

PD-ABP-760

# USAID EASTERN EUROPE REGIONAL ENERGY EFFICIENCY PROJECT

## OIL AND GAS SYSTEMS COMPONENT

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Prepared by

***Bechtel Corporation***



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# Section 1

## Introduction

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### 1.1 OVERVIEW

The purpose of this final report is twofold. First it summarizes the accomplishments of the first phase of the program, and second, it recommends activities to be implemented by the respective authorities in their continued effort in carrying out the objectives of the USAID.

The objectives of the Oil and Gas Systems component of the Eastern Europe Regional Energy Efficiency Project are to provide research, training, and technical and advisory services related to the oil and gas sector of the countries of Eastern Europe. Bechtel Corporation, and its team of subcontractors; Arthur Andersen & Co., Chem Systems Inc., Gaffney, Cline & Associates and H. A. Merklein & Associates, was selected by competitive bidding in March 1992, to perform the services of this contract with the United States Agency for International Development (USAID).

After a kickoff meeting in Washington, D.C. Peter Danforth, Bechtel's Project Director, and Robert Ichord, USAID's Project Officer visited the countries of Eastern Europe to interview key industry and government staff to determine the priorities of technical services required under this contract. Based on the information obtained from this site visit, Peter Danforth and the team developed a First Year Work Plan identifying eleven potential task activities to be performed under the contract. Eight of these proposed task assignments were subsequently approved by USAID and performed by the team.

### 1.2 PROJECT OBJECTIVES

The objective of the Eastern European Regional Energy Efficiency Project was to put into place a mechanism for implementing a regional energy program in coordination with the European Community (EC), the World Bank, the International Energy Agency (IEA) and other bilateral donors. The program was to strengthen democratic institutions, support economic restructuring and the movement to market economies, and improve the quality of life in these countries. Objectives of the contract included:

- Development of policy and institutional framework for more efficient and rational energy production, use, private investment in energy companies, and improved technologies
- Strengthening intra-regional cooperation in energy and stimulating the development of new energy supply arrangements that integrate Eastern Europe with Western Europe and international markets
- Enhancement of the coordination of assistance among the European Community, the World Bank, and the International Energy Agency to avoid duplication of efforts and to leverage limited US resources
- Assistance in establishing a business environment which supports private sector growth
- Facilitating the expansion of private sector enterprise development
- Promoting fiscal reform
- Promoting sustainable use of natural resources
- Helping to put into place laws and legal institutions which support democratic and market-oriented values

- Facilitating decentralization, appropriate to a market society through strengthening local governments

### 1.3 WORKPLAN & PROJECT TASKS

The first year work plan and proposed activities for the project were developed following the trip taken by Peter Danforth and Robert Ichord. The following is a summary of the 10 activities proposed in the first year work plan:

- Romania Petroleum Sector Restructuring
- Technical Services to the New Mining Office of Hungary
- Slovnaft Refinery Deep Conversion Study
- Romanian Refinery Sector Restructuring Study
- Institutional Review and Organizational Restructuring of the Bulgarian Committee of Geology
- Study on Petroleum Refining and Transportation in Regional CEE
- Estonia Gas Metering Analysis
- Concept Paper on Regional Gas Pipeline Network
- Pre-feasibility study of Czech Natural Gas Storage in Underground Caverns
- Co-generation Definitional Mission to Plock Refinery in Poland

USAID approved 8 of these tasks during the first year of contract performance:

- Romania Petroleum Sector Restructuring
- Technical Services to the New Mining Office of Hungary
- Slovnaft Refinery Deep Conversion Study
- Romanian Refinery Sector Restructuring Study
- Institutional Review and Organizational Restructuring of the Bulgarian Committee of Geology
- Study on Petroleum Refining and Transportation in Regional CEE
- Concept Paper on Regional Gas Pipeline Network
- Technical Support for New Romanian Agency for Natural Resources (NAMR)

Two additional tasks, the Estonia Gas Metering Analysis and the Technical Review of CDI Proposal for a Coal Bed Methane Project in Poland, were also approved by USAID. These two tasks were brief reviews lasting approximately one person month each. The Estonia Gas Metering Analysis consisted of a review of the Estonian Gas Metering company and resulted in a report highlighting technical and financial recommendations to avoid disruption of natural gas supply from Russia. The CDI Coal Bed Methane Development Project Proposal Review was conducted by Gaffney Cline in December 1992 and resulted in the issuance of a technical review report in January 1993.

Table 1 presents a brief summary of the objectives and accomplishments of each major task undertaken in the program:

Table 1 - Summary of Objectives and Accomplishments

Task	Objectives	Accomplishments
Petroleum Sector Restructuring - Romania	<ul style="list-style-type: none"> <li>• Develop policy and institutional framework for more efficient and rational energy production</li> <li>• Boost private investment in energy companies and improved technologies</li> <li>• Assist in establishing a business environment which supports private sector growth</li> <li>• Help put into place laws and legal institutions which support democratic and market-oriented values</li> <li>• Strengthen intra-regional cooperation in energy, stimulating the development of new energy supply arrangements which integrate Eastern Europe with Western European and international markets</li> </ul>	<p>Drafted a comprehensive set of Petroleum Charter Documents consisting of:</p> <ul style="list-style-type: none"> <li>• A proposed petroleum policy</li> <li>• Recommendations for a cabinet decision on the petroleum sector which included the establishment of the Mineral Resources Agency of Romania;</li> <li>• A draft petroleum law and set of petroleum regulations;</li> <li>• Model contracts for concession management agreements,</li> <li>• Recommendations for marketing revisions and promotion of exploration and production areas, changes in the roles and responsibilities of GoR, restructuring PETROM, ROMGAS, etc.</li> </ul>
New Mining Office - Hungary	<ul style="list-style-type: none"> <li>• Promote sustainable use of natural resources</li> <li>• Facilitate decentralization appropriate to a market society through strengthening local governments</li> <li>• Develop policy and institutional framework for more efficient and rational energy production and use and private investment in energy companies and improved technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Assisted in the establishment of an independent mining office by providing</li> <li>• A computer network system for the new Hungarian Mining office</li> <li>• Lectures in Hungary on project economics</li> <li>• Logistics support and training for Hungarian inspectors in the U.S</li> </ul>
Slovnaft Refinery Deep Conversion Study - Slovakia	<ul style="list-style-type: none"> <li>• Promote sustainable use of natural resources</li> <li>• Strengthen intra-regional cooperation in the energy sector, stimulating the development of new energy supply arrangements that integrate Eastern Europe with Western European and international markets</li> </ul>	<ul style="list-style-type: none"> <li>• Performed a review of the Slovnaft Refinery Deep Conversion Study developed by the Slovnaft Company and recommended that an independent feasibility study be performed</li> </ul>
Refinery Sector Restructuring - Romania	<ul style="list-style-type: none"> <li>• Promote sustainable use of natural resources</li> <li>• Promote fiscal reform</li> </ul>	<ul style="list-style-type: none"> <li>• Reviewed and evaluated Rafirom's refinery sector restructuring strategy and recommended that the timing and priority of investments be matched to market needs</li> <li>• Forecasted that the market for refined products</li> <li>• Suggested a maximum capacity</li> <li>• Concluded the Petromedia refinery is best suited for exporting products</li> </ul>

Table 1 - Summary of Objectives and Accomplishments Cont'd

<p>Technical Assistance for Committee for Geology and Mineral Resources (CGMR) - Bulgaria</p>	<ul style="list-style-type: none"> <li>• Develop policy and institutional framework for more efficient and rational energy production and use</li> <li>• Boost private investment in energy companies and improved technologies</li> <li>• Assist in establishing a business environment which supports private sector growth</li> <li>• Facilitate expansion of private sector enterprise development</li> <li>• Promoted sustainable use of natural resources</li> <li>• Help put into place laws and legal institutions which support democratic and market-oriented values</li> <li>• Facilitate decentralization appropriate to a market society through strengthening of local governments</li> </ul>	<p>Assisted the CGMR with:</p> <ul style="list-style-type: none"> <li>• Concession management contract negotiations in Sofia</li> </ul> <p>A report was issued after review by CGMR and USAID</p>
<p>Study on refining and transportation in Central and Eastern Europe</p>	<ul style="list-style-type: none"> <li>• Develop policy and institutional framework for more efficient and rational energy production and use and private investment in energy companies and improved technologies</li> <li>• Strengthen intra-regional cooperation in energy and stimulating the development of new energy supply arrangements that integrate Eastern Europe with Western Europe and international markets</li> <li>• Enhance the coordination of assistance among the European Community, the World Bank, and the International Energy Agency to avoid duplication of efforts and leverage limited US resources</li> <li>• Facilitate expansion of private sector enterprise development</li> <li>• Promote sustainable use of natural resources</li> </ul>	<ul style="list-style-type: none"> <li>• Initial workshop held in Budapest, Hungary, in 11/92 to define scope of the study and identify key country counterparts</li> <li>• Bechtel team members traveled to various on-site locations in the CEE countries to model their refineries on the Process Information Modeling System (PIMS)</li> <li>• Environmental assessment visits were made</li> <li>• A steering committee meeting review of initial findings was held</li> <li>• A PIMS training seminar for Ministry and industry representatives was held in Houston, TX in 6/93</li> <li>• The CEE Regional Refinery Workshop was held in DC to review data gathered to-date, the interim report, and to begin the final input phase of the study that produced a final report in 7/94</li> </ul>
<p>Technical Assistance for National Agency for Mineral Resources (NAMR) - Romania</p>	<ul style="list-style-type: none"> <li>• Develop policy and institutional framework for more efficient and rational energy production and use and private investment in energy companies and improved technologies</li> <li>• Facilitate de-centralization appropriate to a market society through strengthening local governments</li> </ul>	<ul style="list-style-type: none"> <li>• Arranged an exploratory trip for the three top members of the NAMR team to visit the US and Canada</li> </ul>

## Section 2

# Petroleum Sector Restructuring - Romania

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### 2.1 SUMMARY

In response to a request from the Government of Romania (GoR) USAID performed a study to design and develop a petroleum sector restructuring strategy. The goals of the strategy were to improve the operational efficiency, managerial effectiveness, financial viability of companies and to encourage significantly increased levels of private-sector investment in the upstream petroleum sector.

The study was designed in two phases: Phase I consisted of the design of the restructuring strategy; and Phase II consisted of elaboration and further definition of recommendations as well as agreement on a timetable for their implementation. The study included research, interviews and analysis to assess the role of the GoR in the sector, including the policy-making, regulatory, operational and other roles of the Ministry of Industries (MIND) and the Ministry of Economy and Finance (MEF). The review also included the organizational, operational and economic environment of the sector, as well as the legal and industrial framework for private-sector investment.

### 2.2 METHODOLOGY

The study was undertaken by a team of petroleum industry specialists with diverse technical, financial and institutional expertise. This USAID funded study was conducted under the overall supervision of Bechtel Corporation, as the prime contractor to USAID. The team included the following individuals:

#### **Bechtel Corporation**

Peter Danforth  
Clive Chandler

#### **Arthur Andersen & Co.**

David Moore  
John Faraguna  
John Meinders  
Richard Wasteney

#### **Gaffney, Cline & Associates**

William Cline  
John McGhee  
Paul Lockwood

#### **Merklein & Associates**

Helmut Merklein

The team worked in Romania from July through September 1992 (Phase I) and during March and April, 1993 (Phase II). A Phase I report was issued in both English and Romanian in November of 1992. Following various meetings between representatives of the World Bank, the GoR and the affected entities, the project team returned to Romania for the Phase II activities. A final report of Phase II was issued in June of 1993.

### 2.3 ACCOMPLISHMENTS

The petroleum sector restructuring strategy consisted of recommendations in three broad areas.

1. The legal, contractual and promotional framework

2. The GoR's role in the energy sector
3. Restructuring the petroleum sector companies

### 2.3.1 Legal, Contractual and Promotional Framework

Specific recommendations and accomplishments of the legal framework were included in a comprehensive set of Petroleum Charter Documents. These included a proposed Petroleum Policy to establish the basis for a new legal framework for the Romanian petroleum sector. Although the Petroleum Policy has no legal effect, it serves as a statement on the principal national goals in petroleum matters.

The Bechtel team recommended a Cabinet decision on petroleum sector issues to establish the National Agency for Mineral Resources (NAMR). As an independent agency, NAMR is to act as the exclusive agent and trustee on the Nation's petroleum resources. It is to regulate the upstream petroleum sector, including oil and gas production activities, oil and gas pipelines as common carriers, as well as natural gas distribution companies. A draft petroleum law was created to serve as the enabling legislation formally establishing the NAMR, giving it broad powers to regulate petroleum activities and to enter into petroleum agreements on behalf of the State. This new proposed law has been framed in terms consistent with international petroleum industry practices and Romanian law, and should increase Romania's attractiveness to large and small national and international companies alike which presently are unwilling to make investments in the absence of a clearly defined legal framework.

A draft set of Petroleum Regulations in such areas as safety, field practices, and environmental protection were also recommended by the Bechtel-led team.

Three draft model contracts for assisting the Government of Romania in attracting foreign investment in the upstream petroleum sector were also included in the petroleum charter document. The model contract is the single most important element in attracting foreign investment into Romania. It is a window through which foreign companies will evaluate both the economic attractiveness of the opportunities and the capability and attitude of Romanian authorities to the sector.

### 2.3.2 Restructuring the GoR's Role in the Energy Sector

The project team made detailed recommendations for changing the role and responsibilities of the GoR in the energy sector. Specifically, the team suggested that:

- The GoR replace the variable-rate revenue-based tax with a fixed-percentage royalty
- The creation of a Mineral Resource which would be responsible for awarding new contract areas on a competitive-bid basis and regulating the physical aspects of exploration, development and production, including conservation of mineral resources and protection of the environment
- Creation of a Tariff-Setting Commission which is to regulate crude oil and natural gas pipeline tariffs
- Pipeline companies responsible for crude oil and natural gas transmission become "common carriers", offering equal access to producers and end-users
- End users be charged for transportation, transmission and distribution in addition to the price of the oil or gas commodity, and that these such elements be added into the end-user price

- GoR officials on the Administrative Boards of PETROM, ROMGAS and Commercial Societies be replaced by independent outside members, and that the boards include additional members of company management

### **2.3.3 Restructuring the Petroleum Sector Companies**

The project team made a number of recommendations for restructuring PETROM, ROMGAS and the Commercial Societies. These recommendations included changes in operating practices, organizational structures and management approaches.

PETROM is wholly owned by the GoR, and is the national oil company responsible for exploration, development, and production of crude oil and natural gas in all Romanian basins except the Transylvanian Depression. It is presently the only producer of crude oil in Romania. PETROM'S exploration and production operations are currently conducted in 25 offshore producing districts and by its offshore subsidiary, PETROMAR. Each district is in effect a self-contained exploration/production company, with its own management, engineering, geological, accounting and support staffs. PETROM is a large and unwieldy company with over 64,000 employees. Its highly decentralized structure leads to severe managerial inefficiency. The project team made a detailed reorganization and restructuring to be undertaken over a two and one-half year time frame.

ROMGAS, the Romanian national gas company, is also wholly owned by the GoR. Its current activities include exploration, development and production of natural gas in the Transylvanian Depression, purchase of natural gas produced by PETROM, transmission and distribution of gas imported from the NIS, transmission of gas for the domestic and transit markets, and distribution of natural gas to end-users in Romania. ROMGAS employs approximately 23,000 people. The team recommended reorganizing ROMGAS into three strategic business units

- 1) Exploration and production
- 2) Gas transmission
- 3) Gas distribution

## **2.4 RECOMMENDATIONS FOR FURTHER WORK**

Further assistance in the organizational development of NAMR should be provided. Furthermore, there should be a change in the role and responsibilities of the GoR in oil and gas production/development.

## Section 3

### New Mining Office - Hungary

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#### 3.1 SUMMARY

The objective of this effort was to coordinate training for the staff of the newly formed Hungarian Mining Office (MBH). MBH is responsible for exploration/development of energy and non-energy mineral resource concession programs. The US Department of the Interior (DOI) provided training and technical assistance in management and regulatory planning/restructuring. The primary task of the Bechtel Team was to provide training, technical assistance and logistical support as specified in the tasks below.

**Task 1 - Confidential and Public Data Management:** Provide staff members to train MBH personnel in data management and to conduct a survey, inspection, and training at DOI facilities.

**Task 2 - Mineral Resources Concession Program:** Provided two Hungarian speaking Bechtel employees to lecture staff in Hungary on economic theory as it pertains to mineral development under concession or leasing systems and provide one Bechtel employee to lecture in Hungary on contract negotiations for mineral resource contracts under concession programs.

**Task 3 - Inspection of Mineral Exploration:** Bechtel provided inspector's training in hard rock mining and oil/gas production safety for eight Hungarian inspectors in the US. The training consisted of 2-3 weeks of formal training plus additional time with DOI inspectors at inspection sites. Mineral exploration and development activities under a mineral concession program.

**Task 4 - Assistance in Identifying and Purchasing Automated Data Processing Equipment:** Purchase and deliver the computer equipment to MBH in Hungary. In addition, logistical support for the entire training and technical assistance program was required.

The new Hungarian Mining Office was also provided with hardware for a new computer workstation system and software capable of providing the necessary data management and analysis support for the agency.

#### 3.2 METHODOLOGY

This study was supervised by Bechtel and DOI's Mineral Management Service (MMS). Training was undertaken by a team of petroleum and mining industry specialists including:

##### **Bechtel Corporation**

Peter Danforth, Project Director  
Clive Chandler  
Joe Westsik  
Tamas Csboth

##### **DOI MMS**

Bob Middleton, Washington, DC  
Doug Koza, Utah office

##### **Gaffney, Cline and Associates**

William Cline

Menno Dinkleman

During late October and early November 1992, five Hungarians from MBH were brought to the US to attend a three week training program in confidential and public data management. Training was conducted by Gaffney, Cline and Associates.

In December 1992, two Hungarian speaking Bechtel team members, Tamas Csboth and Joseph Westsik traveled to Budapest to provide lectures on economics, project management, and mineral resource development. Their trip lasted one week.

In early February 1993, Clive Chandler (Bechtel) and Bill Cline (Gaffney Cline & Associates) traveled to Budapest to provide lectures in contract negotiation for petroleum and mineral concession management.

During the latter part of July and the beginning of August, 1993, nine MBH safety inspectors were brought to the United States for 6 weeks of safety and inspection training and on site visits. DOI provided the site training in Salt Lake City, UT; Rock Springs, WY; Spokane, WA; Price, UT; Houston, TX and Beckley, West Virginia. The group concluded its trip in Washington, D.C. with wrap-up meetings with DOI, USAID, and Bechtel in August 1993.

In May 1994, Bechtel's proposal for providing MBH with new computer equipment was accepted by USAID Based on specifications developed by USDOJ Mineral Management Services (MMS) for a geologic information system, Bechtel requested bids for hardware and software from 3 vendors. Computerland in Budapest, the successful bidder, delivered equipment to the new Hungarian Mining office in late July 1994. After the installation, DOI personnel traveled to Budapest, Hungary, to train MBH staff in the use of the new workstations.

### **3.3 ACCOMPLISHMENTS**

MBH was provided with a computer network system which included 7 workstations complete with software for the new Hungarian Mining office to be used for data management and analysis. The staff of the new Hungarian mining office received lectures, in Hungary, on economic theory as it applied to mineral development under a concession/leasing system, as well as lectures on contract negotiation. Furthermore, the Bechtel/DOI team provided transportation and training facilities for nine Hungarian inspectors in the United States for training in both gas/oil production safety and hard rock mining safety.

### **3.4 RECOMMENDATIONS FOR FURTHER WORK**

The New Hungarian Mining office benefited greatly from the activities provided by USAID funding with support from DOI. To maintain the success of this new organization, the following activities are recommended by the Bechtel and USDOJ team:

- Additional contract negotiations training in concession management.
- Training in detailed economics and economic markets.
- Additional training in oil and gas/ hard rock mining safety, including on-site experience in the United States.

- Additional computer equipment and training, including Intergraph work stations.
- Information and lectures on Occupational Safety and Health Act and MSHA issues.

## Section 4

# Slovnaft Refinery Deep Conversion Study - Slovakia

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### 4.1 SUMMARY

A study was performed to evaluate the relative economics and environmental benefits of desulfurizing heavy fuel oil by installing heavy oil upgrading capacity. The team reviewed the study effort performed by Slovnaft staff and recommended technological alternatives as well as a financing strategy. Presently, high sulfur heavy fuel oil is burned in power plants and industrial facilities without flue gas scrubbers to remove the sulfur. The two approaches to improve air quality at the refinery are:

- Add flue gas desulfurization equipment
- Add new processing equipment

The study team visited the Slovnaft Refinery and reviewed the data regarding specific crude and processing configurations to determine optimum equipment modifications or additions required to reduce the sulfur level in heavy fuel oil. A comparison of the two approaches was made on a capital and operating cost analysis basis. By-product benefits were also identified. A recommendation regarding the most appropriate approach to meet the clean air target was made and a final report describing the basis and findings of the study was issued. This report included order-of-magnitude capital and operating cost estimates to achieve target sulfur reductions as well as recommendations for a follow-on project.

### 4.2 METHODOLOGY

In August and September, 1992, the Bechtel team performed a review of Slovnaft's study. While Slovnaft's report was technically sufficient in reviewing the five oil upgrading options, it was lacking in establishing a market basis or economic justification. Due to privatization activities proceeding at Slovnaft, the reviewers were limited to non-confidential information. Slovnaft requires refinery improvement of its processing of heavy fuel oil processing to provide a better slate of products and allow heavy fuel oil purchasers to meet new environmental emissions standards. Slovnaft's own forecast of product demand indicated a need to improve the production of light distillate products. The team members on this project included:

#### **Bechtel Corporation:**

Peter R. Danforth  
Ralph Ragsdale  
Kamil Rustam

A review report was issued in September 1992 to USAID, the Government of Slovakia and the Slovnaft Company

### 4.3 ACCOMPLISHMENTS

A review report was issued to USAID, the Government of Slovakia and the Slovnaft Company.

**4.4 RECOMMENDATIONS FOR FURTHER WORK**

It is recommended that an independent third party perform a full feasibility study that would be acceptable to potential investors and lenders. A U.S. Trade and Development Agency grant to Slovnaft for such a feasibility has been approved.

## Section 5

# CGMR Technical Assistance - Bulgaria

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### 5.1 SUMMARY

An institutional review and technical assistance to develop a concession management program for the Committee of Geology and Mineral Resources in Bulgaria (CGMR) was performed. The objective was to review the existing mineral and petroleum legal framework in Bulgaria and to recommend appropriate petroleum law revisions and draft model contracts for attracting foreign capital investment in the sector. A work plan was also developed to assist the CGMR in its next round of concession bids. Several reviews were conducted by the Bechtel led team.

### 5.2 METHODOLOGY

Peter Danforth (Bechtel), Clive Chandler (Bechtel), and Bill Cline (Gaffney Cline and Associates), traveled to Sofia, Bulgaria for two weeks to conduct the review and analysis. Peter Danforth traveled to Sofia to review the Terms of Reference (TOR) the week of April 12, 1993 with USAID representatives and CGMR members. The Bechtel/Gaffney, Cline team reviewed the existing law and model contracts prior to their trip in late June 1993, returning to the US in mid July. Gaffney Cline issued a draft report in September.

The Bechtel /Gaffney Cline team assisted the CGMR in their second round of concession contracts in Houston, TX and London, UK during October 1993. Gaffney, Cline issued the final report to USAID and the CGMR in late October 1993.

### 5.3 ACCOMPLISHMENTS

- Bechtel reviewed the existing mineral and geological institutions in Bulgaria analyzed their organizational structures and operational mechanics. Specifically the team assessed the positive and negative effects of the rational stewardship of the nation's mineral resources, the Government/authority's decision-making process and incentives with respect to these resources; and the attractiveness and competitiveness of the country with respect to foreign capital investment.
- The team also assessed Bulgaria's petroleum laws and taxation practices. The team then made recommendations on changing the law to attract private investment in resource discovery and development.
- A brief technical review was performed to determine the relative productivity of Bulgaria with respect to its natural resources. This effort included a review of agreements signed to date, as well as a review and critique of the country's efforts to attract investment. It was suggested that the CGMR review, and possibly revise, their model contracts based on similar experiences in other countries.
- The Committee was then assisted in developing a work plan to obtain the best possible results from the next round of bidding in resource concession contracts.
- The team evaluated the need for training Bulgarian specialists in market economics and contract negotiations. Bechtel developed a report on restructuring strategy and recommendations for follow-up training.

**5.4 RECOMMENDATIONS FOR FURTHER WORK**

CGMR would benefit from the Hungarian Mining office project experience via a series of training classes, both domestically and in the United States, to provide technology transfer in modern computer data base management systems for geological information processing as well as basic education on project development, economics and financing.

## Section 6

# Study on Refining and Transportation - Regional CEE

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### 6.1 SUMMARY

The Central and Eastern Europe Regional study on petroleum refining and transportation had two main objectives.

- To determine the medium to long term perspective (up to 10 years) for the refining and oil transport sector, in terms of structural and performance characteristics that would help to ensure secure, least-cost, and flexible supply of refined products in an environmentally sustainable manner
- To develop feasible strategy options, at the regional and individual country levels, to transform the Sector and to manage the transition from the current situation.

A few of the more than 45 refineries of the CEE Region can be considered economic and efficient by Western European standards. The refining industry in the CEE countries is perceived to have the following characteristics:

- Refining capacity is in excess of demand
- Configuration of facilities leads to inflexibility in processing wider varieties of crude oils and inability to adjust production profile in line with demand requirements
- Processing facilities and production control systems are in many cases old and outdated
- Regulatory and/or institutional arrangements are not conducive to appropriate demand and supply management, nor can they enable the enterprises to operate in an autonomous, efficient and commercial manner

Furthermore, due to historical reasons, the infrastructure of transport of crude and products from and to external markets is severely limited, leading to risks regarding the security of supply and further constraining trade.

The primary task was to review all major sources of information (John Brown study, Chem Systems and Bechtel data, Chevron data, IEA/World Bank/AID studies, etc.) in preparation for the Phase I analyses. Bechtel took the lead on the CEE Regional Model. The individual refineries were combined into a regional model which included interplant transfers of feedstocks, intermediates and finished products.

Chem Systems took the lead in identifying potential strategies and institutional policies on a regional, as well as country-specific, basis. As discussed during the AID meetings, this effort was not exhaustive, but was intended to provide preliminary insight into general energy issues. Recommendations were primarily reflective and were supported by results of the Phase I analysis. A critical element of this activity was the need to cross-check recommendations and outlooks with knowledgeable international oil and energy companies such as Shell, BP, Chevron, etc.

Bechtel and Chem Systems documented their findings in a report format for the Phase I results. A critical aspect of this final report was to identify a recommended program for Phase II.

## 6.2 METHODOLOGY

The project was run by Bechtel Corporation as prime contractor with the assistance of Chem Systems and under the consultation of a Steering committee. The Steering Committee's membership included the Bechtel/Chem Systems team and representatives of the organizations listed below.

### Bechtel Corporation

Peter Danforth  
Charles Harper  
Ralph Ragsdale  
Gary Ewy  
Allan Farber

### Chem Systems

Bruce Burke  
Mike Kratochwill

### USAID

Robert Ichord

### IEA

Philip Starling

A trip to Budapest was undertaken in November 1992 for a kick off meeting with Chem Systems, Bechtel, USAID, IEA, World Bank, and various contacts from each of the CEE nations. The purpose of the trip was to identify specific country counterparts to work with on the study and to identify needs for each country as well as the region as a whole. The Bechtel/Chem Systems team members then traveled to the region to gather refinery data and policy information in 1992/1993 for the interim report.

The Interim report was issued in 1993 to the Steering Committee, USAID and country counterparts for their review. The interim report was updated and resubmitted prior to the CEE Regional Refinery Workshop Conference in Washington, DC in November of 1993. The week long conference brought together 2 country representatives from each CEE nation including the Head of Research and Development from the Ministry of Industry in Lithuania, the International Energy Agency (IEA), the European Communities (CEC), The World Bank, USAID, the Bechtel/Chem Systems team members and representatives of the US. Department of Energy and several industry representatives, including Amoco.

During the week long sessions, comments and data for the final report was gathered. Additional information was requested from the country counterparts in December 1993 and all information gathering was completed by the end of March 1994. The final report on the Regional Refinery Study was issued in July 1994.

## 6.3 ACCOMPLISHMENTS

- The terms of reference (TOR) for the Regional Refinery Rationalization Study was reviewed and approved by the sponsoring organizations
- Key contacts for each country were identified and specific assignments were formulated for each counterpart. The workshop was attended by representatives from Hungary, Poland, Slovakia, Bulgaria, and Romania, the CEC, the World Bank, USAID, IEA, Bechtel, Chem Systems and a representative from the US Embassy in Budapest
- The PIMS modeling staff traveled to five of the countries. As a result of these visits and interviews, a revised workplan and scope were issued

- Environmental assessment visits were completed Bechtel
- A PIMS training seminar was held in Houston, TX. Twelve delegates from Central and Eastern Europe attended. A copy of the draft interim report was issued to each delegate for review
- A refinery economic analysis (PIMS) was performed and a draft interim report was issued to the Steering Committee
- The CEE Regional Refinery Workshop was held in Washington, D.C. with fourteen delegates from the region attending to review the interim report and define additional data for the final report
- A final report for the CEE Regional Refinery Study was issued to USAID, the World Bank, IEA, CEC and the country counterparts

#### **6.4 RECOMMENDATIONS FOR FURTHER WORK**

The regional refining and transportation analysis for Central and Eastern Europe was limited by the inability to utilize actual refining configuration, yields and operating costs. Due to the confidential nature of actual operating financial and technical process information, the team's analysis utilized information available in the public domain and is not necessarily a true reflection of current processing configurations. Yields for each unit were based on expected yields from similar units operating in Western Refineries. In order to provide more meaningful results to Government Ministries, ownership groups or potential investors, each refinery should be modeled using actual current yields and operating conditions. The future analysis should focus on a group of refineries for a specific country or individual refineries on a case-by-case basis.

## Section 7

# Refinery & Petrochemical Sector Restructuring - Romania

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### 7.1 SUMMARY

The overall objectives of the two-phase Refinery and Petrochemical Sector Restructuring were to assist the Government of Romania in developing a strategy for strengthening and restructuring the refining and petrochemical sector with an aim at making the sector more economically and financially viable and to establish a framework for attracting private investment into the sector.

Currently, the sector is comprised of 11 refineries and 9 associated companies dealing in services and retail. Most of the associated companies are monopolies. Both the associated companies and the refineries have been coordinated by RAFIROM, the state owned trading company responsible for the oil refining and petrochemical industries, since May 1993. In the last year considerable progress was made toward reducing the substantial overcapacity in refining, but further steps are necessary. RAFIROM has prepared a strategy document with the assistance of the 20 companies in the sector, which envisages rationalization of capacity and substantial investment in the sector. USAID and The World Bank wish to assist the Romanian government in its goals and appointed a team from Bechtel and Chem Systems to make preliminary assessments of the measures required to restructure the sector.

The primary activity for the first phase was a two week fact finding mission to Romania. The terms of reference for this phase initially were to review the internationally developed feasibility and restructuring strategy prepared for the five largest refineries. The team was then to review and evaluate RAFIROM's Refinery Sector Restructuring Strategy from the point of view of meeting product demand over a period of at least ten years. This was followed by an update to the petroleum product demand forecast for the USAID financed Regional Refinery Study (see Section 6) using current detailed data from the Ministry of Industry and RAFIROM, and to develop potential economic options for satisfying the demand.

The team proposed an optimum sector development scenario identifying refineries that are likely to become or remain competitive in the medium-term. Since Chem Systems had already made a separate, comprehensive, strategy study for the petrochemicals sector, the current study was intended to compliment and be consistent with the existing study. Only petrochemical activities associated with refineries were considered.

The objective of the second Phase would be to implement the action plan for sector development and restructuring as identified in the first phase.

### 7.2 METHODOLOGY

The study team was comprised of Peter Danforth (Bechtel) and Terry Baker (Chem Systems). After a review of relevant prior studies, the team visited Romania from March 13 through March 29, 1994. During this period, visits were made to the major refineries, the oil terminal and to all the service companies involved in the sector. Meetings were also held with representatives of USAID, the World Bank, RENEL, and the US Embassy. At the end of the visit, a presentation was made to representatives of the companies to report the initial findings and the status of the mission.

After the visit to Romania, the team stopped in London, UK to coordinate their efforts with the petrochemicals sector study and to prepare the draft report.

### 7.3 ACCOMPLISHMENTS

Since the budget resources for this project were limited, the draft report resulting from the March visit was to provide only the framework for discussion and for actions to be undertaken early in Phase II of the project. The key findings of the Phase I report were first that the timing and priority of investments must be matched to market needs.

### 7.4 RECOMMENDATIONS FOR FURTHER WORK

An analysis is required to determine which refineries are uncompetitive and should be shut down. A first impression is that Petromedia should be kept for potential export (even if export amounts are minimal), with Arpechim for petrochemicals, Petrotel for lubricants and either Rafo or Petrobrazi would have to be surplused. Rafo has the better location but Petrobrazi is newer and larger.

Forecasting the Romanian market is presently difficult since the economy is in the throes of an enormous transition. A credible estimate is that the market for refined products within Romania will rise at 3 to 5 percent per annum requiring an installed capacity of 16 to 20 million tons in the year 2000. If an additional 2.5 to 3.0 million tons per year of white products can be economically exported for the Petromedia refinery at Constanta, the total required capacity would increase to between 19 and 23 million tons per year. A detailed market survey should be made to support these findings in view of the structural changes occurring in the industry.

The Phase II program should implement the restructuring and development plan as identified in Phase I. A number of basic activities are required to transition from a system of horizontally structured monopolies to a market-driven industry that has a competitive pricing mechanism in the petroleum products sector. In the short run, capital is required to allow revamping and modernization of the refining and transportation sector to improve energy efficiency and product quality requirements and to meet all environmental standards, while rationalizing the excess capacity. The following list of activities should be performed in Phase II:

- Review Romanian general business laws for provisions that might affect foreign business activities and be inimical to possible investors;
- Review Romanian tax provisions for compatibility with the tax provisions in the U.S. and European for assurance of compatible tax treatment and tax credit availability.
- Determine the fair market value of domestic crudes based on quality, gravity and sulfur content, as compared to similar internationally traded crudes.
- Perform a detailed linear programming simulation to optimize each refinery, large and small, using actual cost of imported crude (or fair market value of domestic crude), including transportation, and allowing real market prices to determine the economic ranking of each refinery on a common basis.
- Conduct a benchmarking study to compare the profitability of all the Romanian refineries with each other and external reference refineries.

- Conduct a detailed product marketing study to establish the Romanian demand and value for each significant refined product (including naphtha) for the next decade.
- Estimate the cost of each of RAFIROM's proposed modernization projects and perform a feasibility study to allow a ranking of projects and determine which projects should be performed first.
- Develop strategies for rationalizing the refining sector in Romania to minimize excess capacity and improve the economic performance potential of each refinery, thus encouraging investment in the sector by international companies.
- Provide training programs for RAFIROM and refinery staff in market pricing concepts, project economics, refinery optimization, financing, accounting and planning.
- Develop financing alternatives to fund the capital program required to modernize the most economic refineries and decommission the less efficient refineries to rationalize the refining capacity, quality and quantity with market demand.
- Perform an analysis of the organizational structures and functions of each entity involved in the sector and recommend restructuring the entities to best achieve the objectives of each entity and the sector as a whole.
- Recommend pricing strategies to improve the viability of the sector including import and export tariffs, pipeline and rail transport tariffs, domestic crude oil and natural gas prices, and discuss the regulatory process and methods of tariff setting required of the natural monopolies in the sector.

## Section 8

# NAMR Technical Support/Training - Romania

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### 8.1 SUMMARY

Three officials NAMR came on a tour to the United States and Canada to study regulatory procedures and institutions. Given the broad mandate of NAMR, this tour included a variety of Western regulatory institutions. The officials were also given an opportunity to solicit comments and ideas from U.S. companies subject to this type of regulation. The three week tour was arranged by Peter Danforth, Project Director, Bechtel Corporation with the meetings arranged by H.A. Merklein & Associates. The group was briefed in Washington, D.C. by Bechtel, Arthur Anderson & Co. and Merklein & Associates. The group was accompanied on its tour by Helmut Merklein.

### 8.2 METHODOLOGY

The three key members of NAMR were brought to the U.S. in April 1994. A kick-off meeting was held at the Bechtel Washington office. In attendance were the following:

<b>Bechtel</b>	<b>USAID</b>
Peter Danforth	Robert F. Ichord, Jr.
<b>Arthur Anderson</b>	<b>NAMR</b>
Richard Wasteneys	Doru Badulescu
David Moore	Nicolae Turdean
	Mihai German
<b>Merklein &amp; Associates</b>	<b>World Bank</b>
Helmut Merklein	Mohsen Shirazi
	Seyoum Solomon
	Akin Oduolowu

The Romanian visitors attended meetings in Washington, DC with the Energy Information Administration, the Federal Energy Regulatory Commission, the Public Service Commission, the Washington Gas Company, and the U.S. Department of the Interior - Minerals and Management Service and Geological Service. The group then traveled to Austin and Houston, Texas to meet with the Texas Railroad Commission, the Texas General Land Office, the Bureau of Economic Geology at the University of Texas, the Southern Union Gas Company, Coastal Corporation, the Western Geophysical Corporation, Amoco Production Company and Bechtel Energy Resources Corporation. From Houston, the group traveled to Calgary, Alberta, Canada and met with the Energy Resources Conservation Board and the National Energy Board. They returned to Washington, DC prior to their departure for Romania, to finish their wrap up report which included a list of general conclusions garnered from their three weeks of meetings.

### 8.3 ACCOMPLISHMENTS

The exploratory trip of the NAMR Team in the United States and permitted the establishment of contacts with various Governmental institutions responsible for the regulation of oil and gas activities. The focus of the trip was on oil and gas operations. With regard to solid mineral resources, the session on coal

mining was limited to surface operations. Two areas falling within NAMR's responsibility that were not covered were underground water and construction materials.

The exchange of opinions and the generous assistance provided by the various regulatory bodies visited, made a very substantial contribution to the ability of NAMR to optimally structure themselves and to develop viable regulations in the Romanian oil sector.

#### **8.4 RECOMMENDATIONS FOR FURTHER WORK**

*Additional support is recommended on matters such as pipeline transportation rates and tariffs structure, energy sector regulations and updating the national energy sector database. This can best be accomplished by providing on-site advisors to provide the following assistance:*

- Further definition of oil, gas and products pipeline transportation rates and tariffs structure and policy, and their implementation and computerization
- Further definition of previously developed energy sector regulations, adaptation of these regulations to Romanian conditions and applications, and developing additional regulatory policies, where needed
- Upgrading the existing exploration and producing database to a new database and computer operating system, and provide training in their operation and maintenance. Appropriate computer hardware and software should be provided for the new upgraded database

## Appendix A

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**Table 2 Reports Issued Under the Contract**

<b>Report Title</b>	<b>Date Issued</b>	<b>Co-Author(s)</b>
1. Sloznaft Deep Conversion Study	9/92	Bechtel
2. Petroleum Sector Restructuring Strategy for Romania	10/92	Arthur Andersen
3. USAID - Bulgaria - Committee For Geology And Mineral Resources - Technical Assistance In Respect Of A Legal, Contractual And Strategic Plan To Attract Increased And Productive Foreign Investment In The Upstream Petroleum Sector	10/93	Gaffney, Cline & Associates
4. Central And Eastern Europe Regional Refinery and Transportation System Study - Phase I - Interim Report.	Fall 1993	Chem Systems
5. Central And Eastern Europe Regional Refinery and Transportation System Study - Phase 1 - Final Report	7/94	Chem Systems
6. Romanian Refinery and Petrochemical Sector Restructuring Project	4/94	Chem Systems
7. National Agency For Mineral Resources (NAMR) - Exploratory Trip Of Romanian Officials	4/94	Merklein & Associates