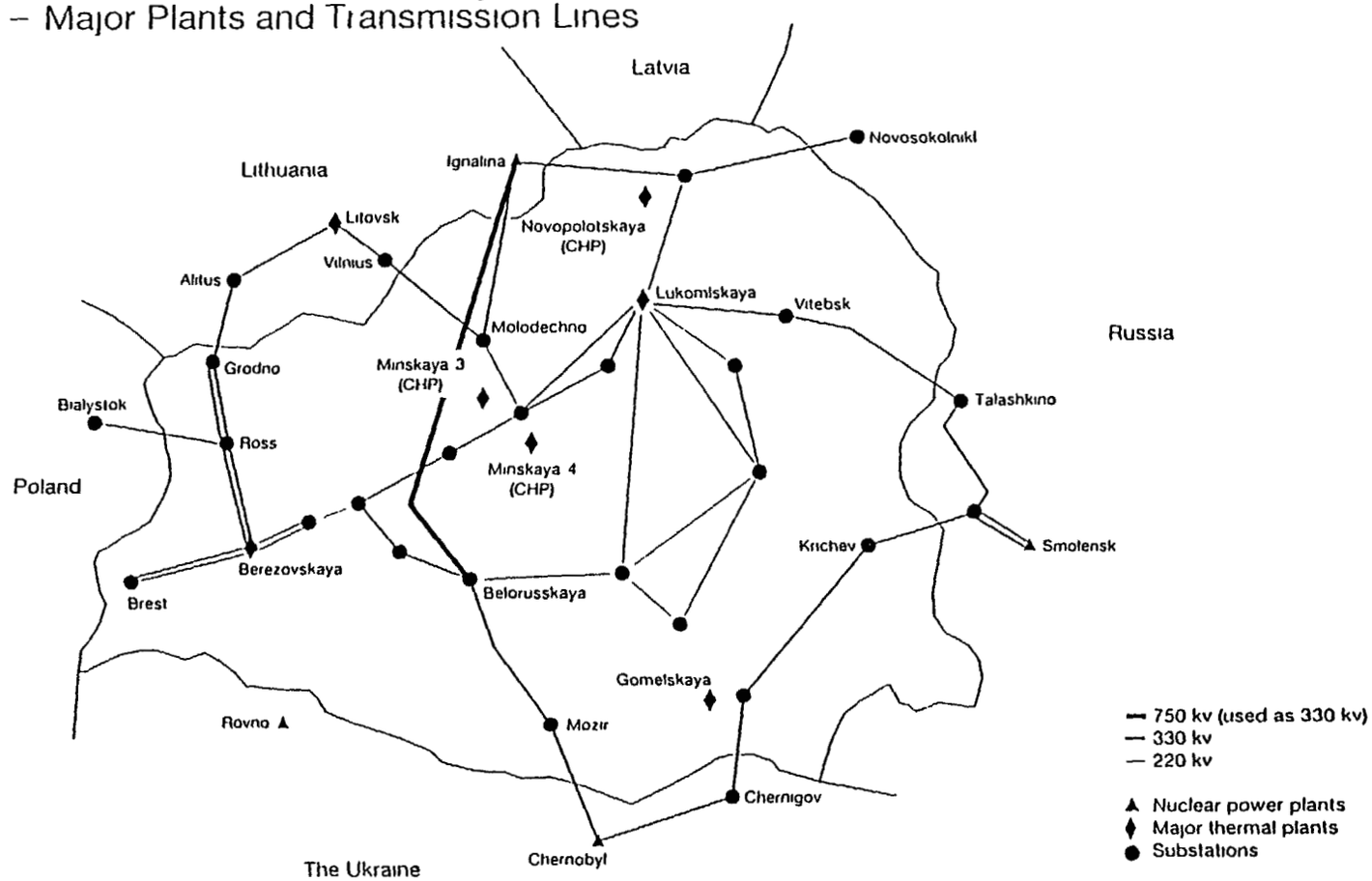
Belarus

1990 installed capacity 6,842 MW 1990 peak load 8,566 MW

Ministry of Fuel and Energy Management, Planning, Import and Export					
Unified Dispatch Management Dispatch (at the national level)					
Brest energo	**Vitebsk energo**	**Gomel energo**	**Gorodno energo**	**Minsk energo**	**Mogilev energo**
Electricity Generation (non-nuclear) and Heat Generation	Electricity Generation (non-nuclear) and Heat Generation	Electricity Generation (non-nuclear) and Heat Generation	Electricity Generation (non-nuclear) and Heat Generation	Electricity Generation (non-nuclear) and Heat Generation	Electricity Generation (non-nuclear) and Heat Generation
High Voltage Network	High Voltage Network	High Voltage Network	High Voltage Network	High Voltage Network	High Voltage Network
Low Voltage Network	Low Voltage Network	Low Voltage Network	Low Voltage Network	Low Voltage Network	Low Voltage Network
Heat Distribution Networks	Heat Distribution Networks	Heat Distribution Networks	Heat Distribution Networks	Heat Distribution Networks	Heat Distribution Networks

The transfer of electricity from one energo to another energo is carried out under the orders of the national dispatch center Electricity and heat prices to end users are set by the Cabinet of Ministers Transfer prices are not published and the energos are not independent Belarus has no nuclear plants in operation or under construction

Electrical Power System of Belarus
– Major Plants and Transmission Lines



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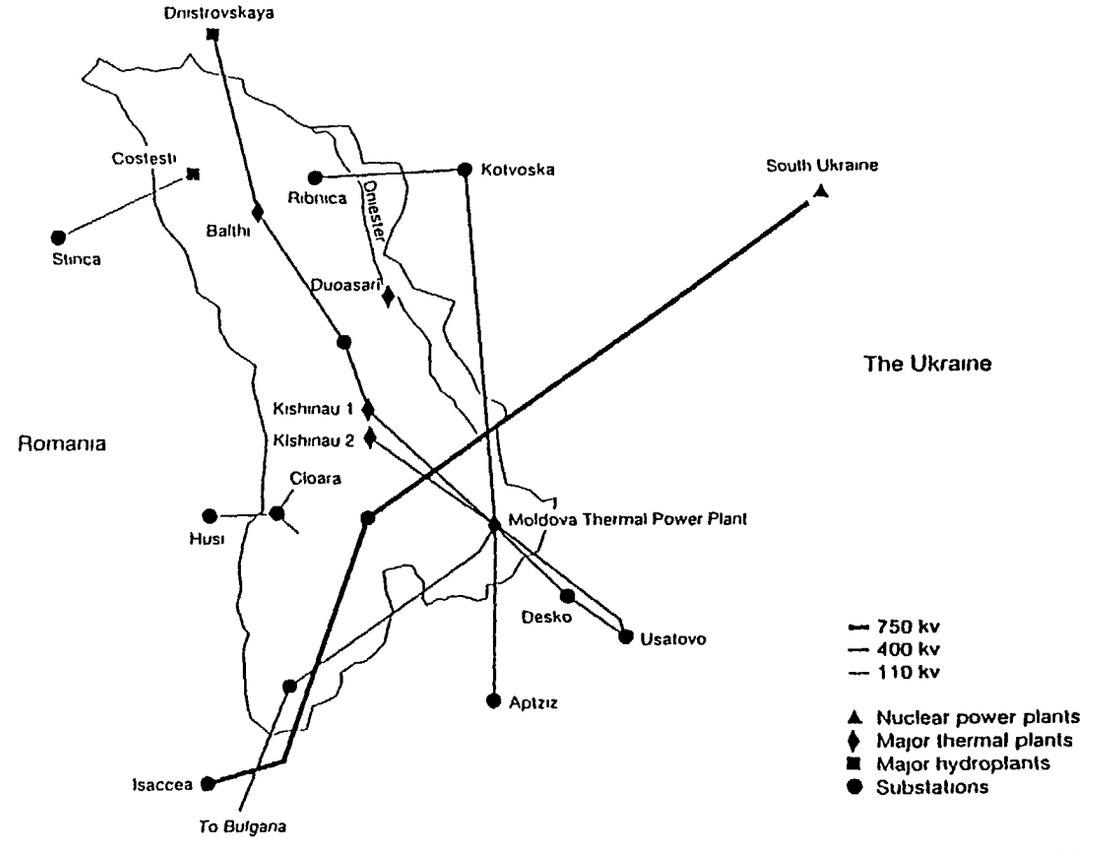
Moldova

1992 installed capacity 2,998 MW 1992 peak load 1,850 MW

Moldenergo
Management, Planning, Import and Export
Electricity Generation (non-nuclear) and Heat Generation
High Voltage Network and Low Voltage Network
Heat Distribution Networks

Transfer prices are not published Most of the electricity consumed in Moldova is generated at the Moldovan Thermal Power Plant (2520 MW total, including 1600 MW coal-fired) on the left bank of the Dniester The political division between the left bank and the rest of the country is an obstacle to the restructuring the power sector The power stations are intended to be financially "self-managing" but there are serious non-payment problems

Electrical Power System of Moldova
– Major Plants and Transmission Lines



Interconnection of Power Systems of the Baltic States

Facts in Brief

1995

DC

Baltija

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General description of the Pool of Baltic Power Systems 2

DC Baltija - Baltic IPS operator 5

Structure of power generation and consumption 6

Annual interchange of Baltic Power Systems 9

Fuel consumption for heat and power 11

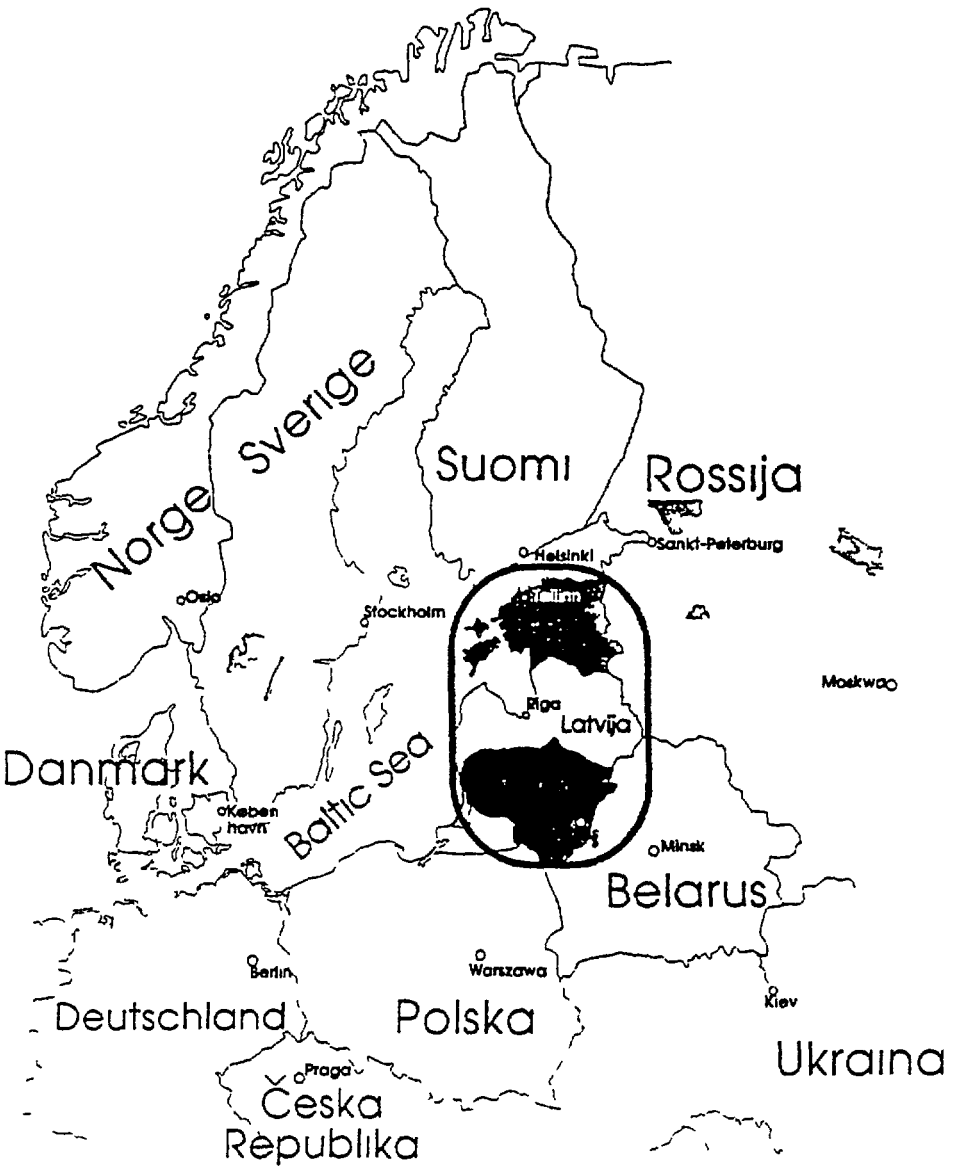
Power networks 11

Investigations 16

Telecommunications, SCADA, EMS 19

General description of IPS of the Baltic States

Interconnection of Power Systems of the Baltic States (Baltic IPS) was founded by representatives of Estonia, Latvia and Lithuania after regaining complete independence of the Baltic countries in 1992 The Baltic countries cover 175,015 sq km area with approx 8 mil inhabitants (Estonia - 45,215 sq km and 1 58 mil inhab , Latvia - 64,600 sq km and 2,68 mil inhab , Lithuania - 65,200 sq km and 3,75 mil inhab)



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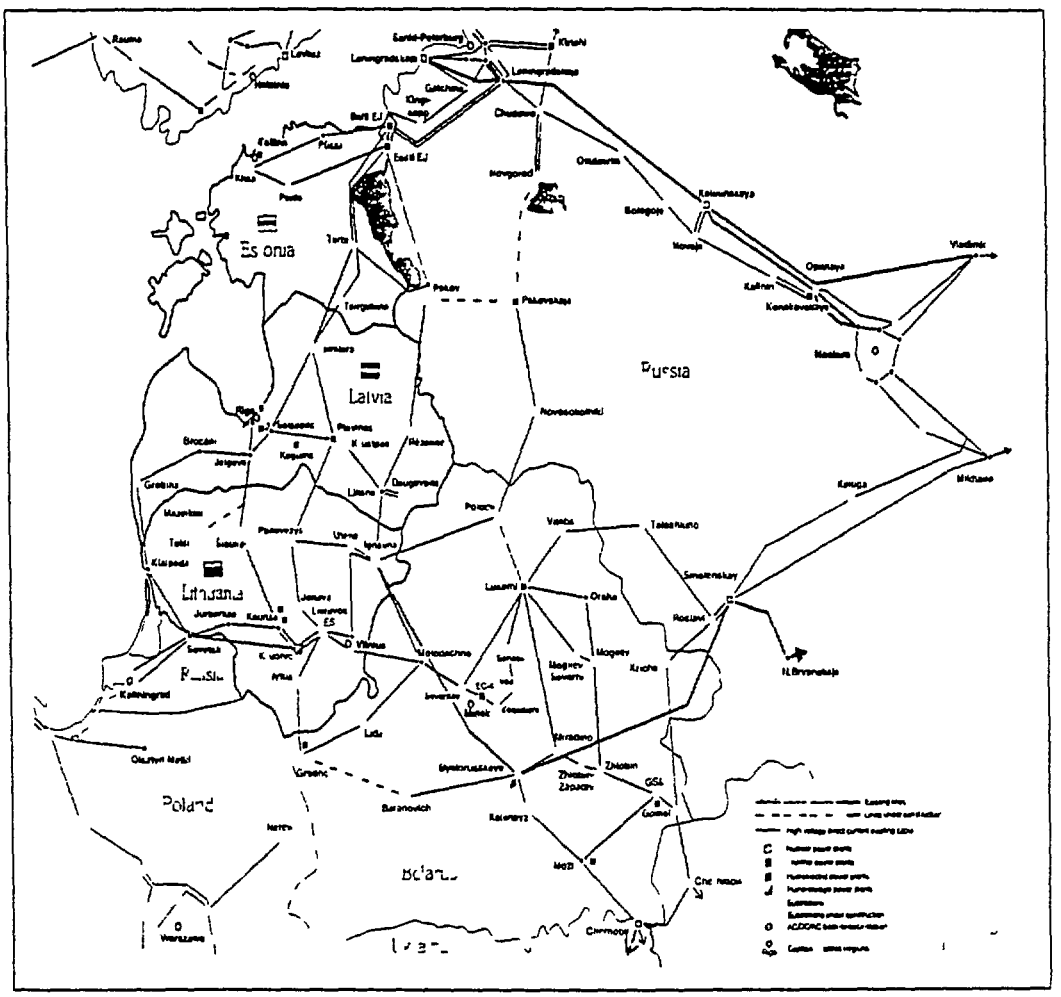
Baltic IPS includes the state owned power systems of the Republic of Estonia, Republic of Latvia and Republic of Lithuania Baltic IPS operates parallel (on a synchronous AC grid) with the Unified Power System of Russia and with the Power System of Belarus via a power loop made up of high voltage transmission lines of 330 kV, 500 kV and 750 kV of the Baltic IPS - IPS of North-West Russia - IPS of Central Russia - IPS of Belarus - Baltic IPS The historically constructed grid of 330 kV dating from 1960 in the territory of the former USSR has been the reason for parallel operation of the Baltic state power systems with Belarus and Russia

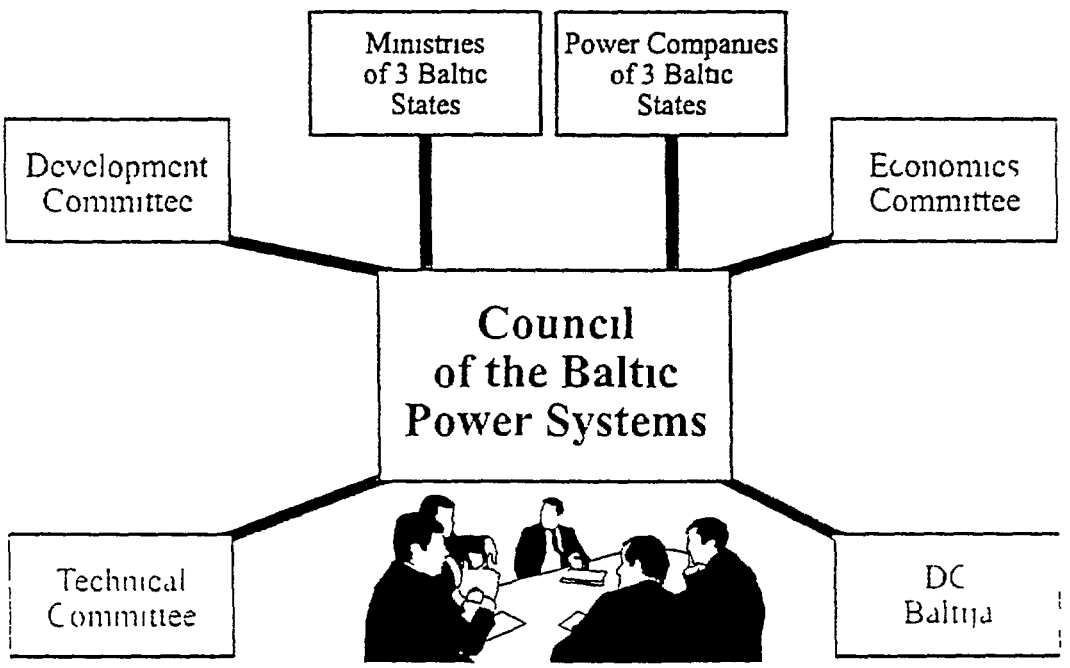


Power loop of Baltic IPS - IPS of North-West Russia - IPS of Central Russia - IPS of Belarus - Baltic IPS

88

Operative-dispatch management of the Baltic IPS within the frame of its legal competence and in accordance with the multilateral agreement on parallel operation of the power systems of the Baltic countries is carried out by the Baltic Power Systems Control Centre Ltd (DC Baltija) in Riga, which is a Joint Venture of Estonia, Latvia and Lithuania The terms of parallel operation with IPS Central Russia and IPS Belarus are determined by a bilateral agreement between IPS of Russia and DC Baltija.

DC Baltija statutes are agreed to and signed by the directors of three Power companies and accepted by the respective governments DC Baltija is a separate legal entity and the board of directors of DC Baltija (called the Council of the Baltic Power Systems) consists of two representatives from each Baltic Power company plus one representative of each authority

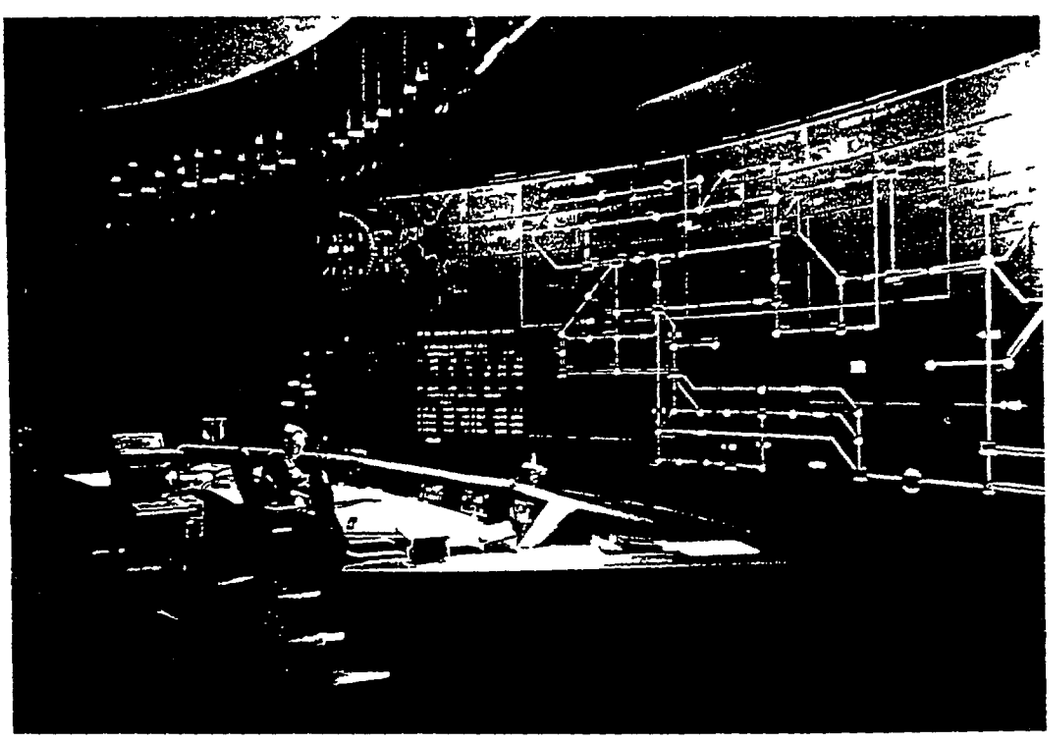


The council is responsible for all final agreements regarding the parallel operation of the Baltics The key responsibilities of parallel operation are defined by the Multilateral Agreement of the Baltic Power Companies and DC Baltija

DC Baltija - Baltic IPS operator

DC Baltija is responsible for

- *Dispatching the operation of the entire 330 kV network in Baltics and with neighboring IPS of Russia and Belarus*
- *Dispatching and planning an energy balance for the Baltic power systems on daily, weekly, monthly and annual basis*
- *Ensuring reliability 330 kV network under accepted criteria*
- *Defining the reserve requirements and its allocation*
- *Providing voltage control and reactive power balance of 330 kV network*
- *Dispatching the under emergency conditions affecting normal parallel operation of the Baltic Systems*
- *Coordinating maintenance schedules of the major generation units and transmission lines*
- *Performing 330 kV grid studies such as stability, short circuit, security and control*
- *Providing the settings and coordinating the maintenance of relay protections and security devices of the 330 kV network*



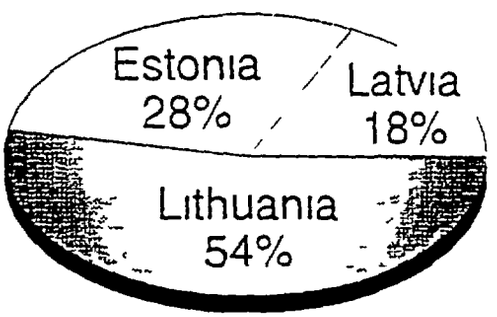
Control Room of DC Baltija

From the control room of DC Baltija, staff is able to control and to coordinate the operation of Baltic IPS generation and transmission facilities throughout the Baltics, as well as to monitor operating conditions at adjacent power systems in Russia and Belarus interconnected in power Loop

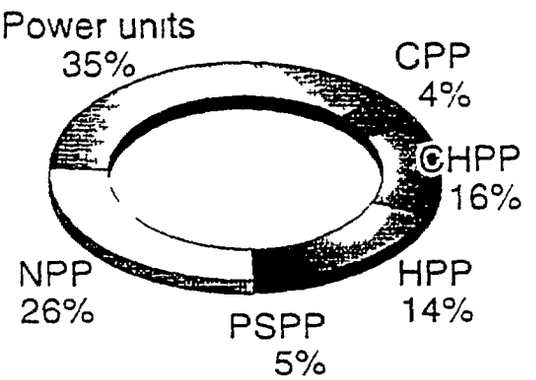
Structure of power generation and consumption

Total installed capacity of the Baltic Power Systems was 11,703 8 MW on 01 01 96

It includes a wide range of different types of equipment - a nuclear power plant (NPP), hydro power plants (HPP), condensing power plants (CPP), combined heat and power plants (CHPP) as well as pumped storage power plant (PSPP) and two wind power generators (WP)

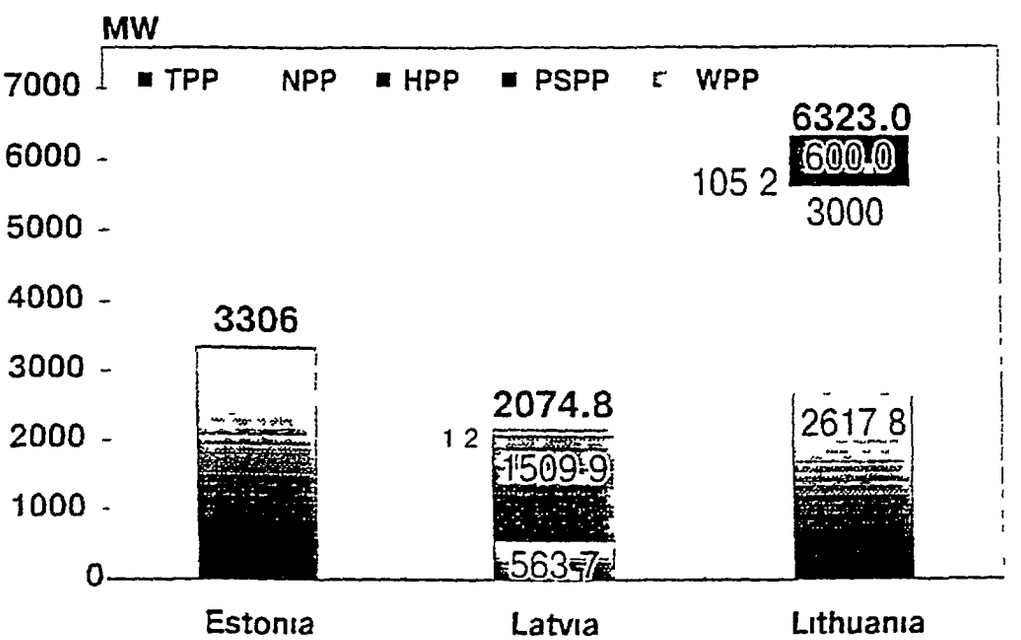


Allocation of the installed capacity (11,703 8 MW) in the power systems of the Baltic countries



The structure of the installed capacity according to the types of equipment

The distribution of the installed capacity among power systems:



Largest thermal power plants (TPP) of the Baltic IPS

Plant	Installed capacity (MW)	Available capacity at peak load (MW)	Number of units (number x capacity)	Steam pressure (atm)	Fuel
Estonian CPP	1610	1340	8 x 200	140	oil shale
Baltic CPP	1390	1242	7 x 100	100	oil shale
CHPP Iru	190	190	1 x 110 1 x 80	140	gas, HFO
Riga CHPP-2	390	390	3 x 110 1 x 60	140	gas, HFO
Ignalina nuclear power plant	3000 (2 reactors, each 1500)	2600	4 x 750	70	nuclear
Lithuanian CPP	1800	1800	4 x 150 4 x 300	140 255	gas, HFO
Vilnus CHPP-3	360	348	2 x 180	140	gas, HFO
Maziekai CHPP	194	116	2 x 80 2 x 34	140	gas, HFO
Kaunas CHPP	170	170	1 x 110 1 x 60		gas, HFO

Hydro- and pumped storage power plants

Plant	Installed capacity (MW)	Available capacity at peak load (MW)	Number of units
Plavinas	840	840	10
Riga	402	402	6
Kegums	260	236	7
Kruonio	600	570	3
Kaunas	100 8	100	4

Hydro power plants Plavinas, Kegums and Riga are plants of the river Daugava Cascade in the Republic of Latvia

Hydro power plant Kaunas is located on the river Nemunas in the Republic of Lithuania

Pumped storage power plant Kruonis has on upper artificially constructed lake which is still under construction and is operating with water level of 140 - 146 m above the sea level (the designed level is 153 5 m)

When filled up to 146 m the lake provides for operation of three units at full capacity during 7 4 hours

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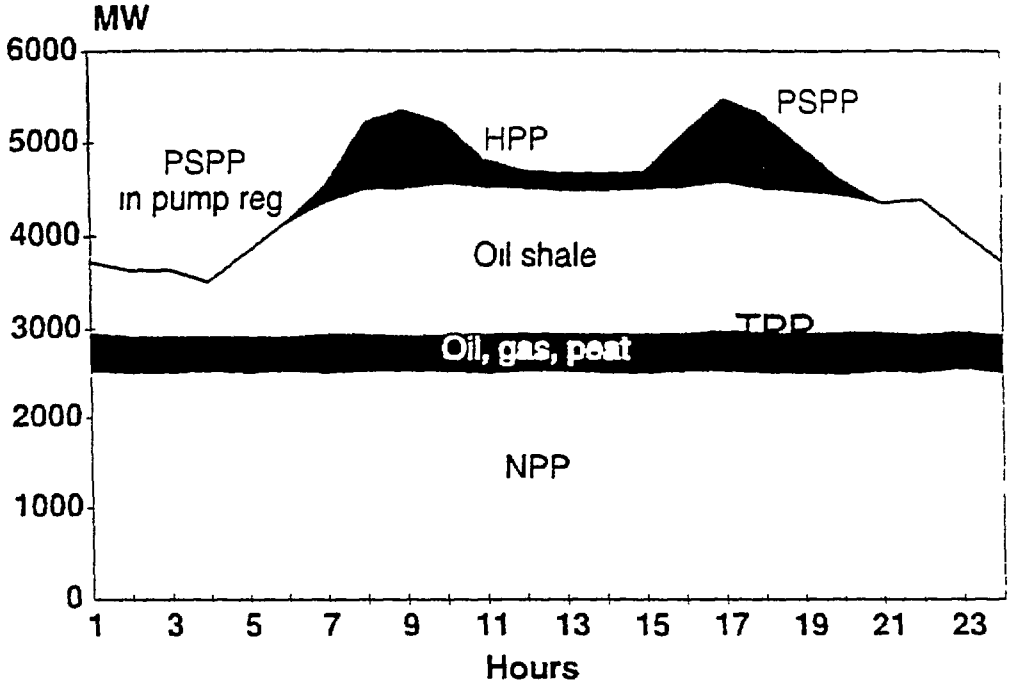
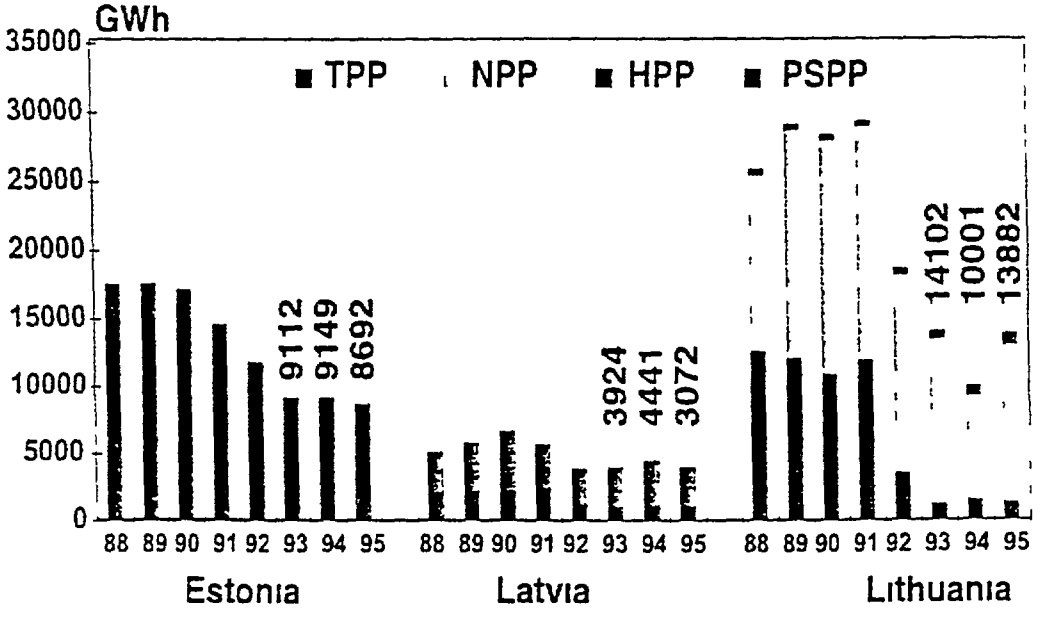
Power plant output structure on peak demand
December, 6,1995 17 00 a m , 4 687 MW



Trend of production over the years
of different types of plants



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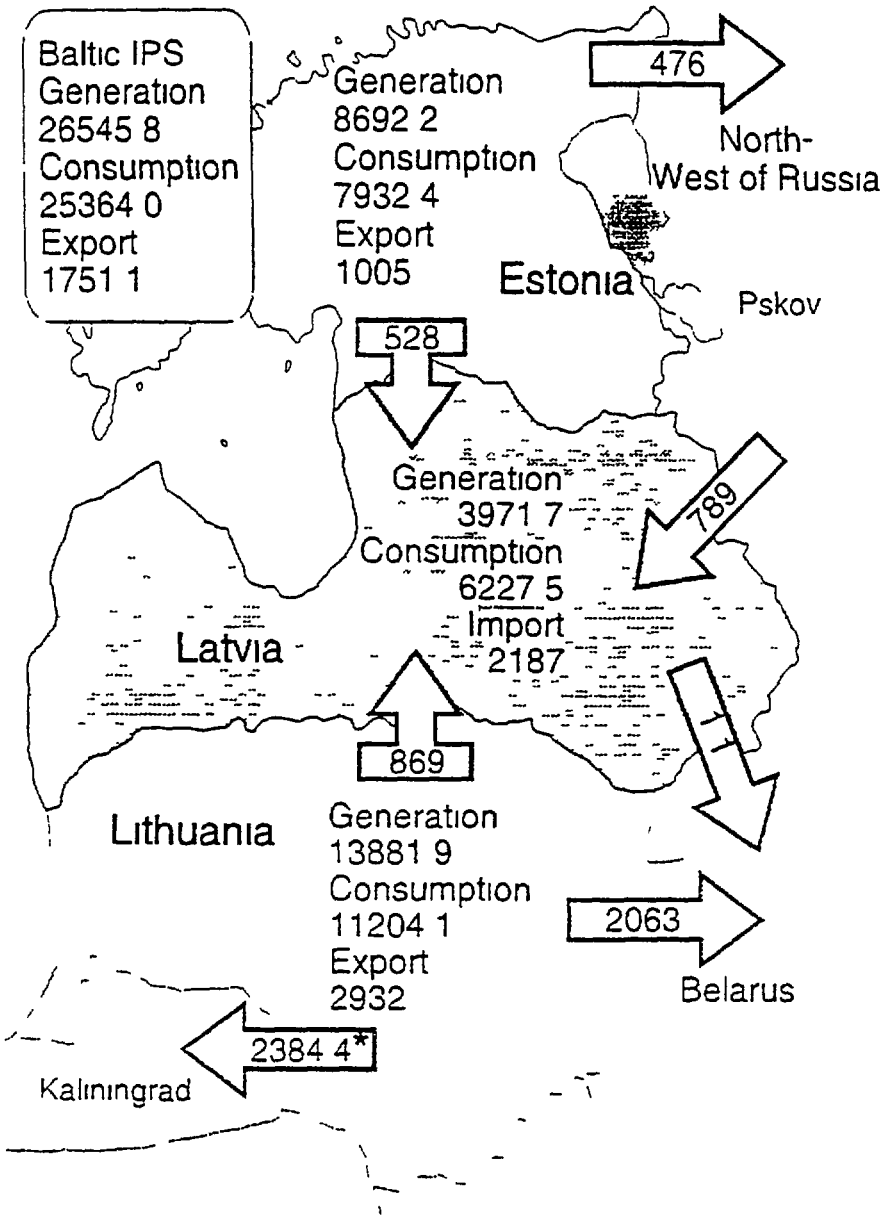
Annual interchange of Baltic Power Systems (GWh)

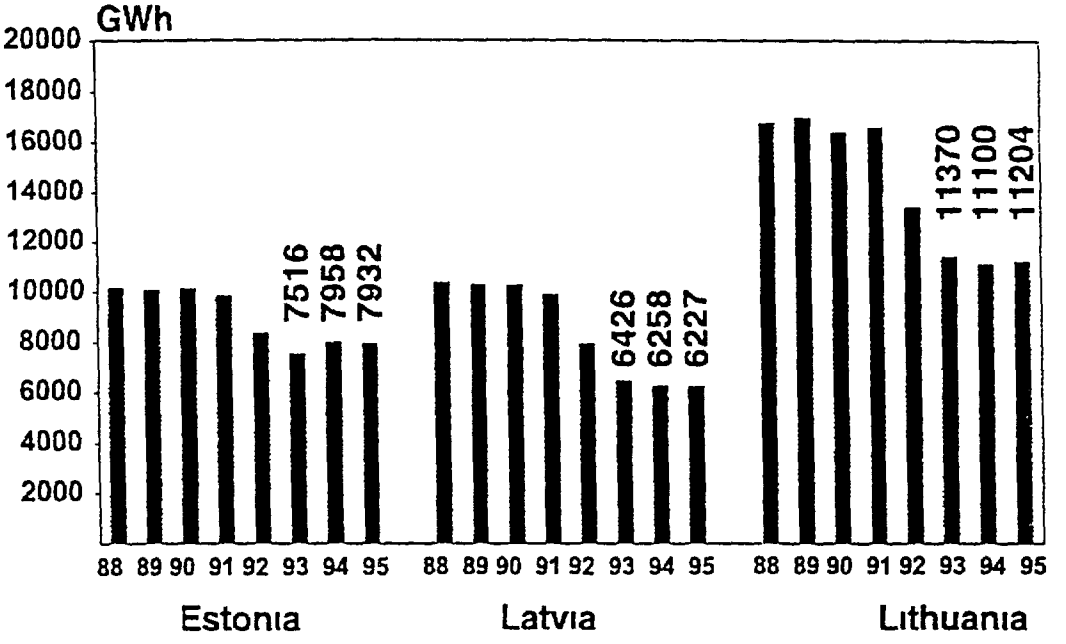


* Russia s wheeling power

After the collapse of the centralized planned economy, the Baltic States have started to expand the Power Market

Trend of power consumption

Balance of capacity and energy of the power systems of Baltya can be characterized by the general situation in economics of those three States and the neighboring countries of Russia and Belarus. Therefore the changes of consumer structure and increase of power demand is on-going process



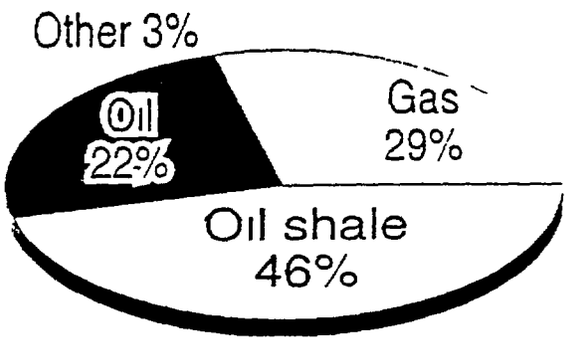
Consumption of Lithuanian power system has increased by 0 94% compared to 1994 The corresponding decrease for Latvia is 0 5% and for Estonia - 0 38%

Total power losses in power networks of the Baltic IPS amounted to 4905 8 GWh.

In 1995 the losses in Estonia power system were 1637 5 GWh (20 9%), in Latvia power system - 1263 1 GWh (20 9%) and Lithuania power system - 2005 2 GWh (15 8%)

Fuel consumption for heat and power

The consumption of fuel in all power systems for generation of power and production of heat amounted to 7681 8 thous tons of oil equivalent The consumption has decreased by 7 4% compared to 1994 It means decrease of consumption for power generation by 6 3% and for heat production - by 8 5%



Shares of different kinds of fossil fuel in the total consumption of the Baltic IPS

Decrease of heat production in the combined cycle power plants has resulted in an increase of heat rate (that is specific consumption of fuel for power generation) up to 403 8 g/kWh (more to 2 7 g/kWh)

Power networks

The basic network forming the Baltic IPS are 57 high voltage power transmission overhead lines of 330 kV and 31 switch-yards equipped with 77 autotransformers and transformers, 71 busbars and 222 circuit breakers with 1200 sets of relay protection and line automatic

Estonian power system is connected with Lenenergo (Russia) by three high voltage power transmission lines of 330 kV and with Latvian power system - by two high voltage power transmission lines of 330 kV There are two connections to Pskov's power system

Latvian power system is connected with Lithuanian power system by four high voltage power transmission lines of 330 kV, and Lithuanian power system is connected with Belarus by five high voltage power transmission lines of 330 kV

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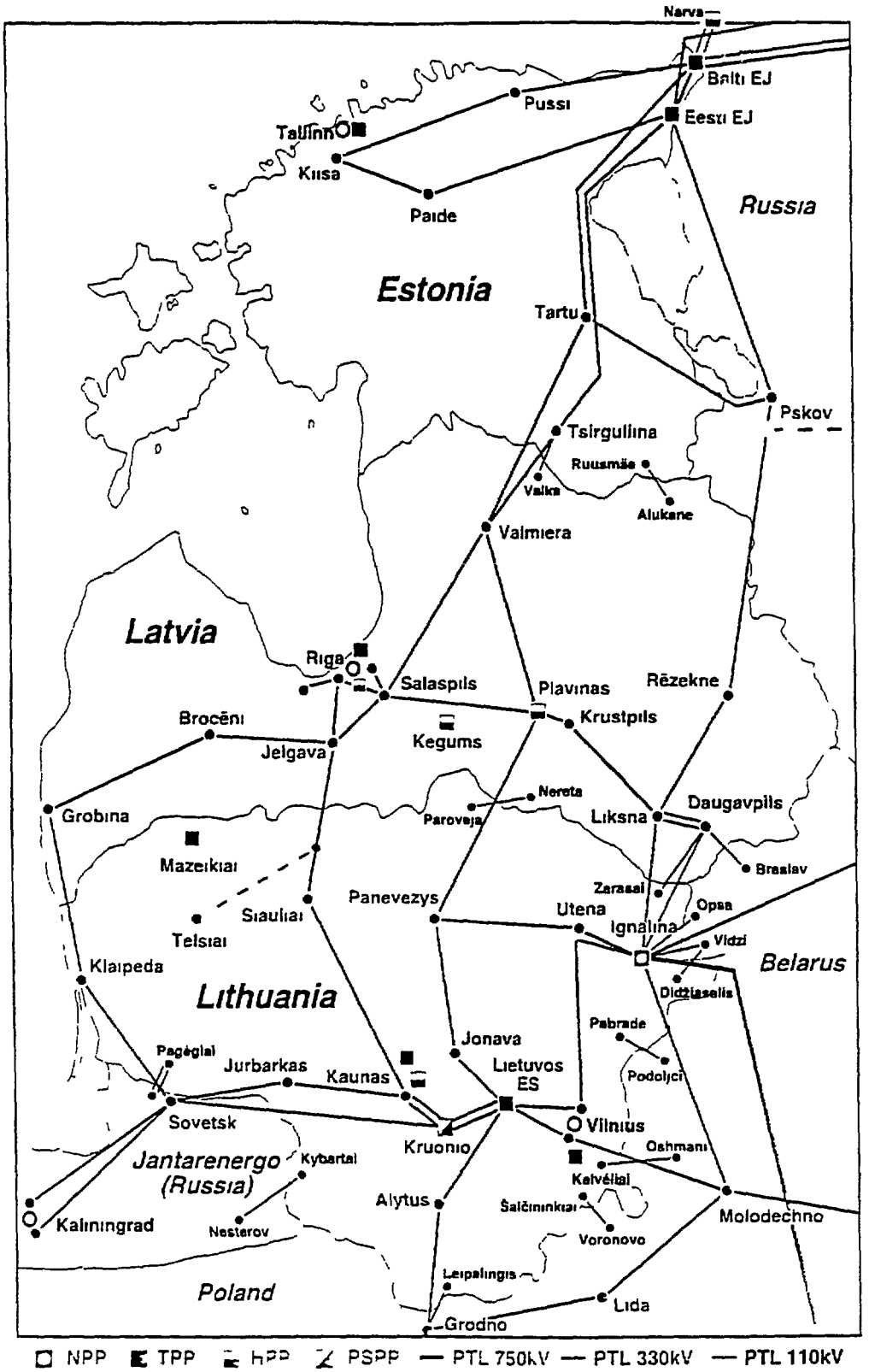

On this picture is not shown the bulk distribution network of 110 kV Only the 110 kV interconnections among countries are shown

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Power distribution network of the Baltic IPS consists primarily of 110 kV lines, the only exception being Estonian power system where there is also a 220 kV network

Network status on 01.01 96

Power system	Length of HV lines (km)			Installed capacity of network autotransformers and transformers (MVA)			Installed shunt reactors (MVAr)
	110 kV	220 kV	330 kV	110 kV	220 kV	330 kV	10 kV
Estonia	3447 0	572	1245 0	3371 0	830	1795	30 0
Latvia	3988 3	-	1247 9	3728 5	-	2825	-
Lithuania	5048 0	-	1599 0	5305 4	-	3640	-
Baltic IPS	12510 3	572	4091 9	12404 9	830	8260	30 0

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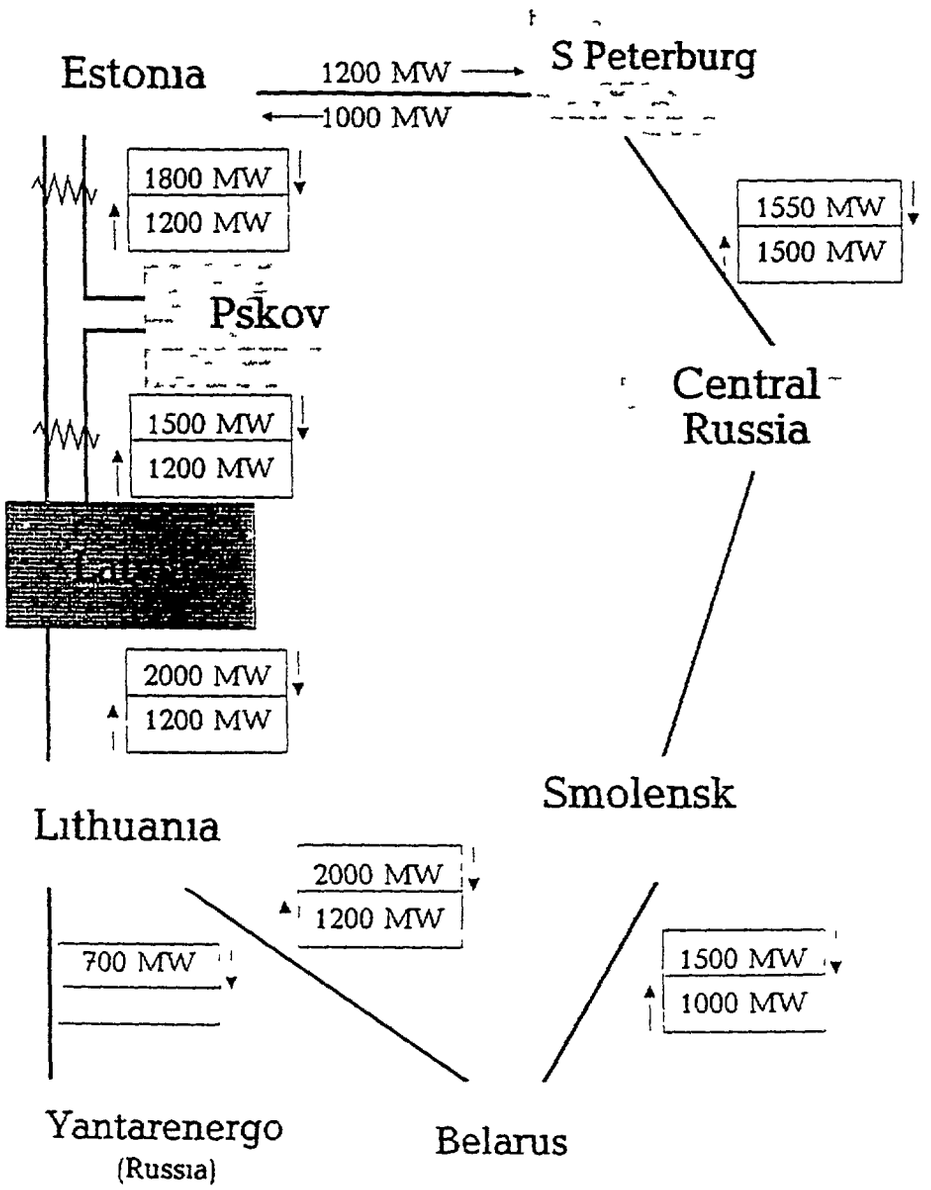
Transmission capacity is calculated according to terms of maintaining dynamic (transient) stability (taking into account the response of power generating units in emergency operation), thermal limitations and some other limitations, and varies between 1200 MW and 2000 MW In order to provide full and effective utilization of control into the power Loop, there are implemented emergency protections (105 sets) and coordinated emergency systems (6)

Real transmission capacity of 330 kV and 750 kV network

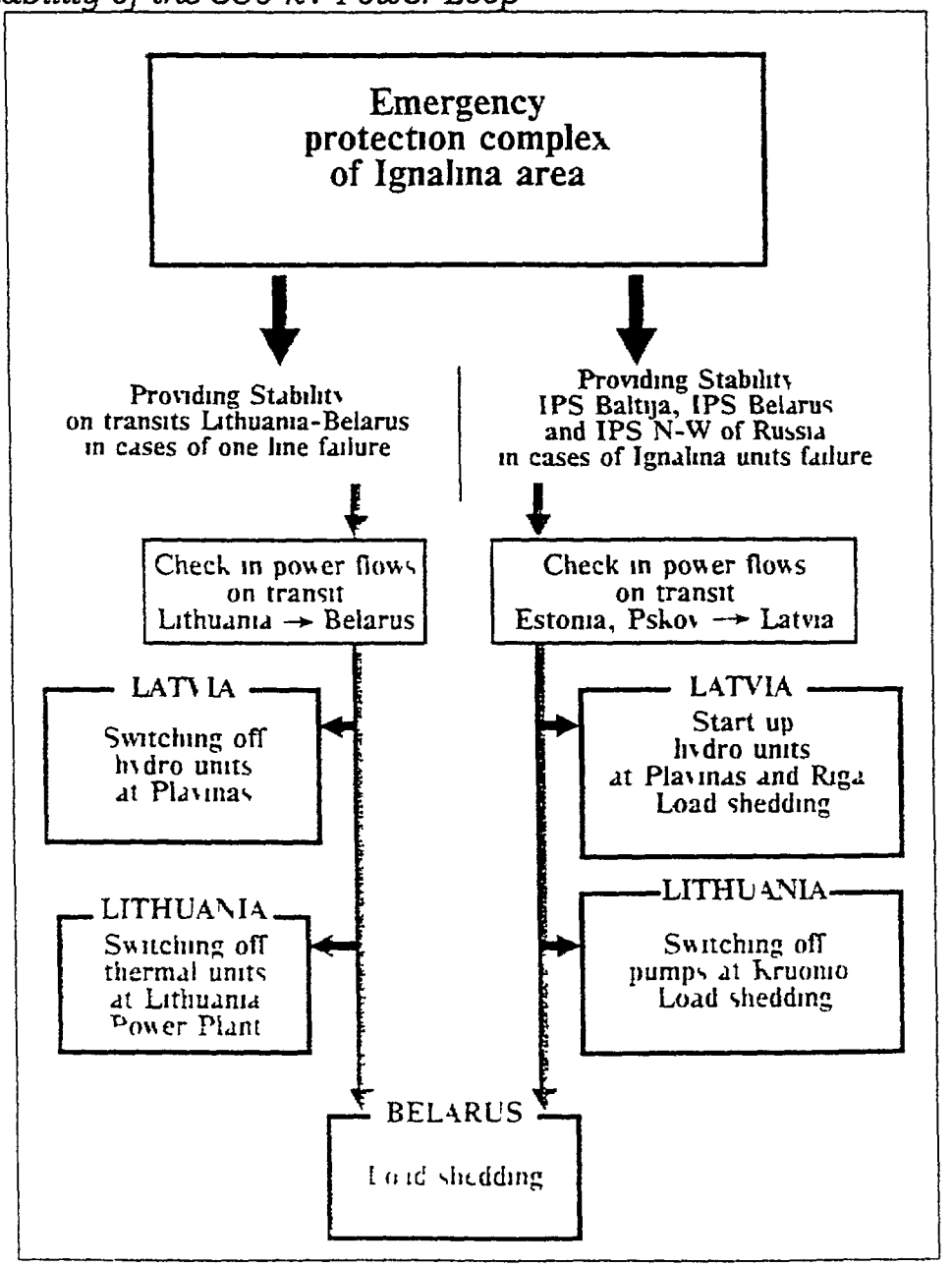


90

DC Baltija carry out all necessary studies for providing relay and emergency protection sets and is obligated to coordinate setting of relay protections in 330 kV Grid of the Baltic IPS due to availability of basic and back-up protections

This principle and technical devices implemented in to the power systems of former Soviet Union seriously differ from the approach in Western countries, where every circuit is equipped with two sets of basic protections

Especially important is emergency protection complex of Ignalina area for providing reliable power supply of Ignalina nuclear plant to power systems as well as providing sufficient level of reliability of the 330 kV Power Loop



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Investigations

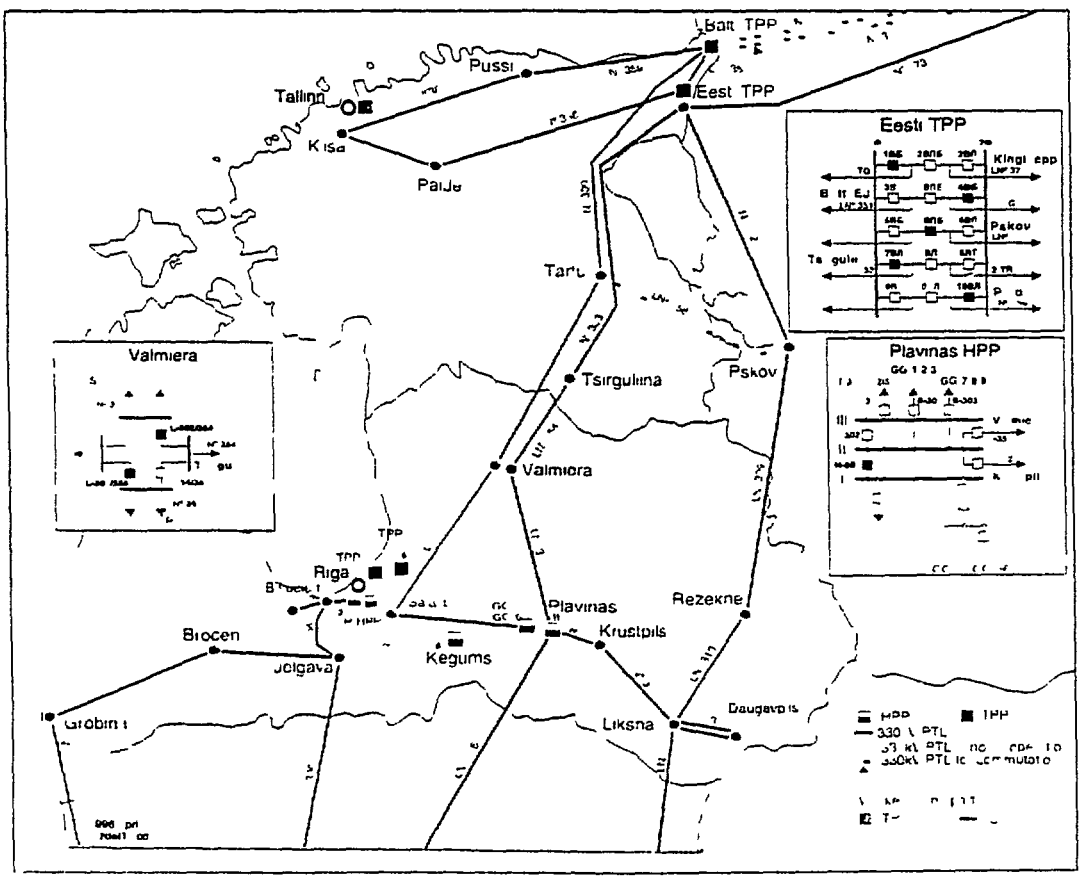
DC Baltja provides activities to increase reliability of Power System parallel operation.

Island operation of Estonia Power System and part of Latvia Power System (Saturday, 20th of May, 1995).

There were aimed the following goals,

- *to study the character of frequency / load curves in separate operating systems,*
- *to verify possibility of frequency primary control,*
- *to estimate the dead zone of primary control of turbines frequency governors,*
- *to estimate the drop of the turbine controller*

The changes of power generation were carried out by the commutation of loaded 330 kV Transmission Line



After this first phase of experiment, there is developed the experimental Program for island operation of three Baltic Systems The second phase of experiment is planned to be organized next year

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The experiments of short circuit were carried out on 330 kV Transmission Line (Wednesdays, 1st and 8th of November, 1995)

The types of faults were

- *one phase-to-ground short circuit,*
- *one phase-to-ground short circuit with large transition resistance,*
- *five double-phase faults,*
- *one three-phase fault*

There were aimed the following goals

- *to verify the accordance of calculated current and voltage values to the actual in the case of maximum load and angle and to estimate the different fault location automatic equipment in such case,*
- *to verify the accordance of calculated transient stability values to the actual physical conditions,*
- *to estimate the behaviour, operation time, etc , of equipment 7SA513 "SIEMENS" in the case of different load,*
- *to observe the procedure of formatting the electric arc in the case of one phase-to- ground short circuit with large transition resistance*

Four stages of one phase-to-ground short circuit with large transition resistance (a tree) are represented on next page

1

2

3

4

Telecommunications, SCADA and EMS

Telecommunications

The telecommunication Network provides the usual operational and administrative telephone and data transmission services It consists of a combination of balanced pair cables, power line carrier, leased lines and some microwave links All the communication lines are analogue type and provide standard telephone channels 0 3 - 3 4 kHz and data exchange up to 14400 bits per second

To achieve high availability and reliability of Communication Network there are the primary and backup dedicated link set-up to all Control Centres and main entities in Baltic power systems as well as neighboring power systems Control Centres in Russia and Belarus

Local digital telephone exchange (PBX) is utilised for local and long distance telephone communications, but to ensure operator one-touch communication a digital exchange is installed at six work positions, each having 90 numbers

In future fiber-optic cables are being installed in Baltic power systems and will formed a backbone for the power companies' communication needs It will permit high speed and reliable communication with all of the regional Control Centres

SCADA

SCADA hardware consists of 2 minicomputers EC-1011M (which were taken into operation in 1985), 6 microcomputers RPT-80 and RPT-70, gateway to Local Area Network (LAN) and the mapboard circuit

One of the minicomputers EC-1011M is utilised for all SCADA functions, the second one is utilised for State Estimation software running It is possible to change functions of both minicomputers

Microcomputers' RPT-80 (Remote Process Terminal) used for data acquisition are redundant RPT-80 connected with Remote Terminal Units (RTU) MKT-2, MKT-3, UTK-1 and with the same RPT-80 mounted at power systems Redundant two RPT-70

used for mapboard circuit control function RPT are linked to the EC-1011M through a switch.

The total number 1070 of measurements and 1000 of telesignals used for data acquisition system

Application programs (EMS)

There are several tools for network reliability, Generation Control and planning

- *Automatic frequency and Generation Control used for automatic electric power constraints over the network*
- *"Mustang" program complex used for the calculation of steady-state and transient electromechanical performances of power system*
- *State Estimation results used for the inaccurate voltage measurements being replaced automatically*
- *"Korona" program complex used for full range calculations necessary for scheduling and planning*
- *Hydro Cascade program complex performs real time calculations of various quantities making it easier for DC Baltic dispatchers to control the filling of water reservoirs and water flow through the Daugava Hydro Power Plants*
- *"AUTOP" Active Power Transfer Limit Signals software used in real time calculations of alarm and emergency system Program recalculates values depending on the electrical regime and air temperature*
- *Some programs to Control Emergency Automation and Load Shedding*

DC Baltija
1 Shmerla str Riga
LV 1006 Latvia

Phone
(371) 7552864

Fax
(371 2) 559702
(371 2) 559722

Telex
161740

Power Pool Operation

David Thornton
CMP International Consultants

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NEW ENGLAND POWER POOL (NEPOOL) OPERATIONS

NEPOOL owns no generation or transmission assets The Pool is an organization formed by private and municipal electric utility companies (the "Participants") 26 years ago to produce and transmit the electricity requirements of the five-state New England area as a single system. The New England Power Exchange (NEPEX - the operating arm of NEPOOL) dispatches the participants' generating units through a single-system approach in the most economical way possible without compromising prescribed levels of reliability Economic benefits to each Participant are calculated by comparing the actual Pool dispatch of resources against a modeled approximation of a self- (non Pool) dispatch.

DETERMINATION OF SAVINGS

The Concept of Own-Load Dispatch

For each Participant a production simulation model is run on an hourly basis to determine what the Participant's generation pattern would have been if its assets had not been dispatched by the Pool. An hourly "Own-Load" dispatch is prepared using each Participant's own generation assets (including unit and system contract purchases) to meet its stand-alone load plus operating reserves. A comparison is then made between the actual dispatch of each asset and its own-load dispatch in that hour If an actual dispatch exceeds the own-load dispatch, that is considered a delivery to the Pool If own-load exceeds actual dispatch, it is considered a receipt from the Pool

in 1 above crosses the boundary between Canada and the United States

The Metering Point for the power and energy delivered under this Agreement is at Des Cantons Substation of Hydro-Québec

(b) Other Delivery Points

Such other delivery points as may be agreed to by the Operating Committee

SUPPLEMENT II

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

INCREMENTAL COST AND DECREMENTAL COST

1 INCREMENTAL COST

The words "incremental cost" where used in this 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 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

DISTRIBUTION OF SAVINGS

How do the Savings get distributed to the Participants?

One-half of NEPOOL expenses are drawn from the Savings (The other half is billed to Participants according to their Adjusted Annual Peak loads)

The remaining Savings are distributed according to Shares earned by Participants. Standard Savings Shares are awarded for each megawatt-hour of economy interchange. Bonus Shares can also be earned by utilities with pumped storage operation or by thermal units that lower the Pool's overall thermal heat rate

DATA REQUIRED BY NEPEX FROM PARTICIPANTS

- Current turbine/generator characteristics
- Current fuel prices
- Hourly generation values
- Hourly energy flows between Participants
- Any unit constraints
  - such as transmission restrictions (must-run situations) or environmental considerations
- Information about contractual arrangements (these are also modeled into the own-load calculations)

OPERATING RESERVE

There are two types of reserve:

- INSTALLED RESERVE is a probabilistically determined amount of total installed capacity needed to meet desired level of reliability while recognizing the variability of load, generation availability and mutual assistance.

- OPERATING RESERVE is the amount of spinning (synchronized) and fast-start reserve capability needed to preserve the integrity of the system following a severe contingency and to restore the system's capability to handle the next contingency within a defined time period.

NEPOOL's OPERATING RESERVE REQUIREMENTS

Divided into three categories:

- 10 Minute Non-Synchronized Reserve
- 10 Minute Synchronized Reserve
- 30 Minute Reserve

Needed for

- Possible loss of generating equipment within either NEPOOL or the NPCC territory
- Possible loss of transmission equipment within NEPOOL or between NPCC Control Areas
- Automatic Generation Control within the Pool

  Errors in forecasting load

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 audits

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

Operating reserve DSM includes techniques such as fast response.

- Interruptible loads
- Customer Generation
- Remote control of customer use (water heating, space heating, etc)
- Voltage reduction
- Other operator-controlled demand-reducing actions

HOW TO AUDIT CAPABILITY

INSTALLED RESERVE

Seasonal testing of capability under defined conditions

- Number of hours
- Ambient temperature
- River flow
- Station configuration

Details of proof must be elaborated

Occasional unannounced tests

HOW TO AUDIT CAPABILITY

OPERATING RESERVE

On-line testing of response rates:

Periodic 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 testing of the time it takes off-line fast-start units to get on-line and fully loaded

Details of proof in both cases must be elaborated

HOW TO AUDIT CAPABILITY

DSM RESERVE

Seasonal testing of response and MW of load relief actually available from.

- Interruptible Loads
- Customer Generation
- Operator-Initiated Remote Control
- Voltage Reduction

Details of proof must be elaborated

If customer payments are associated with DSM capability, penalties must be included for non-performance

INSTALLED CAPACITY OBLIGATIONS

From the 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."

OPERATING RESERVE OBLIGATIONS

From the 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 Reserve Criteria."

The NPCC Operating Reserves Criteria cover:

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

MEETING RESERVE OBLIGATIONS

Two Approaches

- Each Utility does it on its own
- Groups of utilities do it by cooperating
  - On a bilateral basis
  - Through a Pooling arrangement

NEPOOL's POOLWIDE INSTALLED CAPACITY REQUIREMENT

Each year NEPOOL's Executive Committee establishes the Pool's "Objective Capability" for the next power year.

Each NEPOOL Participant provides its share of the Pool Capability according to its own peak loads in relation to the Pool's peak loads. Each Participant is allocated a Capability Responsibility (CR) two times a year: a November through April period and a May through October period.

- 70% weighted by respective annual peaks

- 30% weighted by respective monthly peaks (benefits scheduled maintenance)

ADJUSTMENTS TO A PARTICIPANT'S CAPABILITY RESPONSIBILITY

Performance Improvement Program

- Compares actual availability to target availability
- Adjusts each Participant's CR based on the weighted difference between actual and targeted availability for its units
- "Safety Net" protects against impact of catastrophic failure (20% cap; reason for pooling)

New Unit Adjustment is a way of allocating the incremental reliability benefits/impacts from the design performance of a new unit

ADJUSTMENTS TO A PARTICIPANT'S CAPABILITY RESPONSIBILITY (cont.)

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 CR requirements is different from that assumed in setting Objective Capability, an adjustment to required Objective Capability is performed

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-Year
Deficiency Charge:	US $33/KW-Year

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

NEPOOL OPERATING RESERVE

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

Sufficient reserve is maintained to cover 1.5 times the largest contingency. Of this total reserve:

1/3 - available in 30 minutes

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

US/Canadian Electricity Contracts

David Thornton
CMP International Consultants

Benefits of Inter-Utility Trade

Furthers the objective of meeting demand at minimum economic cost

One-way sales can provide lower cost power to buyer and revenues to seller

Two-way sales provide mutual assistance during disturbances, sharing of reserves, and exchange surplus energy and capacity

Situations Facing Hydro-Quebec and NEPOOL 15 Years Ago

Hydro-Quebec:

- Developing large hydro facilities
- Excess low-cost energy

NEPOOL:

- High-cost fuel charges
- Need for low-cost energy

Technical Challenges

Hydro-Quebec operates asynchronous from remainder of NPCC

Asynchronous tie designed

- 690 MW initially (2 terminals)
- 2000 MW for Phase 2 (5 terminals)

Description of Agreement between H-Q and NEPOOL

General Principles behind the Agreement:

- H-Q is not obliged to run thermal generation or purchase third-party energy to fulfill its commitments under the Agreement
- Contract energy receipts by NEPOOL are for the purpose of displacing fossil-fired generation
- Agreement is for <u>energy only</u>

Articles of the Agreement

- Article I - Definitions
  - Defines potentially ambiguous words and terms used in the Agreement
    - "Contract Period"
    - "Contract Energy"
    - "Pre-Scheduled Energy"
    - "On-Peak Hours"
    - etc.

Articles (continued)

- Article II - Reservation and Delivery of Contract Energy
  - Sets Contract Energy targets over the life of the Agreement
  - Defines procedures for setting long- and short-term targets
- Article III - Delivery Schedules
  - Defines procedures for short-term notifications by Seller and acceptances by Buyer
    - Weekly
    - Daily
    - Hourly

Articles (continued)

- Article IV - Energy Characteristics
  - Direct current or three-phase alternating current
  - Compatible with respective operating voltages
- Article V - Delivery Points
  - Defines international border as the point of delivery

Articles (continued)

- Article VI - Operating Committee
  - Two members from H-Q; two from NEPOOL
  - Authorized to do all things necessary to ensure delivery of and payment for energy
  - Decisions must be unanimous
  - Arbitration clause

Articles (continued)

- Article VII - Measurement of Energy
  - Defines location of metering points
  - Loss adjustment necessary between metering points and delivery points
- Article VIII - Rates and Billing
  - Defines price index for Pre-Scheduled energy
  - Billing procedures and terms

Articles (continued)

- Article IX - Dependability of Supply
  - Recognizes that firm power is not part of Agreement
  - Clarifies H-Q's obligations to their customers relative to the Agreement

Other Noteworthy Articles

- Force Majeure
  - Absolves each party from failure to perform due to conditions clearly beyond its control
- Termination on Default
- Termination (other)

Other Forms of Interconnection Agreements

- EXAMPLE: Between **Central Maine Power Company** and **Hydro-Quebec**
- Purpose of Interconnection
  - Provide mutual assistance during emergencies
  - Improve reliability through coordinated operations
  - Exchange surplus capacity and energy

Central Maine Power and Hydro-Quebec

- Similar Articles as in H-Q/ NEPOOL, but more complex due to bilateral operation and inclusion of capacity
  - Operating Reserve
  - Coordination of Maintenance Schedules
  - Coordinated development of power systems (reliability)

Central Maine Power and Hydro-Quebec

Classification of Transactions

- Definition of Incremental and Decremental Costs
  - any cost incurred by one party supplying energy to or making capacity available to the other, which would not otherwise be incurred if the transaction did not take place
- Reserve Energy
  - Increases Buyer's spinning reserve

Transactions

- Test Energy
  - accounts for energy used to test interconnection facilities
- Tertiary Energy
  - miscellaneous energy not covered specifically in the Agreement
- Inadvertent Energy
  - accumulated energy interchange errors
  - to be returned in kind at mutually agreeable times

Transactions

- Hourly Capacity
  - capacity, with or without energy, sold on an hourly basis to enable buyer to meet load, operating reserve and firm commitments
  - cannot be purchased for economic reasons
  - rates and charges:
    - $5/MW/hour for capacity
    - 110% of incremental cost for energy

Transactions

- Daily Capacity
  - capacity, with or without energy, sold on a daily basis to enable buyer to meet load, operating reserve and firm commitments
  - rates and charges:
    - $120/MW/day for capacity
    - 110% of incremental cost for energy

Transactions

- Short Term Capacity
  - sold on a weekly basis to supplement or replace capacity on buyer's system
  - rates and charges:
    - $600/MW/week for capacity
    - 110% of incremental cost for energy

Transactions

- Conservation Energy
  - supplements energy storages or conserves fuel supplies on buyer's system
  - generally does not include capacity component
  - usually replaced in kind

Transactions

- Economy Energy
  - energy sold on an hourly basis to allow buyer to reduce more expensive generation
  - cannot be used to meet reserve requirements
- Assured Economy Energy
  - buyer must be given time to start alternate source before canceling
  - capacity may be included in operating reserve

Transactions

- Diversity Capacity and Energy
  - any capacity and/or energy exchanged or sold in order to benefit from diversity of load or supply between the two systems
  - priced the same as weekly capacity except when returned in kind

Transactions

- Emergency Energy
  - Assistance in case of emergency outage of generation, lines or equipment
  - Subject to Seller's internal needs and contractual obligations
  - Buyer must restore its facilities to normal operation as rapidly as possible

INTERCONNECTION AGREEMENT

This Agreement made as of the day of 198

BETWEEN

HYDRO-QUEBEC, a body politic and corporate, duly incorporated and regulated by the Hydro-Quebec Act (R S Q , Chapter H-5) having its head office and principal place of business at 75 Dorchester Boulevard West, Montreal, Province of Quebec, party of the first part,

AND

The corporate entities which are the participants in the New England Power Pool (NEPOOL) pursuant to the New England Power Pool Agreement, dated September 1, 1971, as amended and as filed with the Federal Energy Regulatory Commission Those entities which are the participants in NEPOOL as of the date hereof are shown on Schedule A and are acting herein by and through the NEPOOL Management Committee The participants in NEPOOL, as shown on Schedule A, and as changed from time to time by additions of new participants or terminations of participants effected in accordance with the terms of the NEPOOL Agreement, are hereinafter called the "NEPOOL Participants", party of the second part

WHEREAS, the NEPOOL Participants and HYDRO-QUEBEC are engaged in the generation, transmission and supply of electric power and energy in their respective service areas and desire to maintain interconnections between their systems, and

WHEREAS, it is the desire, intent and purpose of the parties to provide mutual assistance during emergencies, improve reliability of bulk power supply through coordinated operations, provide operating economies by the exchange of surplus power and energy and also, to the extent deemed mutually desirable, secure additional economies through coordinated development,

NOW, THEREFORE, the parties agree as follows

ARTICLE I

1 0 GOVERNMENTAL AUTHORIZATIONS

This Agreement, including its Supplements, is subject to the initial and continuing governmental authorizations required to establish, operate and maintain interconnections and to interchange power and energy as herein specified

ARTICLE II

2 0 GENERAL OBLIGATIONS AND PRACTICES

2 1 Characteristics of Power and Energy

All electric power and energy interchanged hereunder shall be in the form of direct current or three phase alternating current compatible with and at nominal operating voltages appropriate to the particular interconnection

2 2 Sharing Reserves in Emergencies

The NEPOOL Participants and HYDRO-QUEBEC shall, to the maximum extent each deems consistent with the safe and proper operation of its own system, the furnishing of economical, dependable and satisfactory services to its own customers, and its obligations to other parties, make available to the other party hereto in emergencies on the other's system, its available generating capability in excess of its load requirements up to the limit of the capacity of the interconnection facilities The conditions, rates and charges for such transactions are set out in Supplements II through VI

2 3 Interchange of Surplus Power and Energy

At times other than emergencies, each party will make available to the other such surplus energy as it may, at its own option, desire to sell

The conditions, rates and charges for such transactions are set out in Supplements II through VI

2 4 Regulation of Energy Flows

The parties will cooperate in establishing operating practices in order to, as far as practicable, keep the net power and energy passing from one system to the other as close as possible to prearranged schedules

2 5 Operating Reserve

Each of the parties will normally maintain such operating reserve as it deems necessary for its own system Subject to the availability of supply, either may arrange to obtain operating reserve from the other The conditions, rates and charges for such transactions are set out in Supplement VI

2 6 Operating Voltage

The operating voltage of the interconnection shall be controlled in accordance with operating practices and limitations set from time to time by the Operating Committee hereinafter established

2 7 Maintenance Schedules

To the extent mutually considered desirable and to the extent permitted by their other obligations, the parties shall coordinate maintenance schedules for generating equipment and transmission lines so as to increase the reliability of their power systems and maximize as far as practicable the value of the interconnection for the parties

2 8 Coordinated Development

The parties will cooperate to the extent mutually considered desirable and feasible in coordinating development of generating and other facilities so as to increase the reliability of their power systems and maximize as far as practicable the value of the interconnection for the parties

ARTICLE III

3 0 OWNERSHIP, OPERATION AND MAINTENANCE OF THE INTERCONNECTION FACILITIES

3 1 A description of the interconnection facilities and the delivery points is given in Supplement I Unless agreed otherwise, one or more of the NEPOOL Participants shall own, lease or contract to use the interconnection facilities located in New England and HYDRO-QUEBEC shall own, lease or contract to use the interconnection facilities located in Quebec

3 2 Each of the parties shall be responsible for the operation and maintenance of the facilities owned, leased or contracted for use by it, including all costs associated therewith Changes or additions to the interconnection facilities may be made by mutual agreement

ARTICLE IV

4 0 DELIVERY AND METERING

4 1 Delivery of Power and Energy

Electric power and energy will be delivered and received at the delivery points specified in Supplement I

4 2 Metering

Appropriate metering devices shall be installed as required to provide readings at least hourly of the power and energy interchange The measurements of power and energy obtained from the metering equipment shall be adjusted to determine the quantities of power and energy delivered at the delivery at the delivery points

4 3 Inspection and Testing

Any properly designated representative of the parties shall have access to the billing meters for the purpose of reading the same The accuracy of the meters shall be verified by proper tests at least once a year or upon reasonable notice given by either of the parties to the other Each party shall be entitled to have a representative present at such verification

4 4 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 from other meter readings, if available, or, if not available, shall be estimated and agreed to by the Operating Committee, but no adjustment shall be made for more than the two most recently completed billing periods unless otherwise agreed by the Operating Committee

ARTICLE V

5 0 CLASSIFICATION OF TRANSACTIONS

5 1 The classification of services provided pursuant to this Agreement and the related terms, conditions, rates and charges are set forth in Supplements to this Agreement

5 2 These classifications are in addition to any power, energy or other services provided for by any other agreement which may be in effect between the NEPOOL Participants and HYDRO-QUEBEC during the term of this Agreement

ARTICLE VI

6 0 SUPPLEMENTS

The supplements made a part of this Agreement are as follows

Supplement I Interconnection Facilities and Delivery points

Supplement II	Incremental Cost and Decremental Cost
Supplement III	Economy, Fuel Replacement, Tertiary and Inadvertent Energy
Supplement IV	Capacity or emergency power
Supplement V	Supplemental or Conservation Energy
Supplement VI	Operating Reserve

ARTICLE VII

7 0 BILLING

7 1 Promptly after the end of each calendar month, a bill or bills shall be rendered for any services provided during that month under the terms of this Agreement If the monthly billing is unavoidably delayed, an interim bill based on estimated charges may be issued

7 2 Unless otherwise indicated in writing by HYDRO-QUEBEC, all payments due by the NEPOOL Participants to HYDRO-QUEBEC will be effected in immediately available funds of the United States of America by wire transfer to a bank account in Montreal, Quebec, Canada, designated by HYDRO-QUEBEC, or in such other manner as is reasonably requested by HYDRO-QUEBEC

7 3 Unless otherwise indicated in writing by the NEPOOL Participants, all payments due by HYDRO-QUEBEC to the NEPOOL Participants will be effected in immediately available funds of the United States of America by wire transfer to a bank account in Hartford, Connecticut, designated by the NEPOOL Participants, or in such other manner as is reasonably requested by the NEPOOL Participants

7 4 In the event that it is required, in the determination of any costs for purposes of billing under this Agreement, to express Canadian funds in the United States of America funds or the United States of America funds in Canadian funds, the parties will use the average, for the period covered by the bill, of the daily noon rates of exchange quoted by the Bank of Canada for purchases of the United States of America funds or the reciprocal thereof for purchases of Canadian funds, as the case may be

7 5 All bills will be payable within twenty (20) days following their receipt unless agreed otherwise by the Operating Committee All amounts due not paid within thirty (30) days following the said date of receipt shall be subject to interest from the said date of receipt at a rate two percentage points higher than the prime commercial rate per annum

announced by Citibank, N A at its principal office in New York, New York, or by any other bank designated by the Operating Committee, as in effect from time to time, each change in such announced rate to be effective for the purposes hereof on the date on which such change is effective, unless another rate is agreed to by the Operating Committee In the event a party disputes a portion of a bill, such party shall pay the undisputed portion within the time period specified above

ARTICLE VIII

8 0 OPERATING COMMITTEE

8 1 The parties shall maintain an Operating Committee, consisting of four members, two appointed by HYDRO-QUEBEC and two appointed by the NEPOOL Participants, and four alienate members, two appointed by HYDRO-QUEBEC and two appointed by the NEPOOL Participants Should a member be unable to attend a meeting, he shall be represented at the meeting by the alternate member or by a person named either by the member or the alternate, or by the person to whom such member reports administratively Prompt notice in writing shall be given for all appointments, removals and replacements

8 2 Duties

The Operating Committee is authorized on behalf of both parties to do all things necessary to provide for transmission and delivery of power and energy and for payment for such power and energy in accordance with the provisions and intent of this Agreement and of any other power agreements between the parties

Specifically, the duties of the Operating Committee include but are not limited to

(a) All matters related to the interconnected operation of the parties' electric systems,

(b) All matters related to the metering, accounting and billing for power, energy and other related services,

(c) The coordination of maintenance schedules,

(d) The correlation of short range forecasts of load and capacity requirements,

(e) The consideration of such other operating matters as may arise in carrying out the objectives of this Agreement or as may be referred to it,

(f) The determination and allocation of losses

8 3 Decisions

All decisions of the Operating Committee shall be unanimous

8 4 Expenses

Each party shall pay the expenses of its own members of the Operating Committee Any expenses jointly incurred by the Committee for activities pertaining to the interconnection shall be shared equally by HYDRO-QUEBEC and the NEPOOL Participants or in such other proportion as may be agreed upon by the Operating Committee

8 5 Access to Records and Documents

The Operating Committee shall have access at all reasonable times to the pertinent and relevant records of the NEPOOL Participants and HYDRO-QUEBEC required to substantiate any fact pertaining to this Agreement

8 6 Agreements of the Operating Committee

Any agreement of the Operating Committee made pursuant to this Agreement shall be confirmed in writing and signed by the members of the said Committee

ARTICLE IX

9 0 CONTINUITY OF SERVICE

The NEPOOL Participants and HYDRO-QUEBEC shall exercise reasonable care 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 restored as soon as practicable

10 0 FORCE MAJEURE

Each party hereto shall use all due diligence to perform its obligation under this Agreement but conditions may arise which prevent or delay performance by one or the other because of causes beyond a party's reasonable control, including without limiting the generality of the foregoing, failure of facilities, flood, earthquake, storm, lightning, fire, explosion, epidemic, war, riot, civil disturbance, labour trouble, strike, sabotage and restraint by court or public authority which by exercise of due diligence and foresight either party could not be expected to avoid If a party 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 with all reasonable dispatch, and shall not be liable for injury, damage or loss resulting from such inability However, settlement of strikes and labour disturbances shall be wholly within the discretion of the party having the difficulty

ARTICLE XI

11 0 LIABILITY

No party shall make any claim upon any other by reason of one party's circuits or system being damaged or rendered inoperative for any period as a result of an occurrence on the circuits or system of the other party or on the circuits or system utilized by a party to the Agreement Without limiting the generality of the foregoing, no party shall be held responsible for any loss or damage sustained by another party if, for any cause or reason whatsoever, the delivery of power and energy is interrupted, increased or decreased or if the voltage or frequency of the power and energy delivered hereunder to the other party is increased, decreased or in any way affected for whatever length of time

A party to this Agreement shall not make any claim against another party for any liability it has incurred as a result of any damages sustained by third parties from any cause whatsoever

ARTICLE XII

12 0 APPLICABLE LAW

This Agreement shall be governed by and construed in accordance with the laws of the Province of Quebec

ARTICLE XIII

13 0 ASSIGNABILITY

Subject to Article XV, except in the event of merger, consolidation or sale of all, or substantially all of the assets of a party devoted to production, transmission, distribution and sale of electricity, no voluntary transfer of this Agreement or of the rights of a party hereunder shall be made without the written approval of the other party, provided that in any event any successor to or assignee of the rights of a party, whether by voluntary transfer, judicial sale or otherwise, 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 party hereunder

ARTICLE XIV

14 0 EFFECTIVE DATE AND TERM

14 1 Subject to Article I, this Agreement shall take effect on the first calendar date on which the interconnection facilities identified in Section 1(a) of Supplement I, are available to transmit commercially power and energy betwen the NEPOOL Participants and HYDRO-QUEBEC, except for testing purposes while commissionning the interconnection facilities and shall continue in full force and effect until terminated

14 2 This Agreement may be terminated at any time by mutual agreement This Agreement may also be terminated by a party by giving five (5) years prior written notice to the other party, it being understood that such unilateral termination shall not prejudice the completion of any other agreement then in force between the parties, and that no such termination notice may be given prior to the date on which this Agreement takes effect

14 3 Any of the Supplements II to VI inclusive forming part of this Agreement may be terminated by either party by giving twelve (12) months prior written notice to the other party, it being understood and agreed that such unilateral termination shall notice prejudice the completion of any other agreement then in force between the parties

ARTICLE XV

15 0 NEPOOL PARTICIPANTS

15 1 The utilities identified on Schedule A, which are the NEPOOL Participants at the date of this Agreement, have caused this Agreement to be executed on their behalf by the Chairman of the NEPOOL Executive Committee, this execution being authorized by Section 5 15 (d) of the NEPOOL Agreement dated September 1, 1971, as amended, and a vote of the NEPOOL Management Committee adopted November 12, 1982

15 2 The NEPOOL Participants agree to give prompt written notice to HYDRO-QUEBEC in the event that either

(i) a utility which, at the date of this Agreement is or subsequently becomes a NEPOOL Participant, terminates its participation in NEPOOL, or

(ii) a utility which, at the date of this Agreement is not a NEPOOL Participant, subsequently becomes such a Participant

15 3 In the event any utility so terminates its participation in NEPOOL, its status as a party to this Agreement shall terminate upon the giving of and at the date specified in such notice of such termination In the event any utility becomes a Participant in NEPOOL after the date of this Agreement, it shall become a party to this Agreement upon the

giving of and at the date specified in such notice of its Participant status

15 4 Except as otherwise provided in Section 15 5 of this Article, the NEPOOL Participants shall be treated as a single party for all purposes of this Agreement, and the NEPOOL Management Committee (or the NEPOOL Executive Committee acting on its behalf) or its designee shall act for and represent the NEPOOL Participants in all matters with respect to this Agreement, other than those assigned to the Operating Committee under Article VIII Any action taken by the Management Committee (or the Executive Committee acting on its behalf) or its designee on behalf of the NEPOOL Participants under this Agreement shall be conclusive and binding upon the NEPOOL Participants

15 5 The obligations of the NEPOOL Participants under this Agreement are several and not joint The relative obligations of the NEPOOL Participants at any time shall be measured by their respective Adjusted Annual Peaks as that term is defined in the NEPOOL Agreement referred to in Section 15 1 of this Article

ARTICLE XVI

16 0 NOTICES

16 1 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 pre-paid, to the party at the address shown on the signature page hereof The designation of such address may be changed at any time by any party by written notice given to the other party

16 2 Any notice, demand or request so addressed and mailed by registered mail shall be deemed to be given when so mailed, and shall be deemed to be received on the seventh business day following its deposit in the mails of the United States of America or Canada

ARTICLE XVII

17 0 TERMINATION ON DEFAULT

If one or more of the individual NEPOOL Participants or HYDRO-QUEBEC is in default in the performance of any of its obligations under this Agreement, the other party (HYDRO-QUEBEC or the NEPOOL Participants) shall have the right to terminate this Agreement upon three (3) months' prior written notice to the party which is in default and on the date specified in such notice, if such default is not corrected before the end of three-month period

ARTICLE XVIII

18 0 REVIEW AND AMENDMENT

18 1 The terms of this Agreement are subject to review at the request of either party If, consequent to such review, it is agreed that any of the provisions hereof, or the practices or conduct of either party impose an inequity, hardship or undue burden upon the other party, the parties shall endeavour to amend or supplement this Agreement in such a manner as will remove such inequity, hardship or undue burden

18 2 Amendments which may appear advisable shall effected in writing by the duly authorized representatives of each party

ARTICLE XIX

19 0 PREVIOUS COMMUNICATIONS

This instrument shall constitute the sole and complete agreement of the parties hereto in respect of the matters herein set forth All previous communications between the parties hereto, either oral or written, including without limitation the various drafts of this instruments, shall be of no force or effect and shall not be used as a guide to the interpretation of this instrument

IN WITNESS WHEREOF, the parties hereto have executed this Agreement

SUPPLEMENT I

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

INTERCONNECTION FACILITIES AND DELIVERY POINTS

The interconnection facilities and the related delivery points between the NEPOOL Participants and HYDRO-QUEBEC are described in this Supplement I

1 INTERCONNECTION FACILITIES

(a) Direct Current Interconnection

The interconnection facilities consist of a direct current transmission line insulated for a nominal operating voltage of ± 450 kV linking Des Cantons Substation in Quebec and Comerford Generating Station in New Hampshire and crossing the International Boundary near Stanhope in Quebec and Norton in Vermont, including the related rectifying and inverting equipment at both ends

(b) Other Interconnection Facilities

Such other interconnection facilities as may be agreed to by the parties

(c) Miscellaneous Facilities

Such additional equipment and facilities for metering, telemetering, relaying, load control, communications and such other purposes as may be deemed necessary by the parties to effect adequate and satisfactory operation of the interconnection facilities

2 DELIVERY POINTS

(a) Delivery Points

The delivery point is located at the point where the transmission line described

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in 1 above crosses the boundary between Canada and the United States

The Metering Point for the power and energy delivered under this Agreement is at Des Cantons Substation of Hydro-Québec

(b) Other Delivery Points

Such other delivery points as may be agreed to by the Operating Committee

SUPPLEMENT II

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

INCREMENTAL COST AND DECREMENTAL COST

1 INCREMENTAL COST

The words "incremental cost" where used in this 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 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

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Any incremental transmission cost or saving

Any applicable incremental taxes or grants in lieu of taxes

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 cost 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

2 DECREMENTAL COST

The words "decremental cost" when used in relation with matters pertaining to this Agreement shall mean the net sum of all avoided applicable costs, as defined above, to the party to whom energy is supplied

SUPPLEMENT III

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

ECONOMY, FUEL REPLACEMENT, TERTIAIRY AND INADVERTENT ENERGY

The classifications, conditions, rates and charges for Economy, Fuel Replacement, Tertiary and Inadvertent Energy are set forth in this Supplement III

1 ECONOMY ENERGY

"Economy Energy" is defined as energy derived from non-renewable resources and delivered in order to effect a savings in the cost of generation when the receiving party has adequate generating capability available to carry its own load

Either party may suspend or terminate 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

Incremental cost and decremental cost are defined in Supplement II herein

2 FUEL REPLACEMENT ENERGY

"Fuel Replacement Energy" is defined as energy derived from renewable resources and delivered to replace energy derived from non-renewable resources in order to effect savings and economize non-renewable resources

Either party, may suspend or terminate the supply of Fuel Replacement Energy at any time on reasonable notice to the other

Unless otherwise agreed by the Operating Committee for a specific delivery, the price to be paid for Fuel Replacement Energy shall be the lesser of

(a) 80% of the decremental cost of the energy thus replaced, less any applicable added cost resulting from the delivery, or

(b) a price consisting of one-half of a basic energy cost agreed upon from time to time by the Operating Committee, plus one-half of the decremental cost of the energy thus replaced, less any applicable added cost resulting from the delivery, said price not to be less than a value specified by the Operating Committee

Decremental cost is defined in Supplement II herein

3 TERTIARY ENERGY

"Tertiary Energy" is defined as energy which is not otherwise covered herein or in any other agreement between the parties, and which can be from either party to the other, over and above the supplying party's commitments or requirements for its own system This may include, for example, energy supplied to enable water storage control or to facilitate river regulation

The conditions, rates and charges for Tertiary Energy shall be as agreed upon by the Operating Committee from time to time

4 INADVERTENT ENERGY

"Inadvertent Energy" is defined as the difference between net actual energy interchange and net scheduled energy interchange The net scheduled energy interchange used to determine Inadvertent Energy shall be the net total of the schedules as used for billing energy under this or any other agreement between the parties The methods of determining the "net actual interchange" and the "net scheduled interchange" will be established by the Operating Committee

Unless otherwise agreed by the Operating Committee, Inadvertent Energy shall be balanced by the return of an equal number of megawatthours at mutually agreeable times

SUPPLEMENT IV

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

CAPACITY OR EMERGENCY POWER

The conditions, rates and charges for Capacity or Emergency Power are set forth in this Supplement IV

"Capacity or Emergency Power" is defined as capacity and associated energy which is supplied by either the NEPOOL Participants or HYDRO-QUEBEC to the other as day-to-day assistance in case of a temporary capacity deficiency existing as the result of forced outages of facilities or unusual or abnormal operating conditions affecting the capacity of the receiving party's own

generating capability

1 Normally, a request for Capacity or Emergency Power for Capacity or Emergency Power shall be made the previous day In an emergency, a schedule shall be made as soon as it becomes apparent that continued assistance will be required Any emergency delivery lasting less than thirty (30) consecutive minutes, whether scheduled or not, shall be classified as Inadvertent Energy

2 The delivery of Capacity or Emergency Power shall be maintained unless, in the opinion of the supplying party, the delivery is prevented or made inadvisable by an emergency or other unforeseen conditions

3 The following rates and charges shall apply to the purchase of Capacity or Emergency Power unless agreed otherwise by the Operating Committee for a specific delivery

(a) The demand shall be 120 $U S /MW/day applied to the maximum amount of power scheduled and provided in any hour of that day

(b) The charge for associated energy delivered in each hour shall be the greater of

(i) 110% of the incremental cost of such energy as defined in Supplement II, or

(ii) a rate or rates in dollars per megawatthour agreed upon by the Operating Committee

4 The receiving party may cancel all or part of a scheduled Capacity or Emergency Power purchase prior to the commencement of delivery, but shall be subject to a cancellation charge of 110% of any cost incurred by the supplying party in preparing to deliver said schedule but not less than 10 $U S /MW of cancelled Capacity or Emergency Power

5 If Capacity or Emergency Power is reduced from the amount scheduled for thirty (30) consecutive minutes or more during the daily period of reservation by the supplying party by reason of its system requirements, then the receiving party may cancel its Capacity or Emergency Power purchase during that day and pay only for the energy already received

6 If the supplying party purchases Capacity or Emergency Power or equivalent from a third party external to this Agreement for delivery to the other party hereto, then the charges for such delivery shall be 110% of the out-of-pocket costs incurred by the supplying party in acquiring and delivering such Capacity or Emergency Power or equivalent from said third party Such out-of-pocket cost shall consist of the total amount paid therefore by the supplying party which otherwise would not have been paid by such party, plus the

cost of the incremental electric losses supplying party's system

SUPPLEMENT V

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

SUPPLEMENTAL OR CONSERVATION ENERGY

"Supplemental or Conservation Energy" is defined as energy provided to supplement energy storage (water or fuel) or conserve fuel supplies of the receiving party, the need for which results from water or fuel unavailability, governmental actions or widespread disasters, any one of which is beyond the reasonable control of the party

Unless agreed otherwise by the Operating Committee for a specific delivery, the parties may arrange to purchase or exchange Supplemental or Conservation Energy under the following conditions, rates and charges

1 A request for Supplemental or Conservation Energy ordinarily shall be submitted in writing and shall state

- an estimate of the megawatthours of energy desired,
- the time period for which the energy is required,
- and, if applicable, the time period during which such energy shall be returned in kind

2 The arrangements and conditions for each purchase shall be agreed upon by the Operating Committee Unless otherwise specified, the following conditions will apply

(a) The necessary generation and transmission capability, fuels and storages will be reserved by the supplying party to fulfill its commitment to the receiving party during the period of reservation

(b) If unforeseen conditions arise such that, in the opinion of the supplying party, the commitment would jeopardize the security of supply to its own system, the supplying party has the right to reduce or cancel its commitment

(c) The delivery of Supplemental or Conservation Energy is subject to interruption at any time upon reasonable notice

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3 There shall be no charge for the equivalent exchange of Supplemental or Conservation Energy (i e the delivery and return in kind of such energy)

4 The charge for Supplemental or Conservation Energy shall be established by the Operating Committee

5 If agreed upon by the Operating Committee, the receiving party may cancel any part or all of a schedule for delivery of Supplemental or Conservation Energy, but shall be subject, unless otherwise agreed upon by the Operating Committee to a cancellation charge equal to 110% of any cost which the supplying party may have incurred in preparing to deliver said Supplemental or Conservation Energy

SUPPLEMENT VI

Forming part of the Interconnection Agreement
between
The NEPOOL Participants
and
HYDRO-QUEBEC

OPERATING RESERVE

The conditions, rates and charges for Operating Reserve are set forth in this Supplement VI

Operating Reserve may be made available by one party to the other on a day-to-day basis in order to supplement the resources of the receiving party at times of temporary deficiency The supply of Operating Reserve shall be continued as scheduled unless, in the opinion of the supplying party, it is prevented or made inadvisable by an emergency or other unforeseen conditions

The conditions, rates and charges for the supply of Operating Reserve shall be established by the Operating Committee, however the rates and charges for the supply of Operating Reserve shall not be less than 110% of the cost of providing such Operating Reserve

The receiving party may cancel all or part of a scheduled Operating Reserve purchase but shall be subject to a cancellation charge of 110% of any cost incurred by the supplying party in preparing to make available said scheduled reserve

CONVENTION D'INTERCONNEXION

INTERCONNECTION AGREEMENT

HYDRO-QUEBEC

CENTRAL MAINE POWER COMPANY

1995

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CONVENTION D'INTERCONNEXION

Conclue ce ___ jour _____ ____

ENTRE

HYDRO-QUEBEC, société dûment consituée et régie par la Loi sur Hydro-Québec (L R Q chapitre H-5) ayant son siège social et sa principale place d affaires au 75 ouest boulevard René-Lévesque, Montréal Québec Canada, H2Z 1A4 ci-après appelée HYDRO-QUEBEC

ET

CENTRAL MAINE POWER COMPANY société consituée selon les lois de l'état de Maine, Etats-Unis d Amérique, ayant son siège social et sa principale place d'affaires au 83 Edison Drive Augusta Maine 04336 ci-après appelée "CMP'

ATTENDU QU'HYDRO-QUEBEC et CMP sont engagées dans la production le transport et la fourniture de puissance et d'énergie électriques dans les territoires respectifs qu'elles desservent, et qu elles désirent maintenir des interconnexions entre leurs réseaux et

ATTENDU QUE c'est le désir l'intention et le but des parties de se fournir une aide mutuelle en cas d urgence d améliorer la qualité du réseau de production et de transport par des opérations coordonnées de réaliser des économies d exploitation par des échanges de surplus de puissance et d énergie et aussi dans la mesure jugée mutuellement souhaitable d'assurer des économies additionnelles par un développement coordonné

EN CONSEQUENCE les parties conviennent de ce qui suit

INTERCONNECTION AGREEMENT

Made and entered into as of the ____ day of _____ ____

BETWEEN

HYDRO-QUEBEC, a body politic and corporate, duly incorporated and regulated by the HYDRO-QUEBEC Act (R S Q chapter H-5) and having its head office and principal place of business at 75 René-Lévesque Boulevard West Montréal Québec Canada H2Z 1A4, hereinafter referred to as HYDRO-QUEBEC

AND

CENTRAL MAINE POWER COMPANY a corporation created under the laws of the state of Maine, United States of America having its headquarters and principal place of business at 83 Edison Drive Augusta Maine 04336 hereinafter called "CMP"

WHEREAS HYDRO-QUEBEC and CMP are engaged in the generation transmission and supply of electric power and energy in their respective service areas and desire to maintain interconnections between their systems and

WHEREAS it is the desire intent and purpose of the parties to provide mutual assistance during emergencies improve reliability of bulk power supply through coordinated operations provide operating economies by the exchange of surplus power and energy and also to the extent deemed mutually desirable secure additional economies through coordinated development

NOW THEREFORE the parties agree as follows

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ARTICLE I

1 0 APPROBATIONS

Cette convention, y compris ses annexes, est sujette aux approbations gouvernementales initiales et devant se continuer afin de permettre aux parties d'établir, d'exploiter et d'entretenir des interconnexions et pour échanger de l'énergie électrique tel qu'il est prévu ci-après

Chacune des parties aux présentes collabore avec les autres parties pour l'échange de renseignements techniques et légaux de données ou autres éléments qui peuvent être raisonnablement requis dans le cadre des approbations reliées à cette convention

ARTICLE I

1 0 AUTHORIZATIONS

This Agreement including its Supplements is subject to the initial and continuing governmental authorizations required to establish, operate and maintain interconnections and to interchange electric energy as herein specified

Each party hereto will cooperate with the others in the furnishing of technical and legal information, data or other matters which may reasonably be required concerning authorizations related to this Agreement.

ARTICLE II

2 0 OBLIGATIONS ET PRATIQUES GÉNÉRALES

2 1 Caractéristiques de l énergie

Toute la puissance et l énergie électriques échangées conformément à la présente sont sous forme de courant alternatif triphasé à 60 Hz ou sous forme de courant direct et aux tensions nominales d exploitation compatibles avec l interconnexion

2 2 Partage des réserves en cas d urgence

HYDRO-QUEBEC et CMP doivent mettre à la disposition de l autre partie en cas d'urgence dans le réseau de telle autre partie, sa capacité de production disponible excédant les besoins de sa charge jusqu à concurrence de la capacité des installations d'interconnexion Cette disponibilité est sujet jusqu au point maximal que chaque partie juge compatible avec une exploitation sûre et prudente de son propre réseau et sa fourniture à ses abonnés d'un service économique fiable et satisfaisant et avec ses obligations envers d'autres parties

2 3 Exploitation asynchrone

CMP et HYDRO-QUEBEC n exploitent pas normalement leurs réseaux en synchronisme La puissance et l'énergie fournies par une partie à l autre son normalement fournies par des groupes de production débranchés du réseau de fournisseur et électriquement branchés au réseau de l acheteur ou par l'intermédiaire d une attache asynchrone

2 4 Echange de surplus de puissance et d'énergie

Sauf en cas d urgence chaque partie met à la disposition de l autre partie tels surplus de puissance et d énergie qu elle peut à son seul choix désirer vendre

ARTICLE II

2 0 GENERAL OBLIGATIONS AND PRACTICES

2 1 Energy Characteristics

All electric power and energy interchanged hereunder shall be in the form of 3 phase 60 Hz alternating current or in the form of direct current at nominal operating voltages appropriate to the interconnection

2 2 Sharing Reserves in Emergencies

HYDRO-QUEBEC and CMP shall make available to the other party hereto in emergencies on the other's system, its available generating capability in excess of its load requirements up to the limit of the capacity of the interconnection facilities Such availability shall be subject to the maximum extent each deems consistent with the safe and proper operation of its own system, the furnishing of economical dependable and satisfactory services to its own customers and its obligations to other parties

2 3 Asynchronous Operation

CMP and HYDRO-QUEBEC will not normally operate their systems synchronously in parallel Power and energy furnished by one party to the other will normally be supplied either by generators electrically disconnected from the supplier's system and electrically connected to the receiver's system or through an asynchronous tie

2 4 Interchange of Surplus Power and Energy

At times other than emergencies each party will make available to the other such surplus power and energy as it may at its own option desire to sell

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2 5 Régulation des mouvements d énergie

Les parties coopèrent pour établir des pratiques d exploitation aptes à garder autant que faire se peut la quantité nette de puissance et d énergie passant d un réseau à l'autre aussi près que possible des programmes préétablis

Lorsque c est approprié les échanges de puissance réactive seront programmés et contrôlés selon les pratiques d exploitation et dans les limites imposées de temps à autre par le Comité d exploitation tel que défini à l Article VIII ci-après

2 6 Réserve d exploitation

Chaque partie maintient normalement la réserve d exploitation qu'elle juge nécessaire pour son propre réseau Sous réserve des disponibilités chacune peut faire les arrangements nécessaires pour obtenir de l autre de la réserve d exploitation etdoit faire cette détermination conforme aux règlements de NEPOOL sur la réserve d exploitation

2 7 Programmes d'entretien

Dans la mesure mutuellement considérée souhaitable les parties doivent coordonner les programmes d'entretien des installations de production et des lignes de transport afin d'augmenter la fiabilité de leurs réseaux de production et de maximiser autant que faire se peut la valeur de l interconnexion pour les parties

2 8 Développement coordonné

Les parties coopèrent dans la mesure jugée mutuellement souhaitable et réalisable pour coordonner le développement des installations de production et autres afin d augmenter la fiabilité de leurs réseaux et de maximiser autant que faire se peut la valeur de l interconnexion pour les parties

2 5 Regulation of Energy Flows

The parties will cooperate in establishing operating practices in order to keep the net power and energy passing from one system to the other as close as practical to prearranged schedules

Reactive power interchange if appropriate, shall be scheduled and controlled in accordance with operating practices and limitations set from time to time by the Operating Committee as defined in Article VIII hereinafter

2 6 Operating Reserve

Each of the parties will normally maintain such operating reserve as it deems necessary for its own system Subject to the availability of supply, either may arrange to obtain operating reserve from the other and shall make such determination consistent with NEPOOL rules on Operating Reserve

2 7 Maintenance Schedules

To the extent mutually considered desirable the parties shall coordinate maintenance schedules for generating equipment and transmission lines so as to increase the reliability of their power systems and maximize as much as practicable the value of the interconnection for the parties

2 8 Coordinated Development

The parties will cooperate to the extent mutually considered desirable and feasible in coordinating development of generating and other facilities so as to increase the reliability of their power systems and maximize as much as practicable the value of the interconnection for the parties

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ARTICLE III

3 0 PROPRIÉTÉ, EXPLOITATION ET ENTRETIEN DES INSTALLATIONS D'INTERCONNEXION

3 1 Une description des installations d interconnexion des points de livraison et des points de mesurage est fournie à l'annexe I à cette convention A moins d une entente à l effet contraire, CMP doit posséder louer ou autrement détenir le droit d'utiliser les installations d'interconnexion situées dans la Nouvelle Angleterre et HYDRO-QUEBEC doit posséder, louer ou autrement détenir le droit d'utiliser les installations d interconnexion situées au Québec

3 2 Chacune des parties est responsable, jusqu'au point approprié de l exploitation et de l entretien des installations dont elle est propriétaire ou locataire, ou qu'elle a le droit d'utiliser y compris tous les frais qui y sont associés Les changements ou additions aux installations d interconnexion sont faits par entente mutuelle

ARTICLE IV

4 0 LIVRAISON ET MESURAGE

4 1 Livraison de puissance et d'énergie

La puissance et l'énergie électriques sont livrées et reçues aux points de livraison définis à l'annexe I.

4 2 Mesurage

Des instruments de mesure appropriés sont installés tel qu'il est requis pour fournir des lectures au moins horaires des échanges de puissance et d énergie Les enregistrements de puissance et d'énergie sont ajustés en vue de déterminer les quantités de puissance et d énergie livrées aux points de livraison

ARTICLE III

3 0 OWNERSHIP, OPERATION AND MAINTENANCE OF THE INTERCONNECTION FACILITIES

3 1 A description of the Interconnection Facilities the Delivery Points and the Metering Points is provided in Supplement I to this Agreement. Unless agreed otherwise CMP shall own lease or contract to use the Interconnection Facilities located in New England and HYDRO-QUEBEC shall own lease or contract to use the Interconnection Facilities located in Québec

3 2 Each of the parties shall be responsible to the extent appropriate, for the operation and maintenance of the facilities owned, leased or contracted for use by it, including all costs associated therewith Changes or additions to the Interconnection Facilities may be made by mutual agreement.

ARTICLE IV

4 0 DELIVERY AND METERING

4 1 Delivery of Power and Energy

Electric power and energy will be delivered and received at the Delivery Points as defined in Supplement I

4 2 Metering

Appropriate metering devices shall be installed as required to provide readings at least hourly of the power and energy interchange The measurements of the power and energy obtained from the metering equipment shall be adjusted to determine the quantities of power and energy delivered at the Delivery Points

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L équipement de mesurage pour les points de mesurage définis à l'Annexe I est fourni installé entretenu et vérifié par HYDRO-QUEBEC conformément aux standards d exactitude convenus par les deux parties Les kilowattheuremètres de facturation sont scellés par les deux parties Lesdits sceaux ne sont pas enlevés sans l accord des deux parties

4 3 Inspection et essais

Tout représentant autorisé de l'une ou l autre des parties a accès aux compteurs de facturation afin d en faire la lecture L exactitude des compteurs doit être vérifiée par des essais appropriés au moins une fois l an ou sur avis raisonnable donné par une partie à l autre Chaque partie a le droit d avoir un représentant présent lors d une telle vérification

4 4 Compteurs hors service

Lorsque les compteurs de facturation sont hors service pour essai ou réparation ou à cause d un défaut ou d'un mauvais fonctionnement, la livraison de puissance et d énergie durant la période d'indisponibilité ou de mauvais fonctionnement de tels compteurs est déterminée à l'aide d'autres lectures de compteurs, si disponibles, ou sinon, estimée et fixée par entente du Comité d'exploitation

4 5 Pertes de transport

Le mesurage de l échange réel de puissance et d énergie obtenu aux points de mesurage sera corrigé en tenant compte des pertes entre les points de mesurage et les points de livraison pour déterminer les quantités de puissance et d énergie livrées aux points de livraison

The measuring equipment for the metering points as defined in Supplement I will be provided installed maintained and tested by HYDRO-QUÉBEC to accuracy standards agreed to by both parties The billing kilowatthour meters will be sealed by both parties Such seals will not be removed without the concurrence of both parties

4 3 Inspection and Testing

Any authorized representative of either of the parties shall have access to the billing meters for the purpose of reading the same The accuracy of the meters shall be verified by proper tests at least once a year or upon reasonable notice given by either of the parties to the other Each party shall be entitled to have a representative present at such verification

4 4 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 from other meter readings if available or if not available shall be estimated and agreed to by the Operating Committee

4 5 Transmission Losses

The measurements of real power and energy flow obtained at the Metering Points will be corrected by taking into account losses between the Metering Points and the Delivery Points to determine the amounts of power and energy delivered at the Delivery Points

ARTICLE V

5 0 CLASSIFICATION DES TRANSACTIONS

5 1 Les différentes classes de services prévues à la présente convention et les termes conditions, tarifs et frais qui y sont associés sont énumérés aux annexes à la présente convention

5 2 Ces classes s'ajoutent à la puissance à l'énergie ou aux autres services prévus à quelque autre entente qui peut être en vigueur entre HYDRO-QUÉBEC et CMP pendant la durée de la présente convention

5 3 Tous les taux et tarifs mentionnés dans les annexes sont exprimés en fonds des États-Unis d'Amérique

ARTICLE V

5 0 CLASSIFICATION OF TRANSACTIONS

5 1 The classification of services provided pursuant to this Agreement and the related terms conditions, rates and charges are set forth in the Supplements to this Agreement

5 2 These classifications are in addition to any power, energy, or other services provided under any other agreement which may be in effect between HYDRO-QUEBEC and CMP during the term of this Agreement.

5 3 All rates and charges specified in the Supplements are expressed in funds of the United States of America.

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ARTICLE VI

6 0 ANNEXES

Les annexes faisant partie de la présente convention sont les suivantes

Annexe I	Installations d'interconnexion, points de livraison etpoints de mesurage
Annexe II	Coût supplémentaire et coût évité
Annexe III	Energie de réserve, d'essais, ad hoc et involontaire
Annexe IV	Puissance journalière
Annexe V	Puissance à court terme
Annexe VI	Energie d'appoint
Annexe VII	Puissance horaire
Annexe VIII	Énergie d économie et énergie d'économie assurée
Annexe IX	Puissance et énergie de diversité
Annexe X	Service de transit
Annexe XI	Service d'optimisation

ARTICLE VI

6 0 SUPPLEMENTS

The Supplements forming part of this Agreement are as follows

Supplement I	Interconnection Facilities, Delivery Points and Metering Points
Supplement II	Incremental Cost and Decremental Cost.
Supplement III	Reserve Test, Tertiary and Inadvertent Energy
Supplement IV	Daily Capacity
Supplement V	Short Term Capacity
Supplement VI	Conservation Energy
Supplement VII	Hourly Capacity
Supplement VIII	Economy Energy and Assured Economy Energy
Supplement IX	Diversity Capacity and Energy
Supplement X	Transmission Service
Supplement XI	Optimization Service

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ARTICLE VII

7 0 MODALITÉS DE FACTURATION ET DE PAIEMENT

7 1 HYDRO-QUEBEC et CMP tiennent à jour un relevé des livraisons ou des réceptions et de toutes les autres données nécessaires à la facturation conformément aux modalités établies par le Comité d'exploitation

7 2 Chaque partie doit présenter une ou des factures pour tous les services fournis durant le mois Les factures doivent comprendre tous les renseignements raisonnablement nécessaires ou utiles au calcul des montants dus

Les factures doivent être validées et expédiées promptement à la fin de chaque mois civil

Sous réserve de redressements subséquents, tous les montants facturés sont exigibles et doivent être acquittés au plus tard quinze (15) jours après la réception de la facture en fonds des Etats-Unis immédiatement encaissables Ces paiements doivent être effectués par virement télégraphique à un compte bancaire désigné par chaque partie ou par tout autre moyen de paiement raisonnablement demandé par chaque partie

Tout solde impayé à l'expiration du délai de quinze (15) jours porte intérêt à compter de la date de réception de la facture à un taux supérieur de deux pour cent au taux commercial préférentiel annuel alors en vigueur et qui est annoncé périodiquement par le principal établissement de The Chase Manhattan Bank N A à New York (New York) ou par une autre banque désignée par le Comité d exploitation Toute modification du taux publié entre en vigueur aux fins des présentes à la date ou cette modification prend effet Le Comité d exploitation peut convenir d un autre taux

ARTICLE VII

7 0 BILLING AND PAYMENTS

7 1 An up-to-date record of deliveries or receipts and of all other data required for billing purposes shall be kept by HYDRO-QUEBEC and CMP in accordance with the procedure established by the Operating Committee

7 2 Each party shall render a bill or bills for any services provided during the month The bills shall incorporate all information as may be reasonable to determine the payments due

Bills shall be validated and sent promptly after the end of each calendar month

All payments shown to be due on a bill subject to subsequent adjustments, shall be due and payable not later than fifteen (15) days after receipt of the bill in immediately available funds of the United States of America Such payments shall be made by wire transfer to a bank account designated by each party or in such other manner as is reasonably requested by each party

Any amount remaining unpaid after the expiration of the fifteen (15) day period shall bear interest from the said date of receipt of the bill at a rate two percentage points higher than the prime commercial rate per annum as in effect and announced from time to time by The Chase Manhattan Bank N A at its principal office in New York New York or by any other bank designated by the Operating Committee each change in such announced rate to be effective for the purposes hereof on the date on which such change is effective The Operating Committee may agree upon another rate

Aux fins du présent article VII une facture est considérée comme reçue trois jours ouvrables après son envoi par courrier recommandé ou au premier jour ouvrable de sa réception effective si elle est livrée personnellement ou par télécommunication

For purposes of this Article VII a bill is deemed received three workdays following its mailing by registered mail or on the first workday of actual receipt if it is personally delivered or telecommunicated

7 3 Si l une ou l'autre des parties conteste raisonnablement le montant d'une facture en totalité ou en partie elle doit en donner avis à l'autre partie au plus tard dans les trente (30) jours de la réception de la facture lui indiquant brièvement l objet de la contestation de même que le montant de la facture en litige Dans ce cas, les parties font tout leur possible pour régler le différend dans un délai raisonnable qui ne doit pas dépasser soixante (60) jours à compter de la date de l'avis Chaque partie demeure tenue d acquitter à temps tout montant contesté S il est finalement établi que tout ou partie du montant contesté n'était pas vraiment payable à HYDRO-QUEBEC ou à CMP l'une ou l autre partie a droit aux intérêts sur le montant remboursé courus depuis la date du paiement, au taux auquel il est fait référence à l article 7 2

7 3 In the event that either party reasonably disputes the amount of any bill whether in whole or in part it shall notify the other party of such dispute no later than thirty (30) days from receipt of the bill indicating to it the amount of such bill subject to dispute and briefly describing the nature of such dispute In such event the Parties shall use their best efforts to resolve such dispute within a reasonable period of time not to exceed sixty (60) days from the date of such notice Either party will still be obligated to make timely payment of any disputed amount If it is ultimately determined that the disputed amount in whole or in part, was not properly payable to HYDRO-QUÉBEC or to CMP interest shall be due to either party on the refunded amount from the date of the payment at the rate referred to in Article 7 2

7 4 Si pour calculer des coûts aux fins de la facturation en vertu de la présente convention il est nécessaire de convertir des fonds canadiens en fonds des États-Unis ou des fonds des Etats-Unis en fonds canadiens les parties utilisent, pour la période visée par la facture la moyenne des taux de change publiés chaque jour à midi par la Banque du Canada pour l achat de fonds des États-Unis ou l inverse pour l achat de fonds canadiens selon le cas

7 4 In the event that it is required in the determination of any costs for purposes of billing under this Agreement, to convert Canadian funds into funds of the United States of America or funds of the United States of America into Canadian funds the parties will use the average for the period covered by the bill of the daily noon rates of exchange quoted by the Bank of Canada for purchases of funds of the United States of America or the reciprocal thereof for purchases of Canadian funds as the case may be

ARTICLE VIII

8 0 COMITÉ D'EXPLOITATION

8 1 Les parties maintiennent un Comité d'exploitation composé de deux membres de chaque partie Si un membre est incapable d'assister à une séance, il est représenté à cette séance par une personne nommée soit par le membre ou par la personne de qui ledit membre dépend administrativement Les parties sont avisées par écrit avec diligence de tout remplacement, de toute nomination ou de toute révocation

8 2 Fonctions

Le Comité d'exploitation est autorisé au nom des deux parties à faire tout ce qui est nécessaire pour assurer la livraison et le paiement de la puissance et de l'énergie conformément aux dispositions et intentions de cette convention d'interconnexion Spécifiquement, les fonctions du Comité d'exploitation incluent, sans s'y limiter

(a) Toutes choses relatives à l'exploitation en interconnexion des réseaux électriques des parties

(b) Toutes choses relatives au mesurage, à la comptabilité et à la facturation de la puissance de l'énergie et des autres services connexes

(c) La coordination des programmes d'entretien

(d) L'échange des prévisions de charge à court terme et des besoins de puissance et énergie

ARTICLE VIII

8 0 OPERATING COMMITTEE

8 1 The parties shall maintain an Operating Committee, consisting of two members from each party Should a member be unable to attend a meeting he shall be represented at the meeting by a person named either by such member or by the person to whom such member reports administratively Prompt notice in writing shall be given for all appointments removals and replacements

8 2 Duties

The Operating Committee is authorized on behalf of both parties to do all things necessary to ensure delivery of and payment for power and energy in accordance with the provisions and intent of this Interconnection Agreement. Specifically, the duties of the Operating Committee include but are not limited to

(a) All matters related to the interconnected operation of the parties' electric system

(b) All matters related to the metering, accounting and billing for power, energy and other related services

(c) The coordination of maintenance schedules

(d) The exchange of short range load forecasts and capacity and energy requirements

(e) La considération de toutes autres questions d'exploitation qui peuvent survenir dans la poursuite des objectifs de cette convention ou qui peuvent lui être référées

(f) L'établissement et la répartition des pertes

(g) La révision et l'adoption des limites d'exploitation dans la gestion de l'interconnexion

8 3 Décisions

Toutes les décisions du Comité d'exploitation doivent être unanimes

8 4 Dépenses

Chaque partie défraie les dépenses de ses membres qu'elle nomme au Comité d'exploitation Toutes dépenses engagées conjointement par le Comité pour des activités se rapportant aux interconnexions sont partagées également entre les parties ou selon toute autre proportion déterminée par le Comité d'exploitation

8 5 Accès aux archives et documents

Chaque partie à la présente doit à la demande du Comité d'exploitation, lui fournir promptement tous les documents requis pour établir tout fait se rapportant à la présente convention

Le Comité d'exploitation détermine le mandat et la procédure pour accéder aux archives et documents

Aux fins de la vérification relative à cette convention les vérificateurs d'HYDRO-QUEBEC et ceux de CMP doivent avoir accès aux dossiers nécessaires par l'intermédiaire du Comité d'exploitation

(e) The consideration of such other operating matters as may arise in carrying out the objectives of this Agreement or as may be referred to it

(f) The determination and allocation of losses

(g) Review and adoption of operating limits for the management of the interconnection

8 3 Decisions

All decisions of the Operating Committee shall be unanimous

8 4 Expenses

Each party shall pay the expenses of its own members on the Operating Committee Any expenses jointly incurred by the Committee for activities pertaining to the interconnections shall be shared equally by the parties or in such other proportion as may be agreed upon by the Operating Committee

8 5 Access to Records and Documents

Each party hereto shall, upon the request of the Operating Committee supply promptly to it any and all documents required to substantiate any fact pertaining to this Agreement.

The Operating Committee shall determine the scope of and the procedure for the access to records and documents

For auditing purposes related to this Agreement, HYDRO-QUEBEC's auditors and CMP auditors shall have access through the Operating Committee to the required documents

8 6 Confidentialité

Les dossiers documents et autres données confidentielles requis aux fins de la vérification seront considérés comme la propriété de la partie qui fournit et ne pourront être communiqués qu'aux administrateurs, dirigeants et employés concernés de la partie requérante Toute divulgation à une autre personne doit faire l'objet d'une autorisation écrite du propriétaire de l information

8 7 Ententes du Comité d exploitation

Toute entente du Comité d exploitation faite conformément à la présente convention doit être confirmée par écrit et signée par les membres dudit Comité

8 8 Arbitrage

Dans le cas que le Comité d'exploitation n atteint pas une décision unanime concernant une litige soulevée sous ses fonctions selon cette convention les parties ne sont pas soumis aux tribunaux Tout litige devra plutôt être soumis à l arbitrage à la demande d'une partie pourvu qu'un tel litige ne puisse ainsi être soumis à l'arbitrage plus d'un an après qu'il n'ait pris naissance Les questions qui ont fait l objet d'une décision unanime du Comité d exploitation ne sont pas sujettes à révision par arbitrage ou autrement.

ARTICLE IX

9 0 CONTINUITÉ DE SERVICE

HYDRO-QUEBEC et CMP doivent chacune exercer une diligence raisonnable pour maintenir la continuité de service pour la livraison et la réception de puissance et d énergie électriques tel qu il est prévu à la présente convention Si pour quelque raison la continuité du service est interrompue la cause de cette interruption doit être éliminée et les conditions d exploitation normales rétablies aussitôt que possible

8 6 Confidentiality

The records documents and all other confidential data required for auditing shall be considered proprietary information of the supplying party and shall be disclosed only to the concerned directors, officers and employees of the demanding party Disclosure to any other person shall require the written consent from the owner of the information

8 7 Agreements of the Operating Committee

Any agreement of the Operating Committee made pursuant to this Agreement shall be confirmed in writing and signed by the members of the said Committee

8 8 Arbitration

In the event that the Operating Committee cannot reach a unanimous decision with respect to a dispute arising under its duties under this Agreement, the parties shall not submit such dispute to any court but shall instead submit such dispute to arbitration upon request of any party provided that no such dispute may be so submitted more than one year after it arises and further that any matter which has been decided by the unanimous decision of the Operating Committee shall not be subject to review in arbitration or otherwise

ARTICLE IX

9 0 CONTINUITY OF SERVICE

HYDRO-QUEBEC and CMP shall each exercise reasonable care to maintain continuity of service in the delivery and receipt of electric power and energy as provided under this Agreement. If continuity of service becomes interrupted for any reason the cause of such interruption shall be removed and normal operating conditions restored as soon as practicable

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ARTICLE X

10 0 FORCE MAJEURE

Chacune des parties exécute avec diligence ses obligations en vertu de la présente convention mais certaines conditions peuvent survenir en empêchant ou en retardant l exécution par l une ou l'autre partie en raison de causes hors de son contrôle raisonnable, incluant sans limiter la généralité de ce qui précède, un défaut des installations une inondation, un tremblement de terre une tempête, des éclairs, un incendie, une explosion une épidémie une guerre une émeute des troubles ouvriers ou civils une grève un sabotage et la contrainte par une cour ou par l autorité publique que l une ou l autre des parties n'a pu éviter par l exercice d'une diligence et d'une prévoyance adéquates Si une partie devient incapable d'exécuter ses obligations en raison de telles causes elle est libérée des obligations qu'elle ne peut ainsi exécuter mais elle doit exercer une diligence adéquate afin de corriger une telle incapacité dans un délai raisonnable et elle ne peut être tenue responsable de tout dommage blessure ou perte résultant d'une telle incapacité Cependant, le règlement des grèves et des troubles ouvriers est laissé à l'entière discrétion de la partie qui fait face à ces difficultés

ARTICLE X

10 0 FORCE MAJEURE

Each party hereto shall use all due diligence to perform its obligations under this Agreement but conditions may arise which prevent or delay performance by one or the other because of causes beyond a party s reasonable control, including without limiting the generality of the foregoing, failure of facilities flood, earthquake storm lightning, fire, explosion epidemic war riot civil disturbance labor trouble strike sabotage and restraint by court or public authority which by exercise of due diligence and foresight either party could not be expected to avoid If a party 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 with all reasonable dispatch, and shall not be liable for injury damage or loss resulting from such inability However settlement of strikes and labor disturbances shall be wholly within the discretion of the party having the difficulty

ARTICLE XI

11 0 RESPONSABILITÉ

Aucune des parties à la présente ne peut formuler de réclamation à l'autre partie en raison du fait que ses circuits et son réseau aient été endommagés ou rendus inopérants pour quelque période de temps par suite d'un événement sur les circuits ou sur le réseau de l'autre partie Sans limiter la généralité de ce qui précède, aucune partie n est responsable de toute perte ou dommage subi par l'autre partie ou par un tiers si pour quelque cause ou raison que ce soit la livraison de puissance et d énergie est interrompue ou réduite ou si la tension de la puissance et de l'énergie livrées en vertu de la présente à l'autre partie est augmentée, réduite ou affectée de quelque façon ou pour quelque période de temps que ce soit.

Une partie à cette convention ne peut formuler une réclamation à l autre partie pour toute responsabilité qu'elle a encourue par suite de dommages subis par des tiers pour quelque raison que ce soit.

ARTICLE XII

12 0 LOI APPLICABLE

Cette convention est régie et interprétée en vertu des lois de la province de Québec

ARTICLE XI

11 0 LIABILITY

Neither party shall make any claim upon the other by reason of one party s circuits and system being damaged or rendered inoperative for any period as a result of an occurence on the circuits or system of the other party Without limiting the generality of the foregoing, neither party shall be held responsible for any loss or damage sustained by the other party or by third parties if for any cause or reason whatsoever the delivery of power and energy is interrupted or diminished or if the voltage of the power and energy delivered hereunder to the other party is increased, decreased or in any way affected for whatever length of time

A party to this Agreement shall not make any claim against the other party for any liability it has incurred as a result of any damages sustained by third parties from any cause whatsoever

ARTICLE XII

12 0 APPLICABLE LAW

This Agreement shall be governed by and construed in accordance with the laws of the Province of Québec

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ARTICLE XIII

13 0 CESSION

Sauf en cas de fusion de consolidation ou de vente de tout ou de substantiellement tout l actif de l'une ou l autre des parties consacré à la production au transport à la distribution et à la vente d'électricité, aucune cession volontaire de la présente convention ou des droits de l une ou l'autre des parties en vertu des présentes ne sera exécutée sans le consentement écrit de l autre partie, pourvu que dans un tel cas tout successeur ou cessionnaire des droits de l une des parties, que ce soit par cession volontaire vente judiciaire ou autrement, soit sujet à toutes les dispositions et conditions de la présente convention au même degré que si tel successeur ou cessionnaire était une des parties originales à la présente convention

ARTICLE XIII

13 0 ASSIGNABILITY

Except in the event of merger consolidation or sale of all, or substantially all of the assets of either party devoted to production transmission distribution and sale of electricity no voluntary transfer of the Agreement or of the rights of either party hereunder shall be made without the written approval of the other party provided that in any event any successor to or assignee of the rights of either party whether by voluntary transfer, judicial sale or otherwise 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 party hereunder

ARTICLE XIV

14 0 DATE D'ENTRÉE EN VIGUEUR ET DURÉE

14 1 Sous réserve de l'article I cette convention entre en vigueur dès sa signature par HYDRO-QUEBEC et CMP et demeure en vigueur jusqu à ce qu elle soit résiliée

14 2 Cette convention peut se terminer en tout temps par entente mutuelle Cette convention peut aussi se terminer par un avis écrit de cinq (5) ans d une partie à l'autre pourvu qu'une telle résiliation unilatérale ne porte pas préjudice à toute autre entente qui pourrait alors être en vigueur entre les parties

14 3 Chacune des annexes II à XI inclusivement peut être annulée sur avis écrit de douze (12) mois à l autre partie étant entendu et compris qu une telle résiliation unilatérale ne porte pas préjudice à toute autre entente qui pourrait alors être en vigueur entre les parties

ARTICLE XIV

14 0 EFFECTIVE DATE AND TERM

14 1 Subject to Article I, this Agreement shall take effect upon the signature of HYDRO-QUEBEC and CMP and shall continue in full force and effect until terminated

14 2 This Agreement may be terminated at any time by mutual agreement. This Agreement may also be terminated by a party by giving five (5) years prior written notice to the other party it being understood and agreed that such unilateral termination shall not prejudice any other agreement then in force between the parties

14 3 Any of the Supplements II to XI inclusive forming part of this Agreement may be terminated by either party by giving twelve (12) months prior written notice to the other party it being understood and agreed that such unilateral termination shall not prejudice any other agreement then in force between the parties

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ARTICLE XV

15 0 REVUE ET MODIFICATION

15 1 Les termes de cette convention peuvent être révisés à la demande d'une partie Si à la suite d'une telle révision, il est convenu que l'une quelconque des dispositions de la présente ou des procédures ou attitudes de l'une des parties impose une injustice ou un fardeau indu à l autre partie, alors les parties doivent s'efforcer de modifier ou de compléter la présente convention de façon à mettre fin à cette injustice ou à ce fardeau indu

15 2 Les modifications qui paraissent souhaitables sont faites par écrit par les représentants autorisés des parties

EN FOI DE QUOI les parties à la présente ont signé cette convention

HYDRO-QUEBEC

_____

ARTICLE XV

15 0 REVIEW AND AMENDMENT

15 1 The terms of this Agreement are subject to review at the request of either party If consequent upon such review, it is agreed that any of the provisions hereof or the practices or conduct of either party impose an inequity, hardship or undue burden upon the other the parties shall endeavour to amend or supplement this Agreement in such a manner as will remove such inequity, hardship or undue burden

15 2 Amendments which may appear advisable shall be effected in writing by the duly authorized representatives of each party

IN WITNESS WHEREOF the parties hereto have executed this Agreement.

CENTRAL MAINE POWER COMPANY

_____

DATE _____

ANNEXE I

Faisant partie de la
Convention d interconnexion
entre
HYDRO-QUÉBEC
et
CMP

INSTALLATIONS D'INTERCONNEXION POINTS DE LIVRAISON ET POINTS DE MESURAGE

Les installations d'interconnexion, les points de livraison et les points de mesurage connexes entre HYDRO-QUEBEC et CMP sont décrits dans la présente annexe I

1 INSTALLATIONS D'INTERCONNEXION

Les installations d'interconnexion sont les suivantes

(a) la ligne de transport à 120 kV entre le poste Bedford au Québec et le poste convertisseur à courant continu à Highgate au Vermont ,

b) la ligne de transport à 120 kV entre le poste de Stanstead au Québec et le poste Border au Vermont ,

c) la ligne de transport à 765 kV située entre le poste Châteauguay d'HYDRO-QUEBEC situé près de Beauharnois Québec, et le poste Massena de la New York Power Authority situé près de Massena, état de New York ,

d) la ligne de transport à courant continue de 450 kV reliant le poste Des Cantons au Québec, aux postes convertisseurs Comerford au New Hampshire et Sandy Pond au Massachussetts ,

(e) toute autre installation désignée par le Comité d exploitation

SUPPLEMENT I

Forming Part of the
Interconnection Agreement
between
HYDRO-QUEBEC
and
CMP

INTERCONNECTION FACILITIES DELIVERY POINTS AND METERING POINTS

The Interconnection Facilities and the related Delivery Points and Metering Points between HYDRO-QUEBEC and CMP are described in this Supplement I

1 INTERCONNECTION FACILITIES

The Interconnection Facilities shall consist of the following

(a) the 120 kV transmission line from Bedford substation in Québec to the HVDC converter terminal at Highgate Vermont

b) the 120 kV transmission line from Stanstead substation in Québec to Border substation in Vermont

c) the 765 kV transmission line located between HYDRO-QUEBEC s Châteauguay substation near Beauharnois Québec and the New York Power Authority's Massena substation near Massena, State of New York ,

d) the 450 kV direct-current transmission line from Des Cantons substation in Québec to the converter terminals at Comerford, New Hampshire and Sandy Pond Massachussetts

(e) any other facilities as determined by the Operating Committee ,

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(f) Installations diverses

Tous appareillages et installations additionnels pour le mesurage et le télémesurage aux fins d'exploitation et de facturation la protection par relais le contrôle de charge, les communications et pour toute autre fin que les parties peuvent juger nécessaire dans le but d'effectuer une exploitation adéquate et satisfaisante des installations d'interconnexion

2 POINTS DE LIVRAISON

Les points de livraison sont les suivants

(a) les points de livraison sont situés aux endroits où les lignes de transport décrites en 1 ci-dessus traversent la frontière entre la province du Québec et les États-Unis, et

(b) tout autre point de livraison tel que désigné par le Comité d'exploitation

3 POINTS DE MESURAGE

(a) le point de mesurage de l'interconnexion Highgate est situé au poste Bedford d'HYDRO-QUEBEC,

(b) le point de mesurage de l'interconnexion Stanstead est situé au poste Stanstead d'HYDRO-QUEBEC,

(c) le point de mesurage est situé au poste Des Cantons d'HYDRO-QUEBEC au poste Comerford à New Hampshire,

(d) le point de mesurage de l'interconnexion multiterminal NEPOOL Phase II est situé aux postes Radisson et Nicolet d'HYDRO-QUEBEC et au poste Sandy Pond à Massachussetts et

(e) tout autre point de mesurage tel que désigné par le Comité d'exploitation

(f) Miscellaneous Facilities

Such additional equipment and facilities for metering and telemetering for operations and billing purposes relaying load control communications and such other purposes as may be deemed necessary by the parties to effect adequate and satisfactory operation of the Interconnection Facilities

2 DELIVERY POINTS

The Delivery Points shall consist of the following

(a) the Delivery Points are located where the transmission lines described in 1 above cross the boundary between the Province of Québec and the United States and

(b) any other Delivery Points as determined by the Operating Committee

3 METERING POINTS

(a) the Metering Point for the Highgate tie is located at Bedford substation of HYDRO-QUEBEC

(b) the Metering point for the Stanstead tie is located at Stanstead substation of HYDRO-QUEBEC

(c) the Metering Point for the NEPOOL Phase I interconnection is located at HYDRO-QUEBEC's Des Cantons substation and at Comerford substation in New Hampshire,

(d) the Metering Point for the multiterminal NEPOOL Phase II interconnection is located at HYDRO-QUEBEC's Radisson and Nicolet substations and Sandy Pond substation in Massachussetts, and

(e) any other Metering Point as determined by the Operating Committee

ANNEXE II

Faisant partie de la
Convention d'interconnexion
entre
HYDRO-QUÉBEC
et
CMP

COÛT SUPPLEMENTAIRE ET COÛT EVITE

1 COÛT SUPPLÉMENTAIRE

Les mots 'coût supplémentaire", lorsque utilisés dans la présente convention, signifient tous les frais engagés par une partie pour fournir de l énergie à l'autre ou pour mettre de la puissance à sa disposition, qui ne seraient pas autrement engagés si la transaction n'avait pas lieu

Lorsque l'énergie provient de moyens faisant partie du réseau du vendeur qui sont normalement en exploitation pour les fins de sa réserve d exploitation ou pour d'autres fins, le coût supplémentaire inclut, sans s'y limiter les éléments suivants

Tout coût supplémentaire des frais de combustible ou des frais du loyer de l'eau

Tout coût de l'énergie achetée pour remplacer de l énergie hydraulique emmagasinée

Tout coût supplémentaire des frais d'entretien

Tout coût supplémentaire des frais de main-d'oeuvre

Tout coût supplémentaire de nature diverse tel que par exemple la manutention du charbon le déversement de l eau etc

Tout coût supplémentaire des frais de transport ou toute économie de ces frais

SUPPLEMENT II

Forming Part of the
Interconnection Agreement
between
HYDRO-QUEBEC
and
CMP

INCREMENTAL COST AND DECREMENTAL COST

1 INCREMENTAL COST

The words "Incremental Cost" when used in this Agreement shall mean any cost incurred by one party hereto supplying energy to or making capacity available to the other which would not otherwise be incurred if the transaction did not take place

The elements for 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 labor cost.

Any incremental cost of a miscellaneous nature such as for example coal handling water spillage etc

Any incremental transmission cost or savings

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Tout coût supplémentaire des taxes applicables ou des octrois tenant lieu de taxes

Any applicable incremental taxes or grants in lieu of taxes

Lorsque l énergie fournie provient de moyens faisant partie du réseau du vendeur mis en exploitation spécifiquement et dans le seul but de fournir de l'énergie ou de mettre de la puissance à la disposition de l'autre partie le coût supplémentaire comprend tous les coûts mentionnés ci-dessus et de plus, s il y a lieu

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 capacity available to the other party then the Incremental Cost shall include all costs referred to above and in addition where applicable

Tout coût d allumage des chaudières

Any boiler firing-up cost.

Tout coût de maintien des chaudières en réserve et sous pression

Any boiler banking (reservation) cost

Tout coût supplémentaire des frais d'entretien des chaudières

Any boiler incremental maintenance cost.

Tout coût supplémentaire des frais de main-d oeuvre relatif aux chaudières

Any boiler incremental labor cost.

Tout coût de mise en marche des turbines

Any turbine starting cost.

Tout coût de marche à vide des turbines

Any turbine speed-no-load cost.

Tout coût supplémentaire des frais de main-d oeuvre relatif aux turbines

Any turbine incremental labor cost

Lorsque l énergie provient de moyens faisant partie du réseau du vendeur le coût supplémentaire peut contenir une allocation, calculée selon des méthodes de probabilité, correspondant à la valeur actuelle estimée des coûts futurs prévisibles découlant de la transaction Les méthodes pour calculer et appliquer une telle allocation sont fixées par écrit par le Comité d'exploitation

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

2 COÛT ÉVITÉ

2 DECREMENTAL COST

Les mots coût évité" lorsque utilisés dans la présente convention, signifient la somme nette de tous les coûts applicables ci-haut définis à cette annexe II qui sont évités par la partie à qui l énergie est fournie

The words 'Decremental Cost when used in this Agreement shall mean the net sum of all avoided applicable costs as defined above in this Supplement II to the party to whom energy is supplied

ANNEXE III

Faisant partie de la
Convention d'interconnexion
entre
HYDRO-QUEBEC
et
CMP

ENERGIE DE RÉSERVE, D'ESSAIS AD HOC ET INVOLONTAIRE

Les classifications conditions, tarifs et frais pour l'énergie de réserve d'essais ad hoc et involontaire sont définis dans la présente annexe III

1 ÉNERGIE DE RÉSERVE

L'"énergie de réserve" est définie comme étant de l'énergie vendue pour permettre à l'acheteur d'éviter d'être obligé de délester des charges lorsque le vendeur n'a pas de puissance de soutien au-dessus de sa réserve d'exploitation L'acheteur n'augmente pas sa réserve d'exploitation mais la transaction a comme effet d'augmenter la réserve tournante de l'acheteur Le vendeur peut inclure la transaction dans sa réserve d'exploitation

A moins qu'il n'en soit convenu autrement par le Comité d'exploitation le prix de l'énergie de réserve est l'équivalent du prix de l'énergie associée à la puissance journalière tel que défini à l'annexe IV

SUPPLEMENT III

Forming Part of the
Interconnection Agreement
between
HYDRO-QUEBEC
and
CMP

RESERVE, TEST, TERTIARY AND INADVERTENT ENERGY

The classifications conditions rates and charges for Reserve Test, Tertiary and Inadvertent Energy are set forth in this Supplement III

1 RESERVE ENERGY

Reserve Energy" is defined as energy sold to enable the buyer to avoid load relief measures if the seller has no surplus capacity above its operating reserve Buyer does not add to its operating reserves but the transaction has the net effect of increasing the buyer's spinning reserve The seller may include the transaction in its operating reserve

Unless otherwise agreed by the Operating Committee the charge for Reserve Energy shall be the equivalent of the charge for energy associated with Daily Capacity as defined in Supplement IV

2 ÉNERGIE D'ESSAIS

L énergie d'essais' est définie comme étant de l énergie livrée par une partie à l'autre partie dans le but de faire des essais sur les installations qui sont directement ou indirectement raccordées aux installations d interconnexion entre les deux parties Les deux réseaux celui qui alimente et celui qui reçoit ont une puissance adéquate pour alimenter leur charge respective La partie qui reçoit n'inclut pas l'énergie d'essais dans sa réserve d exploitation La partie qui fournit peut inclure l'énergie d'essais dans sa réserve d exploitation

A moins qu il n en soit convenu autrement par le Comité d exploitation l énergie d essais reçue par une partie doit être retournée à l'autre partie dans les 90 jours qui suivent la fin des essais et dans les mêmes proportions d heures de pointe et d'heures hors pointe qu elle a été reçue

Pour les fins de cette annexe le terme "heures de pointe' normalement signifie la période comprise entre 08h01 et 22h00, heure locale dans le réseau de l acheteur chaque jour de la semaine du lundi au vendredi inclusivement sauf les jours fériés tel que défini par le Comité d'exploitation Le terme 'heure hors pointe' signifie toute les autres heures

3 ÉNERGIE AD HOC

L énergie ad hoc" est définie comme étant de l énergie qui ne fait partie d aucune des classes autrement prévues aux présentes ou dans toute autre convention entre les parties et qui peut être fournie par l une des parties à l'autre en sus des obligations de la partie qui la fournit ou des besoins de son propre réseau

Les conditions tarifs et frais de l'énergie ad hoc sont fixés à l occasion par le Comité d exploitation

2 TEST ENERGY

Test Energy' is defined as energy delivered by one party to the other party for the purpose of testing facilities that are either directly or indirectly connected to the interconnection facilities between the two parties Both the supplying and receiving systems have adequate capacity to cover their own load The receiving party may not include Test Energy towards meeting its operating reserve requirements The supplying party may include Test Energy in its operating reserve

Unless otherwise agreed by the Operating Committee Test Energy received by one party shall be returned to the other party within 90 days following the end of the test and in the same ratio of on-peak hours and off-peak hours as received

For the purpose of this Supplement the term on-peak hours' normally means the period between the hours of 08 01 and 22 00 local time of the buying system on any week day Monday through Friday except on holidays as defined by the Operating Committee The term off-peak hours" means all others hours

3 TERTIARY ENERGY

"Tertiary Energy" is defined as energy which is not otherwise covered herein or in any other agreement between the parties and which can be from either party to the other over and above the supplying party's commitments or requirements for its own system

The conditions rates and charges for Tertiary Energy shall be as agreed upon by the Operating Committee from time to time

4 ÉNERGIE INVOLONTAIRE

L"énergie involontaire" est définie comme étant la différence entre la quantité réelle d'énergie échangée et la quantité programmée pour échange La quantité programmée pour échange utilisée pour déterminer l'énergie involontaire est la somme nette des programmes utilisés dans la facturation d énergie selon la présente convention Les méthodes pour établir la ' quantité réelle ' et la "quantité programmée" sont fixées par le Comité d'exploitation

À moins qu'il n'en soit convenu autrement par le Comité d'exploitation, l'énergie involontaire est compensée par le retour d'une même quantité de mégawattheures à des moments que les parties jugent appropriés

4 INADVERTENT ENERGY

"Inadvertent Energy" is defined as the difference between actual energy interchange and scheduled energy interchange The scheduled energy interchange used to determine the Inadvertent Energy shall be the net total of the schedules as used for billing energy under this Agreement. The methods of determining the "actual interchange' and the "scheduled interchange" will be established by the Operating Committee

Unless otherwise agreed by the Operating Committee, Inadvertent Energy shall be balanced by the return of an equal number of megawatthours at mutually agreeable times.

ANNEXE IV

Faisant partie de la
Convention d'interconnexion
entre
HYDRO-QUEBEC
et
CMP

PUISSANCE JOURNALIERE

Les conditions tarifs et frais pour la puissance journalière sont contenus dans la présente annexe IV

La "puissance journalière" est définie comme étant la puissance avec ou sans énergie vendue sur une base journalière pour permettre à l acheteur de satisfaire sa charge sa réserve d exploitation et ses engagements fermes L acheteur inclut la puissance journalière achetée dans ses réserves d exploitation le vendeur la soustrait de ses réserves d exploitation

Pour les fins de cette annexe le terme "journalière ' signifie une période de 24 heures prenant fin à 24h00

À moins qu'il n'en soit convenu autrement par le Comité d'exploitation dans le cas d'une livraison particulière les conditions tarifs et frais suivants s appliquent à la puissance journalière

1 Normalement une demande de puissance journalière est faite la journée précédente En cas d'urgence un programme doit être préparé dès qu un besoin d'assistance continue devient évident Toute livraison d'urgence de moins de 30 minutes consécutives programmée ou non est classée comme énergie involontaire

2 La livraison de puissance journalière est maintenue à moins que dans l opinion de la partie qui la fournit cette livraison ne soit empêchée ou rendue indésirable par suite d'une urgence ou d autres conditions imprévues

SUPPLEMENT IV

Forming Part of the
Interconnection Agreement
between
HYDRO-QUEBEC
and
CMP

DAILY CAPACITY

The conditions, rates and charges for Daily Capacity are set forth in this Supplement IV

Daily Capacity ' is defined as capacity with or without energy sold on a daily basis to enable buyer to meet its load operating reserve, and firm commitments Buyer includes the capacity purchased in its operating reserves seller subtracts from its operating reserves

For the purpose of this Supplement the term 'daily ' means a period of 24 hours ending at 24 00 hours

The following conditions, rates and charges shall apply to the purchase of Daily Capacity unless agreed otherwise by the Operating Committee for a specific delivery

1 Normally, a request for Daily Capacity shall be made the previous day In an emergency a schedule shall be made as soon as it becomes apparent that continued assistance will be required Any emergency delivery lasting less than thirty (30) consecutive minutes whether scheduled or not shall be classified as Inadvertent Energy

2 The delivery of Daily Capacity shall be maintained unless in the opinion of the supplying party the delivery is prevented or made inadvisable by an emergency or other unforeseen conditions

3 Les tarifs et frais suivants s'appliquent à la puissance journalière

(a) Le prix de l'appel de puissance est de 120 $/MW/jour appliqué au montant maximum de puissance journalière réservée ou fournie durant toute heure de ce jour

(b) Le prix relatif à l'énergie associée livrée durant chaque heure est le plus grand de

(i) 110% du coût supplémentaire de cette énergie défini à l'annexe II,

ou

(ii) un prix ou des prix en dollars par mégawattheure fixés par le Comité d'exploitation

4 La partie qui reçoit peut annuler un programme de livraison de puissance journalière en tout ou en partie, mais est soumise à des frais d'annulation égaux à 110 % des frais engagés par la partie qui devait la fournir en se préparant à livrer ce programme mais pas moins de 13$/MW de puissance journalière annulée

5 Si la quantité de puissance journalière programmée est réduite pendant trente (30) minutes consécutives ou plus durant la période de réservation d'une journée par la partie qui fournit la puissance journalière et ce en raison des exigences de son réseau, alors la partie qui reçoit peut annuler son achat de puissance journalière durant cette journée et ne payer que l'énergie déjà reçue

3 The following rates and charges shall apply to Daily Capacity

(a) The demand charge shall be $120/MW/day applied to the maximum amount of Daily Capacity reserved or provided in any hour of that day

(b) The charge for associated energy delivered in each hour shall be the greater of

(i) 110 % of the Incremental Cost of such energy as defined in Supplement II,

or

(ii) a rate or rates in dollars per megawatthour agreed upon by the Operating Committee

4 The receiving party may cancel all or part of a scheduled Daily Capacity delivery but shall be subject to a cancellation charge of 110 % of any cost incurred by the supplying party in preparing to deliver said schedule but not less than $13/MW of cancelled Daily Capacity

5 If Daily Capacity is reduced from the amount scheduled for thirty (30) consecutive minutes or more during the daily period of reservation by the supplying party by reason of its system requirements then the receiving party may cancel its Daily Capacity purchase during that day and pay only for the energy already received

6 Si la partie qui fournit achète de la puissance de soutien ou l'équivalent d'une tierce partie non partie à la présente convention, pour livraison à l'autre partie aux présentes le prix pour cette livraison est de 110 % des frais engagés par le fournisseur en achetant et en livrant cette puissance de soutien ou son équivalent en provenance de ladite tierce partie Ces frais engagés sont formés du montant total déboursé à cette fin par la partie aux présentes qui fournit et qui n'auraient pas été autrement déboursés par cette partie, plus le coût des pertes électriques supplémentaires dans le réseau de la partie qui fournit.

6 If the supplying party purchases Daily Capacity or equivalent from a third party external to this Agreement for delivery to the other party hereto, then the charges for such delivery shall be 110 % of the out-of-pocket costs incurred by the supplying party in acquiring and delivering such Daily Capacity or equivalent from said third party Such out-of-pocket cost shall consist of the total amount paid therefore by the supplying party which otherwise would not have been paid by such party, plus the cost of the incremental electrical losses on the supplying party s system

ANNEXE V

Faisant partie de la
Convention d interconnexion
entre
HYDRO-QUEBEC
et
CMP

PUISSANCE A COURT TERME

Les conditions, tarifs et frais relatifs à la puissance à court terme sont contenus dans la présente annexe V

La 'puissance à court terme' est définie comme étant la puissance et l'énergie qui y est associée vendues pour des périodes d'une semaine ou plus pour suppléer ou remplacer la capacité de production disponible sur le réseau acheteur L acheteur inclut cette puissance dans ses réserves d'opération le vendeur la soustrait de ses réserves d opération

Pour les fins de cette annexe le terme 'semaine' signifie toute période de sept (7) jours consécutifs

A moins qu il n'en soit convenu autrement par écrit par le Comité d'exploitation dans le cas d une livraison particulière, les parties peuvent convenir d acheter ou d'échanger de la puissance à court terme selon les conditions tarifs et frais qui suivent

1 Toute demande de puissance à court terme doit normalement être faite par écrit et contenir

- la demande requise en nombre maximal de mégawatts
- une prévision de l énergie requise en nombre maximal de mégawattheures

SUPPLEMENT V

Forming Part of the
Interconnection Agreement
between
HYDRO-QUEBEC
and
CMP

SHORT TERM CAPACITY

The conditions, rates and charges for Short Term Capacity are set forth in this Supplement V

'Short Term Capacity" is defined as Capacity and associated energy sold for one or more weeks to supplement or replace available generating capacity on the buyer's system Buyer includes such capacity in its operating reserves seller subtracts from its operating reserves

For the purpose of this Supplement the term "week" means any period of seven (7) consecutive days

The parties may arrange to purchase or exchange Short Term Capacity under the following conditions, rates and charges unless agreed otherwise in writing by the Operating Committee for a specific delivery

1 A request for Short Term Capacity ordinarily shall be submitted in writing and shall state

- the maximum megawatts of demand desired,
- an estimate of the maximum megawatthours of energy desired

- la période de temps durant laquelle la puissance et l'énergie sont requises
- et s'il y a lieu, la période de temps durant laquelle telles puissance et énergie sont retournées en nature

2 Les arrangements et les conditions de chaque transaction sont déterminés par écrit par le Comité d exploitation A moins qu il n en soit spécifié autrement dans telle entente écrite les conditions suivantes s'appliquent

(a) Les capacités de production et de transport nécessaires sont mises en réserve par la partie qui fournit afin de répondre à ses obligations envers la partie qui reçoit durant la période de réservation

(b) S il survient des conditions imprévues telles que dans l'opinion de la partie qui fournit son engagement met en danger la sécurité de la fourniture sur son propre réseau la partie qui fournit a le droit d'exiger de l autre partie qu elle réduise sa demande à toute quantité spécifiée Cette dernière partie doit se conformer rapidement à telle requête

3 Les tarifs et frais suivants s'appliquent à la puissance à court terme

(a) Le prix relatif à la demande est de 600$/MW/semaine durant la période entière de réservation sur la base du montant maximal de la puissance mise en réserve chaque semaine

(b) Le prix relatif à l'énergie livrée durant chaque heure est le plus élevé de

- the time period for which the capacity and energy are desired

and if applicable the time period during which such capacity and energy shall be returned in kind

2 The arrangements and conditions for each transaction shall be agreed upon in writing by the Operating Committee Unless otherwise specified in such written agreement the following conditions will apply

(a) The necessary generation and transmission capability will be reserved by the supplying party to meet its commitment to the receiving party during the period of reservation

(b) If unforeseen conditions arise such that in the opinion of the supplying party, the commitment would jeopardize the security of supply to its own system the supplying party has the right to request the other party to reduce its takings to any amount specified The party so requested shall comply promptly

3 The following rates and charges shall apply to Short Term Capacity

(a) The demand charge shall be $600/MW/week for the full period of the reservation based on the maximum amount of such capacity reserved in each week

(b) The charge for associated energy delivered in each hour shall be the greater of

(i) 110 % du coût supplémentaire de cette énergie défini à l annexe II,

ou

(ii) un prix ou des prix en dollars par mégawattheure fixés par le Comité d exploitation

4 La partie qui reçoit peut sur un avis raisonnable annuler un programme de livraison de puissance à court terme en tout ou en partie Cependant ladite partie est soumise à des frais d annulation de 110 % des frais engagés par le fournisseur en se préparant à livrer ledit programme, mais pas moins de 66$/MW de puissance à court terme annulée

5 Si la quantité programmée de puissance à court terme est réduite pendant trente (30) minutes consécutives ou plus durant la période de réservation journalière entre 08h01 et 22h00, heure locale dans le réseau de l acheteur par la partie qui fournit en raison des exigences de son réseau, alors le prix hebdomadaire de l appel de puissance à court terme est réduit pour la semaine durant laquelle telle réduction a lieu d'un montant de 120$/MW pour chaque journée durant laquelle une telle réduction est effectuée ne devant pas cependant excéder 600$/MW dans une même semaine

6 Aucun prix n est applicable dans le cas d échange de blocs équivalents de puissance à court terme (i e, la livraison et le remboursement en nature de telles puissance et énergie)

(i) 110 % of the Incremental Cost of such energy as defined in Supplement II

or

(ii) a rate or rates in dollars per megawatthour agreed upon by the Operating Committee

4 The receiving party may cancel all or part of scheduled Short Term Capacity delivery on reasonable notice However the said party shall be subject to a cancellation charge of 110% of any cost incurred by the supplying party in preparing to deliver the said schedule, but not less than $66/MW of cancelled Short Term Capacity

5 - If Short Term Capacity is reduced from the amount reserved for thirty (30) consecutive minutes or more during the daily period of reservation between the hours of 8 01 and 22 00 local time of the buyer's system by the supplying party by reason of its system requirements, the weekly demand charge for Short Term Capacity for the week during which said reduction is made shall be reduced by $120/MW of reduction for each day any such reduction is in effect not to exceed $600/MW within any one week.

6 There shall be no charge for the exchange of equivalent blocks of Short Term Capacity (i e the delivery and return in kind of such capacity and energy)

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ANNEXE VI

Faisant partie de la
Convention d interconnexion
entre
HYDRO-QUEBEC
et
CMP

ENERGIE D APPOINT

L énergie d appoint" est définie comme étant l énergie vendue pour suppléer le stockage d énergie ou pour économiser le combustible sur le réseau acheteur Une telle transaction n inclut pas normalement de puissance et est comptabilisée dans les réserves d'exploitation du vendeur A moins qu'il n'en soit convenu autrement par écrit par le Comité d exploitation dans le cas d'une livraison particulière les parties peuvent faire des arrangements concernant l'achat ou l'échange d'énergie d'appoint selon les conditions tarifs et frais suivants

1 Toute demande d énergie d'appoint doit normalement être faite par écrit et contenir

- Une prévision de l énergie requise en mégawattheures,
- La période de temps durant laquelle l énergie est requise
- et, s il y a lieu la période de temps durant laquelle telle énergie est retournée en nature

2 Les arrangements et les conditions de chaque achat sont déterminés par écrit par le Comité d exploitation A moins qu'il n en soit spécifié autrement dans un tel avis écrit les conditions suivantes s appliquent

SUPPLEMENT VI

Forming Part of the
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between
HYDRO-QUEBEC
and
CMP

CONSERVATION ENERGY

'Conservation Energy" is defined as energy sold to supplement energy storages or conserve fuel supplies on the buyer's system Such transactions normally do not include capacity and are counted in the seller's operating reserves The parties may arrange to purchase or exchange Conservation Energy under the following conditions, rates and charges, unless agreed otherwise in writing by the Operating Committee for a specific delivery

1 A request for Conservation Energy ordinarily shall be submitted in writing and shall state

- An estimate of the megawatthours of energy desired
- the time period for which the energy is required,
- and if applicable the time period during which such energy shall be returned in kind

2 The arrangements and conditions for each purchase shall be agreed upon in writing by the Operating Committee Unless otherwise specified in such written agreement the following conditions will apply

(a) Les capacités de production et de transport nécessaires ainsi que les combustibles et l'emmagasinage sont mis en réserve par la partie qui fournit afin de répondre à ses obligations envers la partie qui reçoit durant la période de réservation

(b) S il survient des conditions imprévues telles que dans l opinion de la partie qui fournit, son engagement met en danger la sécurité de la fourniture sur son propre réseau, la partie qui fournit a le droit de réduire ou d'annuler son engagement.

(c) La livraison d énergie d'appoint est sujette à être interrompue en tout temps sur avis raisonnable

3 Aucun coût n est applicable dans le cas d échanges équivalents d'énergie d'appoint (i e la livraison et le remboursement en nature de telle énergie)

4 Le prix relatif à l'achat d'énergie d'appoint est fixé par le Comité d'exploitation

(a) The necessary generation and transmission capability fuels and storages will be reserved by the supplying party to fulfill its commitment to the receiving party during the period of reservation

(b) If unforeseen conditions arise such that in the opinion of the supplying party, the commitment would jeopardize the security of supply to its own system the supplying party has the right to reduce or cancel its commitment.

(c) The delivery of Conservation Energy is subject to interruption at any time upon reasonable notice

3 There shall be no charge for the equivalent exchange of Conservation Energy (i e the delivery and return in kind of such energy)

4 The charge for Conservation Energy shall be established by the Operating Committee

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ANNEXE VII

Faisant partie de la
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entre
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et
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PUISSANCE HORAIRE

Les conditions tarifs et frais pour la puissance horaire sont contenus dans la présente annexe VII

La puissance horaire ' est définie comme étant la puissance avec ou sans énergie vendue sur une base horaire pour permettre à l'acheteur de satisfaire sa charge sa réserve d'exploitation et ses engagements fermes La puissance horaire ne peut être achetée que si l acheteur n'a pas intentionnellement laissé hors service des unités de production ou s'il n a pas évité, pour des raisons économiques d'autres achats de puissance qui lui étaient disponibles L acheteur inclut la puissance horaire achetée dans ses réserves d'exploitation le vendeur la soustrait de ses réserves d'exploitation

A moins qu'il n'en soit convenu autrement par le Comité d'exploitation dans le cas d'une livraison particulière, les conditions tarifs et frais suivants s'appliquent à la puissance horaire

1 Normalement, une demande de puissance horaire est faite l heure précédente

2 La livraison de puissance horaire est maintenue à moins que dans l'opinion de la partie qui la fournit cette livraison ne soit empêchée ou rendue indésirable par suite d une urgence ou d'autres conditions imprévues

SUPPLEMENT VII

Forming Part of the
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HYDRO-QUEBEC
and
CMP

HOURLY CAPACITY

The conditions rates and charges for Hourly Capacity are set forth in this Supplement VII

Hourly Capacity is defined as capacity with or without energy sold on an hourly basis to enable buyer to meet its load operating reserve and firm commitments Hourly Capacity may only be purchased if the buyer has not intentionally left generating facilities out of service or avoided other capacity purchases available to it for economic reasons Buyer includes the Hourly Capacity purchased in its operating reserves seller subtracts from its operating reserves

The following conditions rates and charges shall apply to the purchase of Hourly Capacity unless agreed otherwise by the Operating Committee for a specific delivery

1 Normally, a request for Hourly Capacity shall be made the previous hour

2 The delivery of Hourly Capacity shall be maintained unless in the opinion of the supplying party the delivery is prevented or made inadvisable by an emergency or other unforeseen conditions

3 Les tarifs et frais suivants s'appliquent à la puissance horaire

(a) Le prix de l appel de puissance est de 5 $/MW/heure appliqué au montant maximum de puissance horaire réservée ou fournie durant l'heure

(b) Le prix relatif à l'énergie associée livrée durant chaque heure est le plus grand de

(i) 110 % du coût supplémentaire de cette énergie défini à l annexe II

ou

(ii) un prix ou des prix en dollars par mégawattheure fixés par le Comité d exploitation

4 Si la quantité de puissance horaire est réduite pendant trente (30) minutes consécutives ou plus durant la période de réservation horaire par la partie qui fournit la puissance horaire et ce en raison des exigences de son réseau alors la partie qui reçoit peut annuler son achat de puissance horaire et ne payer que l'énergie déjà reçue

5 Si la partie qui fournit achète de la puissance horaire ou l'équivalent d une tierce partie, non partie à la présente convention, pour livraison à l'autre partie aux présentes le prix pour cette livraison est de 110 % des frais engagés par le fournisseur en achetant et en livrant cette puissance horaire ou son équivalent en provenance de ladite tierce partie Ces frais engagés sont formés du montant total déboursé à cette fin par la partie aux présentes qui fournit et qui n'auraient pas été autrement déboursés par cette partie plus le coût des pertes électriques supplémentaires dans le réseau de la partie qui fournit.

3 The following rates and charges shall apply to Hourly Capacity

(a) The demand charge shall be $5/MW/hour applied to the maximum amount of Hourly Capacity reserved or provided in the hour

(b) The charge for associated energy delivered in each hour shall be the greater of

(i) 110 % of the Incremental Cost of such energy as defined in Supplement II

or

(ii) a rate or rates in dollars per megawatthour agreed upon by the Operating Committee

4 If Hourly Capacity is reduced from the amount scheduled for thirty (30) consecutive minutes or more during the hourly period of reservation by the supplying party by reason of its system requirements then the receiving party may cancel its Hourly Capacity purchase and pay only for the energy already received

5 If the supplying party purchases Hourly Capacity or equivalent from a third party external to this Agreement for delivery to the other party hereto then the charges for such delivery shall be 110 % of the out-of-pocket costs incurred by the supplying party in acquiring and delivering such Hourly Capacity or equivalent from said third party Such out-of-pocket cost shall consist of the total amount paid therefore by the supplying party which otherwise would not have been paid by such party plus the cost of the incremental electrical losses on the supplying party's system

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ANNEXE VIII

Faisant partie de la
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entre
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et
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ENERGIE D'ECONOMIE ET ENERGIE D ECONOMIE ASSUREE

Les classifications conditions tarifs et frais pour l énergie d économie et l'énergie d'économie assurée sont définis dans la présente annexe VIII

1 ÉNERGIE D'ÉCONOMIE

L'énergie d'économie" est définie comme étant de l'énergie vendue sur une base horaire pour permettre à l'acheteur de réduire ou de ne pas démarrer de la production plus coûteuse ou de programmer moins d'énergie provenant d autres sources Le réseau acheteur a une puissance suffisante pour satisfaire sa charge et n inclut pas l énergie d'économie dans sa réserve d'exploitation Le vendeur peut inclure la transaction dans sa réserve d'exploitation Chacune des parties peut, en tout temps, mettre fin à ou suspendre la fourniture d énergie d'économie

SUPPLEMENT VIII

Forming Part of the
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HYDRO-QUEBEC
and
CMP

ECONOMY ENERGY AND ASSURED ECONOMY ENERGY

The classifications conditions rates and charges for Economy Energy and Assured Economy Energy are set forth in this Supplement VIII

1 ECONOMY ENERGY

"Economy Energy" is defined as energy sold on an hourly basis to allow the buyer to reduce or withhold from service more expensive generation or schedule less from other sources The buying system has adequate capacity to cover its own load and may not include economy energy towards meeting its operating reserve requirements Seller may include the transaction in its operating reserve Either party may terminate or suspend the supply of Economy Energy at any time

A moins qu il n en soit convenu autrement par le Comité d exploitation dans le cas d'une livraison particulière le prix de l'énergie d économie est tel qu'il divisera également entre les parties les économies réalisées par l échange d'énergie Ces économies sont calculées en déduisant du coût évité pour la partie qui reçoit l énergie le coût supplémentaire de la partie qui fournit cette énergie compte tenu de l'augmentation des gains ou pertes de transport. Si de l'énergie hydroélectrique est utilisée pour remplacer de l énergie produite par du combustible fossile alors le prix à payer est 80 % du coût évité de l énergie ainsi remplacée moins tout coût applicable additionnel à l acheteur résultant de la livraison

Le coût supplémentaire et le coût évité sont définis à l'annexe II

2 ÉNERGIE D'ÉCONOMIE ASSURÉE

L''énergie d'économie assurée" est définie comme étant de la puissance et de l'énergie vendue pour permettre à l acheteur de ne pas démarrer de la production ou de programmer moins d'énergie provenant d'autres sources Le vendeur ne peut interrompre la transaction sans accorder à l'acheteur le temps requis pour démarrer de la production ou prendre les dispositions pour obtenir de la puissance et de l énergie L'acheteur peut inclure cette transaction de puissance dans sa réserve d'exploitation Le vendeur doit la soustraire de sa réserve d exploitation

Normalement la période de rappel est mutuellement convenue lors de la programmation de la transaction

Unless otherwise agreed to by the Operating Committee for a specific delivery, the price to be paid for Economy Energy shall be such as to provide an equal division between the parties of the savings gained by the interchange The savings shall be determined by deducting the Incremental Cost to the supplying party from the Decremental Cost to the receiving party of such energy transfer making due allowance for any incremental transmission losses or gains If hydroelectric energy is used to replace fossil fuel energy then the price to be paid shall be 80 % of the Decremental Cost of the energy thus replaced less any applicable added cost to the buyer resulting from the delivery

Incremental Cost and Decremental Cost are defined in Supplement II herein

2 ASSURED ECONOMY ENERGY

Assured Economy Energy" is defined as energy and capacity sold to permit the buyer to withhold generation from service or to schedule less capacity from other sources Seller may not interrupt transaction without giving buyer adequate time to start generation or make other arrangements for capacity and energy Buyer may include such capacity transactions in its operating reserve Seller must subtract from its operating reserve

Normally recall time will be mutually agreed to when the transaction is scheduled

Le vendeur ne peut annuler la vente d'énergie d'économie assurée tant que la période de rappel n'est pas écoulée

A moins qu'il n'en soit convenu autrement par le Comité d'exploitation dans le cas d'une livraison particulière le prix de l'énergie d'économie assurée est tel qu'il divisera également entre les parties les économies réalisées par l'échange d'énergie Ces économies sont calculées en déduisant du coût évité pour la partie qui reçoit la puissance et l'énergie le coût supplémentaire de la partie qui fournit cette puissance et énergie, compte tenu de l'augmentation des gains ou pertes de transport. Si de l'énergie hydroélectrique est utilisée pour remplacer de l'énergie produite par du combustible fossile alors le prix à payer est 80 % du coût évité de la puissance et de l'énergie ainsi remplacées moins tout coût applicable additionnel à l'acheteur résultant de la livraison

Le coût supplémentaire et le coût évité sont définis à l'annexe II.

The seller shall not cancel the sale of Assured Economy Energy before the agreed upon recall time has been completed

Unless otherwise agreed to by the Operating Committe for a specific delivery, the price to be paid for Assured Economy Energy shall be such as to provide an equal division between the parties, of the savings gained by the interchange The savings shall be determined by deducting the Incremental Cost to the supplying party from the Decremental Cost to the receiving party of such capacity and energy transfer making due allowance for any incremental transmission losses or gains If hydroelectric energy is used to replace fossil fuel energy then the price to be paid shall be 80 % of the Decremental Cost of the capacity and energy thus replaced less any applicable added cost to the buyer resulting from the delivery

Incremental Cost and Decremental Cost are defined in Supplement II herein

ANNEXE IX

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PUISSANCE ET ENERGIE DE DIVERSITE

Les conditions, tarifs et frais relatifs à la puissance et l'énergie de diversité sont contenus dans la présente annexe IX

La "puissance et/ou énergie de diversité" est définie comme étant de la puissance et/ou de l'énergie échangée ou vendue pour bénéficier de la diversité qui existe entre la charge des deux réseaux et entre leur production

A moins qu'il n'en soit convenu autrement par écrit par le Comité d'exploitation dans le cas d'une livraison particulière les parties peuvent convenir d'acheter ou d'échanger de la puissance et/ou de l'énergie de diversité selon les conditions tarifs et frais qui suivent

1 Toute demande de puissance et énergie de diversité doit normalement être faite par écrit au moins 2 mois avant le début de la transaction de diversité et contenir

- la demande requise en nombre maximal de mégawatts
- une prévision de l'énergie requise en nombre maximal de mégawattheures,

SUPPLEMENT IX

Forming Part of the
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DIVERSITY CAPACITY AND ENERGY

The conditions, rates and charges for Diversity Capacity and Energy are set forth in this Supplement IX

"Diversity Capacity and/or Energy" is defined as capacity and/or energy exchanged or sold in order to benefit from diversity of load or supply between the two systems

The parties may arrange to purchase or exchange Diversity Capacity and/or Energy under the following conditions rates and charges unless agreed otherwise in writing by the Operating Committee for a specific delivery

1 A request for Diversity Capacity and Energy ordinarily shall be submitted in writing at least 2 months before the commencement of the Diversity transaction and shall state

- the maximum megawatts of demand desired
- an estimate of the maximum megawatthours of energy desired

- la période de temps durant laquelle la puissance et l'énergie sont requises,
- et s'il y a lieu, la période de temps durant laquelle telles puissance et énergie sont retournées en nature

2 Les arrangements et les conditions de chaque transaction sont déterminés par écrit par le Comité d'exploitation A moins qu'il n'en soit spécifié autrement dans telle entente écrite, les conditions suivantes s'appliquent

(a) Les capacités de production et de transport nécessaires sont mises en réserve par la partie qui fournit afin de répondre à ses obligations envers la partie qui reçoit durant la période de réservation

(b) S il survient des conditions imprévues telles que dans l'opinion de la partie qui fournit son engagement met en danger la sécurité de la fourniture sur son propre réseau la partie qui fournit a le droit d exiger de l'autre partie qu elle réduise sa demande à toute quantité spécifiée Cette dernière partie doit se conformer rapidement à telle requête

3 Les tarifs et frais suivants s'appliquent à la puissance et à l énergie de diversité

(a) Le prix relatif à la demande est de 600$/MW/semaine durant la période entière de réservation sur la base du montant maximal de la puissance mise en réserve chaque semaine

(b) Le prix relatif à l'énergie livrée durant chaque heure est le plus élevé de

- the time period for which the capacity and energy are desired
- and if applicable the time period during which such capacity and energy shall be returned in kind

2 The arrangements and conditions for each transaction shall be agreed upon in writing by the Operating Committee Unless otherwise specified in such written agreement, the following conditions will apply

(a) The necessary generation and transmission capability will be reserved by the supplying party to meet its commitment to the receiving party during the period of reservation

(b) If unforeseen conditions arise such that in the opinion of the supplying party the commitment would jeopardize the security of supply to its own system the supplying party has the right to request the other party to reduce its takings to any amount specified The party so requested shall comply promptly

3 The following rates and charges shall apply to Diversity Capacity and Energy

(a) The demand charge shall be $600/MW/week for the full period of the reservation based on the maximum amount of such capacity reserved in each week

(b) The charge for associated energy delivered in each hour shall be the greater of

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(i) 110% du coût supplémentaire de cette énergie défini à l'annexe II,

ou

(ii) un prix ou des prix en dollars par mégawattheure fixés par le Comité d exploitation

4 La partie qui reçoit peut sur un avis raisonnable annuler un programme de livraison de puissance de diversité en tout ou en partie Cependant, ladite partie est soumise à des frais d'annulation de 110 % des frais engagés par le fournisseur en se préparant à livrer ledit programme mais pas moins de 66$/MW de puissance de diversité annulée

5 Si la quantité programmée de puissance de diversité est réduite pendant trente (30) minutes consécutives ou plus durant la période de réservation journalière entre 08h01 et 22h00, heure locale dans le réseau de l acheteur par la partie qui fournit, en raison des exigences de son réseau, alors le prix hebdomadaire de l appel de puissance de diversité est réduit pour la semaine durant laquelle telle réduction a lieu d'un montant de 120$/MW pour chaque journée durant laquelle une telle réduction est effectuée, ne devant pas cependant excéder 600$/MW dans une même semaine

6 Aucun prix n'est applicable dans le cas d échange de blocs équivalents de puissance de diversité (i e la livraison et le remboursement en nature de telles puissance et énergie)

(i) 110% of the Incremental Cost of such energy as defined in Supplement II,

or

(ii) a rate or rates in dollars per megawatthour agreed upon by the Operating Committee

4 The receiving party may cancel all or part of scheduled Diversity Capacity delivery on reasonable notice However the said party shall be subject to a cancellation charge of 110 % of any cost incurred by the supplying party in preparing to deliver the said schedule, but not less that $66/MW of cancelled Diversity Capacity

5 If Diversity Capacity is reduced from the amount reserved for thirty (30) consecutive minutes or more during the daily period of reservation between the hours of 8 01 and 22 00 local time of the buyer s system by the supplying party by reason of its system requirements the weekly demand charge for Diversity Capacity for the week during which said reduction is made shall be reduced by $120/MW of reduction for each day any such reduction is in effect, not to exceed $600/MW within any one week

6 There shall be no charge for the exchange of equivalent blocks of Diversity Capacity (i e the delivery and return in kind of such capacity and energy)

ANNEXE X

Faisant partie de la
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entre
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SERVICE DE TRANSIT

Les conditions tarifs et frais relatifs au service de transit seront tels que convenus par le Comité d'exploitation pour chaque livraison particulière

Le "service de transit" est défini comme étant la livraison d'énergie et/ou de puissance à travers un réseau vers ou provenant d'un autre réseau qui peut faire ou ne pas faire partie de la convention d'interconnexion L'interruption du service est normalement indiquée dans les clauses de l'entente

SUPPLEMENT X

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TRANSMISSION SERVICE

The conditions, rates and charges for Transmission Service shall be as agreed upon by the Operating Committee for each specific delivery

"Transmission Service" is defined as the delivery of energy and/or capacity through a system to or from a system which may or may not be a party to the Interconnection Agreement. Interruption of service will normally be included in terms of agreement.

ANNEXE XI

Faisant partie de la
Convention d'interconnexion
entre
HYDRO-QUÉBEC
et
CMP

SERVICE D'OPTIMISATION

Les conditions tarifs et frais relatifs au service d optimisation seront tels que convenus par le Comité d'exploitation pour chaque cas de service particulier

Le "service d'optimisation" est défini comme étant les actions prises pour améliorer la fiabilité de service de l'un ou l'autre ou des deux réseaux et ce avec ou sans transfert d'énergie

SUPPLEMENT XI

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and
CMP

OPTIMIZATION SERVICE

The conditions, rates and charges for Optimization Service shall be as agreed upon by the Operating Committee for each specific service

Optimization Service" is defined as operations to improve service reliability of either or both systems with or without transferring energy

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Northeast Power Coordinating Council Planning Functions

- Adopts NERC Guidelines
- NPCC ensures that the northeastern region of North America is designed and operated to ensure security, efficiency and reliability
- Through work of committees, NERC establishes criteria for planning and operation of the area
- Through committees and task forces, the Council conducts regional and interregional

THE NPCC AREA WAS MOST DIRECTLY INVOLVED WITH THE 1965 BLACKOUT, AND WAS THE FIRST VOLUNTARY AREA RELIABILITY COUNCIL IN NORTH AMERICA ITS MEMORANDUM OF AGREEMENT WAS SIGNED 1/19/66, LESS THAN TEN WEEKS AFTER THE BLACKOUT THE NPCC AGREEMENT PREDATED THE FORMATION OF NERC

THE NPCC COORDINATES THE ESTABLISHMENT OF PLANNING CRITERIA FOR THE AREA, TAKING INTO CONSIDERATION THE OVERALL GUIDANCE OF NERC AND THE PARTICULAR NEEDS OF THE UTILITIES IN THE NPCC AREA

WITHIN THE NPCC AREA, GROUPS OF UTILITIES HAVE ALSO FORMED ALLIANCES CALLED POWER POOLS, TO GAIN EFFICIENCY OF OPERATION THRU SCALE THE CONSOLIDATED OPERATION THROUGH A POOL ALSO MEANS THAT PLANNING MUST BE COORDINATED AMONG THE POOL MEMBERS TO ENSURE THAT THE SYSTEM CAN RELIABLY SUPPORT THE CONSOLIDATED OPERATION