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# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

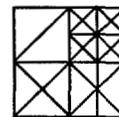
FINAL REPORT - APRIL 1994

Prepared under Contract EUR-0030-C-00-2029-00  
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT  
Bureau for Europe - Energy and Infrastructure Division  
Eastern Europe Energy Efficiency Project - Oil and Gas Systems

In cooperation with: THE WORLD BANK,  
MINISTRY OF INDUSTRY, and  
RAFIROM, SA.

**DRAFT**

USAID



CHEM SYSTEMS

**ROMANIA REFINERY AND PETROCHEMICAL  
SECTOR RESTRUCTURING PROJECT**

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# **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

## **INTRODUCTION AND OBJECTIVE OF STUDY**

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### **BACKGROUND**

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The Government of Romania wishes to restructure its oil refining sector as part of its move towards a market economy. The sector is comprised of 11 refineries and 9 associated companies in services and retail, most of which are monopolies. All have been coordinated by Rafirom since May 1993. In the last year considerable progress has been 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 that 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 have appointed a team from Bechtel and Chem Systems to make preliminary assessments of the measures required to restructure the sector.

Bechtel and Chem Systems are jointly engaged in a Strategy study for the entire Central and Eastern European Region and also are separately undertaking related assignments in Romania on the Oil Upstream Sector, the Electricity Sector, and the Petrochemicals Sector. They are, therefore, well prepared for the current assignment.

The overall objectives of the two-phase Refinery and Petrochemical Sector Restructuring Project for Romania are 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
- Establish a framework for attracting private investment into the sector

The primary activity for Phase One was a two-week fact finding mission to Romania. This report presents the findings of that mission. The terms of reference for the first phase of this study are as follows:

- Review the internationally developed feasibility and restructuring strategy studies prepared for the five largest refineries
- Review and evaluate Rafirom's Refinery Sector Restructuring Strategy from a point of view of meeting the demand over a period of at least ten years

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- Update the petroleum product demand forecast for the USAID-financed Regional Refinery Study using current detailed data from the Ministry of Industry and Rafirom and develop potential economic options for satisfying the demand
- Propose an optimum sector development scenario identifying refineries that are likely to become or remain competitive and that are unlikely to be competitive in the medium-term.

Chem Systems has made a separate, comprehensive, strategy study for the petrochemicals sector. The current study is intended to compliment it and to be consistent with it. Only petrochemical activities associated with refineries are considered.

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

### **METHODOLOGY AND TEAM**

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The team is comprised of Peter Danforth, Project Director, USAID Eastern Europe Regional Energy Efficiency Project, Oil and Gas Systems for Bechtel Corporation; and Terry Baker, Principal, Chem Systems Limited, a subsidiary of the Chem Systems Group. After initial organization and review of relevant prior studies, the team visited Romania from 13 March until 29 March 1994. During this period, visits were made to the major refineries and the oil terminal and to all the service companies involved in the sector, as listed in Table 1. Meetings were also held with representatives of USAID, World Bank, Renel, and the U.S. Embassy. All of the meetings were open and frank. All of the team's visits were organized by Rafirom, and the team wishes to extend its thanks to the staff of Rafirom and of all the companies for their openness and hospitality. 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 to coordinate with the petrochemicals sector study and wrote the draft report. It should be stressed that the first phase analysis is necessarily superficial, since only limited budget was available for a very complex task. However, it is hoped that this report will provide the framework for discussion and action early in Phase Two.

## ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

Table 1  
COMPANIES INTERVIEWED DURING MARCH 13 - 29, 1994

Company/Organization	Person	Title
Ministry of Industries	Mihail Paraschiv	Secretary of State, Chief of Chemical & Petrochemical Dept.
Rafrom S.A.	Ion Ocneanu	Managing Director
Rafrom S.A.	Emil Calota	Vice President
Rafrom S.A.	Emil Popescu	Director, International Cooperation Division
Rafrom S.A.	Marinescu Dumitru	Director, Finance, Economics
Rafrom S.A.	Matei Luchian	Diplomat Engineer, Research and Development Division
Rafrom S.A.	Constantin Stanescu	Diplomat Engineer, Research and Development Division
Rafrom S.A.	Liviu-Dan Ioan	Diplomat Engineer, International Cooperation Division
Rafrom S.A.	Dan Costineanu	Diplomat Engineer, International Cooperation Division
Petrobrazi S.A.	Gheorghe Braniste	Chairman of the Board
Petrobrazi S.A.	Dumitru Ferecus	Development and Technical Manager
Petrobrazi S.A.	Adriana Nitoiu	Revamp. Department
Petrobrazi S.A.	Adrian Boeru	Manager, Public Relations Department
Petrotrans Ploiesti S.A.	Sorin Vijoli	Diplomat Engineer, General Manager
Petrotrans Ploiesti S.A.	Gilca Ion	Engineer, Director of Technology
S.C. Petrotel S.A.	Florin Bazavan	Director, Finance & Accounting Dept.
S.C. Petrotel S.A.	Emilian Moiceanu	Technical Director Refinery
S.C. Petrotel S.A.	Eugen Iavolschi	Technical Director, Petrochemistry
S.C. Petrotel S.A.	P. Jalba	Diplomat Engineer, Process Engineer
Aprechim S.A.	Mihail Georgescu	General Manager
Aprechim S.A.	Ion Mincu	Director of Management
Aprechim S.A.	Ion Cojocar	Research & Development Director
Aprechim S.A.	Ilie Chiliment	Technical Director
Aprechim S.A.	Gheorghe Matei	Technical Production Director
Aprechim S.A.	Gheorghe Stanciu	Technical Director - Refinery
Rafo S.A.	Vasile Tudorica	General Manager
Rafo S.A.	Gheorghe Grigorescu	Technical Manager
Rafo S.A.	Aristide Ionita	Technical Manager for Mechanical Engineering and
Rafo S.A.	Vasile Grigore	Maintenance Department Manager
Petromidia S.A.	Alexandru Nicolciuiu	General Manager
Petromidia S.A.	Vasile Poreisteanu	Deputy General Manager
Petromidia S.A.	Liviu Grigore	Head of Technical Department
Petromidia S.A.	Victor Laiber	Manager, Systems & Information Technology
Oil Terminal S.A.	Popa Ion	Development and Equipment Manager
Oil Terminal S.A.	Oancea Zina	Economic Manager
IPIP S.A.	Victor Dragomirescu	General Director
IPIP S.A.	Ioan R. Zgaia	Technical Director
IPIP S.A.	Petru Valter	Senior Process Engineer
IPIP S.A.	Corvelue Moisiuc	Economic Studies Department
Conpet S.A.	Traian Neacsu	Marketing Consultant
Conpet S.A.	Viorel Gurgu	P.M. Assistant
RENEL	Gabriel Popescu	Director of Strategy & Economic Development
RENEL	Hotopeleanu Stefan	Head of Strategy and Development Office
RENEL	Radu Zainea	Sr. Engineer, Dept. for Int'l Coordination
Petrolexportimport S.A.	Valeriu Iancu	Deputy General Manager
Petrolexportimport S.A.	Virgil Ardeleanu	Deputy General Manager
NAMR	Doru L. Badulescu	President, Secretary of State
NAMR	Nicolae Turdean	General Manager
NAMR	Mihai Silviu German	Manager

# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

## SUMMARY AND CONCLUSIONS

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### KEY FINDINGS AND OBSERVATIONS

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The main findings of the mission are:

- The restructuring strategy as proposed by Rafirom is directionally correct, but the timing and priority of investments must be matched to market needs
- Forecasting the Romanian market is difficult at present because 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 from the Petromidia refinery at Constanta, then 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 Rafirom strategy proposes 25 million tons per year refining capacity in five large and two small refineries by the year 1998; however, if exports are only used to balance refining capacity with domestic demand, a maximum of 20 million tons of capacity is required; if, on the other hand, marginal product export is economically based on Black Sea product prices from Petromidia, then Romania could support up to 23 million tons of capacity in the year 2000
- Based on logistics, the Petromidia refinery is the best refinery in Romania for producing export products intended for the Black Sea or Mediterranean markets; if Romania's refineries only support domestic demand with minimal export, one refinery should be shut down; this decision would be a difficult choice as all five refineries are similar in design and capability; location in relation to the domestic market could be the deciding factor

An analysis of which refinery should be shut down would need to be done. Our quick impression is that Petromidia should be kept for potential export even if it is a minimal amount; Arpechim for petrochemicals, Petrotel for lubricants, and either Rafo or Petrobrazi would have to be surplusd. Rafo has the better location but Petrobrazi is newer and larger.

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The Rafirom strategy regarding the five smaller refineries seems correct. Two will continue processing domestic crudes for specialty products; Astra, S.A. for naphthenic-based crudes to produce lube oil and greases, and Petrolsub, S.A. for processing the very heavy oil produced by underground combustion of crude to make road bitumen and fuel oils.

Rafirom plans that the three other small refineries will operate as remote units within the structure of the larger refineries.

### **PHASE TWO WORK PLAN**

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The Phase Two program should implement the restructuring and development plan as identified in Phase One. 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 will need to be performed in Phase Two:

- 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 tax provisions with U.S. and European laws 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
- Undertake a benchmarking study to compare the profitability of all the Romanian refineries with each other and external reference refineries
- Perform a detailed product marketing study to establish the Romanian demand and value for each significant refined product (including naphtha) for the next decade

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- 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 sectors 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

# **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

## **PETROLEUM PROCESSING AND TRANSPORTATION OVERVIEW**

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### **HISTORICAL BACKGROUND**

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The development of the refining and petrochemical industries in Romania has passed through a number of stages, and it is important to understand them to see the present situation in context.

For 80 years Romania was an exporter of crude oil, refined products, and petrochemicals. In the late 1960s and early 1970s production was declining, and a plan was conceived to build refineries to process imported crude oil, although Romania had no competitive advantage to do so, other than expertise. Five new refineries were ordered, four at existing sites and one on the coast. They were designed to run on high sulphur heavy crudes from Iran and Iraq, for a variety of political reasons, and to preserve independence from the USSR.

In the 1980s, Ceausescu decided that Romania should pay off its foreign debt of about 10 billion dollars, and for the next three years, from 1987 on, virtually no foreign exchange was available to the plants. As a consequence, they could not buy essential spare parts and catalysts and by 1990 were in a dilapidated state.

After the revolution in December 1989, each company was declared independent. However, the refiners had no working capital and could not afford to buy enough crude oil. Any foreign exchange generated was used to repair the plants and replace catalysts. As specialized organizations, the refiners had no commercial expertise and did not always make good deals. Most other Romanian companies were in a similar financial state, exacerbated by the collapse of markets in the Soviet Union, Yugoslavia and the other CMEA states. Debt between suppliers and customers increasingly mounted ultimately reaching unacceptable levels.

In May 1993, the government of Romania decided to impose greater financial discipline into the sector by controlling imports and exports, and hence tolling arrangements that had been established by individual refineries were discontinued for economic reasons. A degree of re-centralization has occurred, but as an essential step in stabilizing the sector.

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### PRESENT STRUCTURE OF THE SECTOR

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The refining sector is the responsibility of the Ministry of Industry, under the Secretary of State for Refining and Petrochemicals. **Petrom** and its offshore subsidiary **Petromar** produce domestic crudes; they are not considered part of the refining sector. Individual companies are owned 70 percent by the State Ownership Fund (SOF) and 30 percent by one of the five regional Public Ownership Funds (POF). The principal companies relevant to the sector are:

- **Rafirom** co-ordinates the sector and allocates crude oil
- **Conpet** transports all crudes within Romania
- **Petrolexportimport** purchases foreign crudes and sells export products
- **Oil Terminal Ltd.** receives imports and offshore crudes and stores export liquid products
- **Petrobrazi, Petrotel, Rafo, Arpechim, and Petromidia**, are the five large refineries that process domestic and imported crude oil
- **Astra, Vega, Steaua Romana, Darmanesti and Petrobsub** are the five smaller refineries that process domestic crudes
- **Lubrifer** does not refine crude, but produces lubes from materials supplied by other refineries
- **Petrotrans** transports products within Romania
- **Peco** retails gasoline, diesel fuel, heating oil and LPG; it has a subsidiary Transpeco, which distributes its products by road
- **Renel**, the electricity utility is a major customer of heavy fuel oil, but is not part of the refining sector

The activities of these companies are discussed further below.

**Rafirom, S. A.** is the holding company for the refining and petrochemicals industries in Romania. Rafirom controls the refining sector by allocating the crude to each refinery, based on quality and efficiency criteria. Rafirom purchases the crude either from Petrom, R. A., the domestic oil exploration and production company, or from Petrolexportimport, S. A., the petroleum

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export and import trading company. The crude is allocated to each refinery at an average price regardless of source, value, or cost of transportation. Each refinery is also subject to price controls at the refinery gate, independent of the product destination or transportation cost. Prices are established by negotiation between Rafirom, the Ministry of Industry (MoI) and the Ministry of Finance (MoF).

**Conpet, S. A.** is the owner and operator of all crude oil pipelines in Romania and transports the crude from the domestic producing regions or the oil terminal at Constanta to the refineries. Conpet has two pipeline systems; one for the domestic onshore production, and the other for imported or offshore production (Petromar) crude from the oil terminal at Constanta. It also operates several small NGL and LPG lines from producing fields. Some crude is transported by rail from remote domestic fields. Conpet is a natural monopoly with transportation rates established with the MoF. Conpet charges Rafirom the same rate for crude transportation (Lei/Ton) regardless of distance or mode of transport (pipeline or rail) although the rail transportation costs exceed their tariffs. A rational, distance-based pipeline tariff structure should be established and common carrier rules devised.

**Petrolexportimport (PEI)** is doing a good job in trading crude for refined products and managing external currency balances. However, there is no reason why this should be a monopoly, or why it should be narrowly focused. We suggest that competition be encouraged, and the former foreign trade organizations (FTO) in products in which Romania has a foreign trade surplus should be able to use revenue to buy crude oil. Expertise in trading must be fostered. Rafirom needs to have its own purchasing and sales experts.

Petrolexportimport is requiring international oil traders to take some portion of white products produced as a swap for crude using letter of credit (LC) financing on both purchase and sale contracts. This mechanism has increased the availability of imported crude, which was constrained by lack of hard currency in prior years.

The caution of PEI in taking positions and in covering risk is to be commended. The costs involved appear to be low. We suggest that the activities of PEI be reviewed to establish whether it is economically viable as a free standing enterprise. It should be privatized to its employees as soon as adequate competition exists.

**Oil Terminal Ltd.** at Constanta is a separate company with the responsibility for receiving crude and storing it in the crude tank farm at the terminal. They also receive petroleum products intended for export, perform some finished product blending (lead addition), and load export ships. The crude storage capacity at Constanta is 500,000 metric tons (T)

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in 10, 30 and 50 thousand ton tanks. The oil terminal can handle seven ships simultaneously with the largest being a 150,000 deadweight ton (DWT) crude tanker. Quantity of oil transferred is measured by tank depth before and after loading. Oil Terminals Limited charges a fixed fee per ton of crude stored or transferred regardless of length of time stored in their tanks. Petroleum products are also charged a fixed rate per ton for the first 15 days, then an additional daily rate is charged until the product is loaded out. Oil Terminals Limited could be privatized by a trade sale to one of the five major world terminaling companies. It has a monopoly position and it is suggested that the activities of the company be reviewed and regulated to establish whether it is economically viable as a freestanding enterprise.

**Romanian Refineries:** There are 10 crude processing refineries in Romania, plus Lubrifin, S.A., that manufacture auto and industrial lube oils and consistent greases from feedstocks made in other refineries. The five largest refineries are all of similar size and complexity and represent 85 percent of the crude processing capacity in Romania. The five smallest refineries all process local domestic crude and produce low-volume specialty products. One refinery, Petrolsub, S.A., processes only a very heavy oil extracted by in-situ combustion of crude in the northwestern part of Romania. Only gas oil, heating oil, and road bitumen are produced at this refinery. This crude is too heavy to economically transport to other refineries in Romania and the production of crude would probably be uneconomic without a dedicated refinery.

Since all refinery gate product prices are established by Rafirom, with approval of MoF, no competition exists between refineries for market share. Some products are sold directly from the refinery to large or local customers, Renel or the railroad, while most other products are sold and transported using Petrotrans' petroleum products pipeline or by rail.

In either case, **Petrotrans**, S.A. has the responsibility of transporting finished products to Peco, other large customers, or the oil terminal for export. The tariff for petroleum product transportation by pipeline is one-half the rate charged by the railroad for the same transportation, regardless of the distance transported. Petrotrans has 2500 km of product pipeline in service covering about 30 percent of Romania and handling about 25 percent of the product demand.

**Peco** is the main retailer of oil products, but there is now competition in this sector. Peco markets retail petroleum products, gasoline (3 grades), diesel, gas oil, and LPG in Romania through 41 product terminals and 450 retail stations. Its market represents about 30 percent of the volume of processed crude in Romania. About 200 private retail gasoline stations exist; however, Peco still has a dominant role in distribution and

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terminaling. The private stations buy directly from the refinery or import. Peco's retail prices are the same throughout the country and are set by the MoF. Private retailers may charge more or less than Peco, but most are within 1 or 2 lei of the official price of 400 lei per liter for gasoline.

**Transpeco, S.A.** truck transports petroleum products, including LPG, as a subsidiary of Peco. Peco will need to be privatized, with some breakup of its terminals and retail chain. Some of its stations could be allocated to each refinery. Alternatively, everything could be auctioned. The possibility of regional monopolies could still exist.

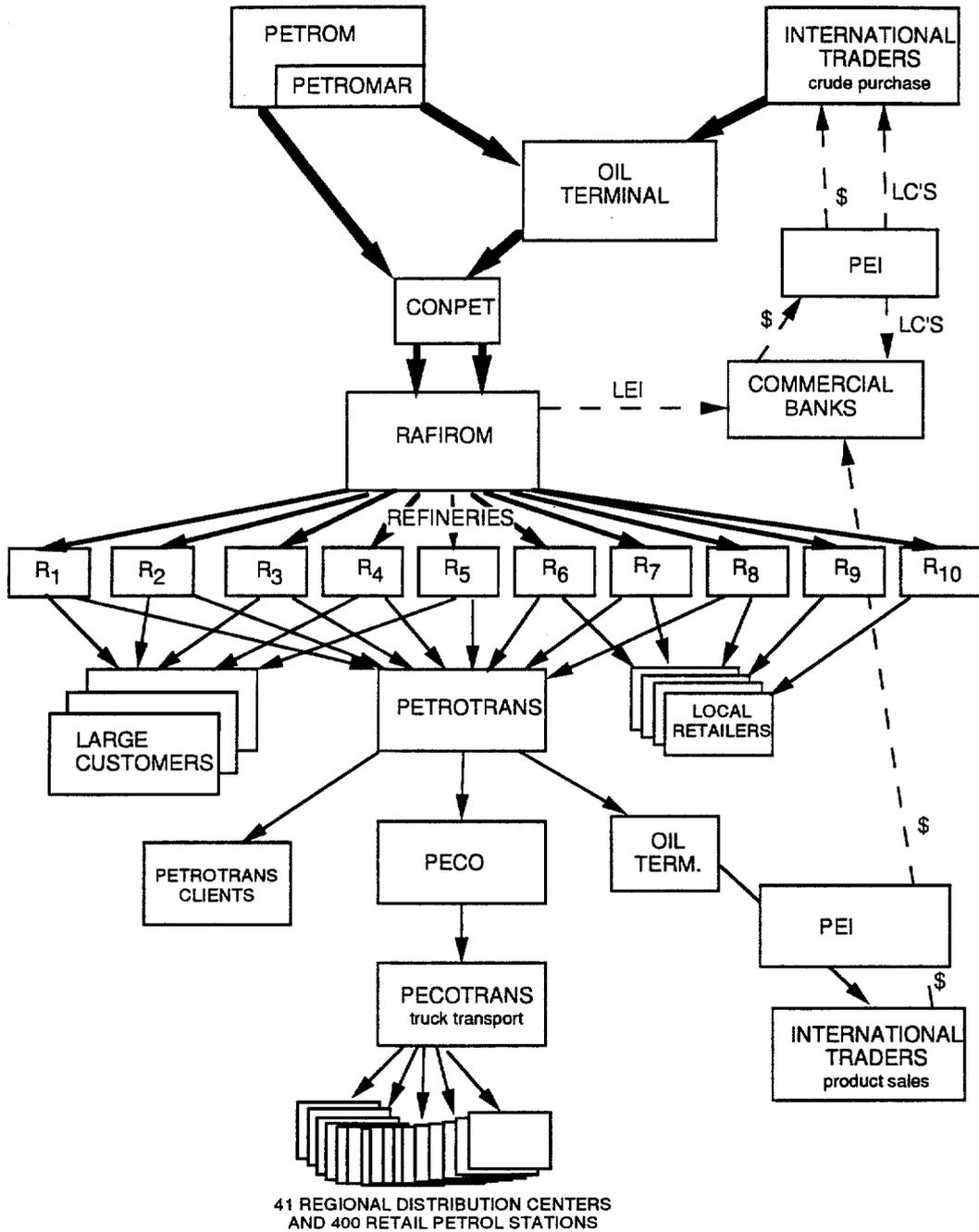
The activities of **Petrom** and **Petromar** are outside the scope of this report, but prices charged for crudes do not accurately represent their value at the refinery gate. Market prices will, however, have to be used to evaluate the real viability of the refineries.

Figure 1 illustrates the present relationship of the organizations in the downstream petroleum sector in Romania.

# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

Figure 1

**ROMANIAN REFINING SECTOR  
RELATIONSHIP DIAGRAM**



**DOWNSTREAM OIL AND PRODUCTS BUSINESS IN ROMANIA**

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# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

## REVIEW OF FEASIBILITY AND RESTRUCTURING STUDIES

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A number of studies have already been made by consultants on the major refineries in the sector. They have been reviewed in Rafirom's office by the study team. (Rafirom has also prepared a strategy study with substantial inputs from the Romanian companies in the sector. That is reviewed in detail in the Review of Rafirom's Refinery Restructuring Strategy section.) It should be appreciated that none of the external studies reviewed are specifically strategic in nature, most have been prepared on perhaps limited budgets for third parties, and none have comparative economics or broad strategic outlooks. The technical analyses focused on the current condition of equipment (at the time of the study the condition was very poor, but is now better). Brief comments on the external studies are given below.

1. *Evaluation of the Midia Refining and Petrochemical Complex, by Muse, Stancil, dated May 1991.*

This brief study was a valuation of the Midia complex based upon: (1) the replacement cost of depreciated assets and (2) the discounted value of estimated future cash flow (NPV). The replacement cost was estimated at \$1.5 billion, depreciated to \$1.1 billion (in 1991 dollars). The NPV was found to be negative for both refining and petrochemicals. The technical review was rather superficial, and lack of familiarity with petrochemicals was evident. Prices were mostly based on U.S. and northwest European markets. Processing costs were estimated as \$12/ton, and a working capital requirement of \$120 million was calculated for refining plus petrochemicals.

2. *Valuation of Petrotel by Coopers & Lybrand with Foster Wheeler, dated March 1992.*

A two-volume analysis of Petrotel's operations in 1991, with valuations based on book value, replacement cost, and NPV with three levels of capital expenditure. Both streams were operating at reduced capacity, and poor financial performance was found with a severe liquidity crisis.

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The depreciated replacement cost of the complex was put at \$871 million, with a gross replacement cost of \$2,000 million, to a 25 percent accuracy. The NPV was:

	<u>NPV at 28% Discount Rate</u>	<u>NPV at 25% Discount Rate</u>
With No Expenditure	Nil	Nil
With Minimal Expenditure	134	158
With Major (\$215 million) Expenditure	131	172

3. *Information Memorandum on Petromidia, by Touche Ross Deloitte, dated February 1993.*

A very general document, with little technical, commercial, or economic analysis. The value of the complex was not estimated, since the purpose of the document was to attract investors, but investment requirements were given as \$118-135 million in Phase One and \$15 - \$335 in Phase Two.

4. *Rafo Valuation Study, by Coopers & Lybrand with Foster Wheeler, dated January 1994.*

A three-volume report containing a detailed condition analysis of the Rafo refineries and valuations based upon domestic sales, partial exports, and full exports. Only full export is found to be profitable. It is suggested that the target markets should be Slovakia and Hungary, as these are importers, but this is an erroneous assumption, as Slovakia has a considerable surplus while Hungary is balanced. Furthermore, both countries have cheaper crude by pipeline from Russia than Rafo, and the location of Rafo is not favorable for export.

In 1993 the company had a gross margin of \$8.34/ton. In 1998, with the export of all products except high sulfur fuel oil to Central Europe at a premium of \$35/ton, a profit of \$56.3 million is forecast. Until that time, the cash flow is forecast to be negative. The study does not take into account that the premium for central Europe, which is higher than freight costs would suggest, is in fact due to temporary limitations in storage and handling following the integration of Germany, and will diminish with time. Furthermore, pricing has been based upon simplistic assumptions that a constant ratio of product prices to crude oil price will continue into the future.

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### **5. *Arpechim, by Chem Systems, October 1992.***

The analysis of Arpechim's refining and petrochemicals activities was undertaken for the joint venture between Coastal and Arpechim in 1992. It analyzed refineries and petrochemical operations and proposed steps to improve short-term profitability, many of which have now been implemented. It found that the high costs of transportation for feedstocks and product made profitability marginal, and it looked at alternative transport options. It also identified high reported material losses in the system from harbor-to-harbor as avoidable financial losses.

### **6. *Arpechim Refinery Review for Chevron, International, by KBC, April 1991.***

KBC performed a one-week site inspection of the Arpechim refinery at Pitesti, Romania, to investigate the possibility of third-party processing opportunities for Chevron. This report was based on a very short visit and is three years old. Most of the findings have either been implemented or further discussed in more recent studies.

### **7. *Pitesti Plant Evaluation for Marc Rich, Inc., by Wright Killin & Company, February 1991.***

Wright Killin & Company performed a Pitesti Refinery plant evaluation for Marc Rich and the refinery in February 1991 to determine the market value of the two-train plant. This information is now quite dated. However, their findings estimated the depreciated replacement cost of the two trains as follows: Train #1 - \$950 million, Train #2 - \$929 million. On a net present value basis using a discounted cash flow approach, the two plants had a negative value as is and a breakeven value after improvements and modernization.

## **UPDATE OF PRODUCT DEMAND FOR ROMANIA**

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### **REFINED PRODUCT DEMAND IN ROMANIA**

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The strategy study prepared by Rafirom has only a cursory forecast of the markets for petroleum products in Romania, and even the historic data is incomplete. We recommend that a full market analysis be made as a basis for projecting the required product slate for major products and of assessing the long-term viability of local manufacture of more specialized products. Furthermore, export prospects need to be rationally assessed. It is difficult to generalize about the effects of radical restructuring of the economy by analogy with countries in other regions. For instance, automobile ownership has been increasing rapidly while GDP has been falling. Only a detailed examination can reveal the mechanisms at work in this unusual situation.

In the absence of such a market analysis, a preliminary assessment of future requirements has been prepared, updating earlier Chem Systems forecasts and Rafirom's estimates. It is presented below with the proviso that it is for indicative purposes, and is not of a quality to use for decision making.

#### **1993 Production of Refined Products**

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Data for 1993 has been provided by Rafirom by refinery and by type of processing; domestic crude, imported crude, and toll processing. In May 1993 all toll processing was stopped by Rafirom/Mol when it was realized that it was uneconomic. Only about eight percent of the total crude processed in 1993 was by a toll processing agreement. About 50 percent of the crude processed was domestic and 50 percent imported. The data provided and the analysis of the results is shown in Table 2. As can be seen from the data, Petrobrazi and the five smaller refineries were almost entirely run on domestic crudes. Arpechim and Petromidia were 100 percent run on imported crudes. Only Petrotel and Rafo ran a significant mixture of domestic and imported crudes (50%/50% for Petrotel and 20%/80% for Rafo).

Table 2  
1993 ACTUAL PETROLEUM PROCESSING IN ROMANIAN REFINERIES  
IN THOUSAND METRIC TONS PER YEAR

EXCHANGE RATE= 1200 LEI/US\$

DOMESTIC CRUDE	PETROBRAZI	PETROTEL	RAFO	ARPECHIM	PETROMIDIA	ASTRA	VEGA	STEAUA	DARMANESTI	PETROLSUB	TOTAL ALL REFINERIES	REFINERY GATE PRICE OR (COST)	PRODUCT YIELD AS A % OF CRUDE
CRUDE RUN	2976.2	1130.8	456.7			577.6	308.8	245.4	395.3	420.0	6510.8	-122,000	
LPG	67.2	10.0	0.0			0.0	0.0	0.0	0.0	0.0	77.2	130,000	1.19%
GASOLINE	676.9	216.4	83.4			7.0	14.0	33.2	96.1	0.0	1127.0	313,746	17.31%
KERO	159.3	0.0	19.0			11.1	31.4	20.9	68.0	45.7	355.4	236,110	5.46%
DIESEL OIL	689.2	314.6	120.4			172.4	115.2	91.3	106.6	40.0	1649.7	229,161	25.34%
HEAVY FUEL OIL	881.6	379.1	141.9			88.1	77.7	45.9	55.1	177.5	1846.9	102,780	28.37%
AROMATICS	48.1	0.0	4.2			0.0	0.0	0.0	0.0	0.0	52.3	367,180	0.80%
NAPHTHA	0.0	0.0	0.0			57.6	0.0	0.0	0.0	0.0	57.6	264,745	0.88%
BITUMIN	0.0	42.5	0.0			63.8	43.6	13.0	0.0	149.2	312.1	121,724	4.79%
LUBE OIL	0.0	44.0	0.0			153.1	7.4	20.7	0.0	3.1	228.3	381,058	3.51%
COKE	80.6	9.4	19.5			0.0	0.0	0.0	35.9	0.0	145.4	288,000	2.23%
PARAFIN	0.0	0.0	0.0			0.0	0.0	5.0	0.0	0.0	5.0	622,728	0.08%
ALL OTHER PRODUCTS	16.8	6.9	1.5			2.4	1.1	7.2	0.0	0.6	36.5	150,000	0.56%
TOTAL PRODUCTS	2619.7	1016.0	388.4	0.0	0.0	555.5	290.4	237.2	361.7	416.1	5893.4		90.52%
GROSS MARGIN, \$/T	\$52.52	\$50.10	\$44.69			\$93.24	\$45.36	\$83.93	\$80.97	\$12.68	\$55.16		
MASS BALANCE, %	88.02%	89.85%	85.04%			96.17%	94.04%	96.66%	91.50%	99.07%	90.52%		

IMPORTED CRUDE:	PETROBRAZI	PETROTEL	RAFO	ARPECHIM	PETROMIDIA	ASTRA	VEGA	STEAUA	DARMANESTI	PETROLSUB	TOTAL ALL REFINERIES	REFINERY GATE PRICE	PRODUCT YIELD AS A % OF CRUDE
CRUDE RUN	122.0	1073.5	1681.2	1617.8	1062.7						5557.2	-122,000	
LPG	2.1	26.6	22.1	21.1	23.2						95.1	130,000	1.71%
GASOLINE	28.6	310.0	416.9	423.8	306.7						1486	313,746	26.74%
KERO/JET	0.0	0.0	6.4	0.0	20.3						26.7	275,200	0.48%
DIESEL OIL	33.7	290.3	529.4	468.3	342.5						1664.2	229,161	29.95%
HEAVY FUEL OIL	42.7	333.4	504.4	544.9	176.9						1602.3	74,800	28.83%
AROMATICS	2.4	0.0	4.4	0.0	0.0							367,180	0.00%
COKE	0.5	0.0	10.9	0.0	58.8						70.2	63,814	1.26%
ALL OTHER	0.0	12.9	30.2	42.2	15.1							150,000	0.00%
TOTAL PRODUCTS	110.0	973.2	1524.7	1500.3	943.5	0.0	0.0	0.0	0.0	0.0	4944.5		88.97%
GROSS MARGIN, \$/T	\$42.29	\$49.02	\$47.69	\$47.77	\$57.18						\$47.04		
MASS BALANCE, %	90.16%	90.66%	90.69%	92.74%	88.78%						88.97%		

TOLL PROCESSING:	PETROBRAZI	PETROTEL	RAFO	ARPECHIM	PETROMIDIA	ASTRA	VEGA	STEAUA	DARMANESTI	PETROLSUB	TOTAL ALL REFINERIES	TOLL PROC. FEE* OR PRICE	PRODUCT YIELD AS A % OF CRUDE
CRUDE RUN	34.8		49.1	367.4	647.5						1098.8	17,400	
LPG	0.0		1.5	5.5	24.1						31.1	-130,000	2.83%
GASOLINE	10.4		12.3	111.0	181.0						314.7		28.64%
KERO	0.0		0.0	0.0	6.7						6.7		0.61%
DIESEL OIL	10.8		14.5	96.8	251.4						373.5		33.99%
HEAVY FUEL OIL	10.9		17.5	122.4	63.0						213.8	-74,800	19.46%
COKE	0.0		0.0	0.0	44.2						44.2	-74,800	4.02%
ALL OTHER	0.0		0.0	0.0	0.0								0.00%
TOTAL PRODUCTS	32.1	0.0	45.8	335.7	570.4	0.0	0.0	0.0	0.0	0.0	984.0		89.55%
GROSS MARGIN, \$/T	(\$5.02)		(\$11.03)	(\$7.89)	\$0.15						(\$3.20)		
MASS BALANCE, %	92.24%		93.28%	91.37%	88.09%						89.55%		

\* ASSUME TOLL PROCESSING FEE OF \$14.50 PER TON

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

### **1993 Refined Product Trade**

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In 1993, Rafirom started a crude purchase/product sale swap arrangement through Petrolexportimport to provide hard currency required to buy imported crude. Through this arrangement, about 800,000 tons of gasoline and 600,000 tons of diesel oil were exported. This generated a total of \$225 million in hard currency by the end of 1993. The total imported crude purchased in 1993 cost over \$550 million, thus the net hard currency outlay by the treasury was still about \$325 million. According to the Rafirom data in Table 3, the yield of gasoline and diesel on imported crude totaled 56.6 percent of the crude run. This implies that nearly 2.5 million tons of imported crude was required just to obtain the exported products. At an average cost of \$100 per ton, this crude cost \$250 million. From this it can be shown that the product export is not generating enough foreign exchange to offset the additional crude required to produce it. It does, however, allow production of heavy fuel oil that has been imported, thus reducing the foreign exchange required for its import.

Romania is short of heavy fuel oil for the power and industrial sectors of the economy, resulting in the apparent importation of over one million tons of heavy fuel oil in 1993. The import quantity is uncertain as most of it is imported by Renel directly and Rafirom does not have the actual data regarding the amount imported. Rafirom has provided the team with an actual Romanian demand of 4.45 million tons in 1993 and an actual production of 3.4 million tons. Unless significant stock changes occurred between 1992 and 1993, this implies a shortfall of over one million tons.

Renel has stated a desire to use low sulfur/low metals heavy fuel oil for power plant fuel as the high sulfur heavy fuel oil produced by imported crudes is fouling and corroding their boilers. Renel's strategy is to bring on-line two nuclear power plants, one in 1995 and the other in 1998, to reduce their dependence on fuel oil. Their demand forecast for heavy fuel oil decreases by about 10 percent in the last few years of the decade.

### **1993 Refined Product Demand**

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In 1993 petroleum product consumption increased substantially, possibly as a result of increased availability. Data for 1991 and 1992 has been based in part on sales by Peco, which has had a declining share of the market, so direct comparisons are possibly faulty. Future demand has been estimated in a simplistic way by calculating the demand growth as a multiple of GDP growth. As discussed above, structural changes make this approach even less reliable than usual, but it is the only methodology that can be applied without extensive field work.

**ROMANIA REFINERY AND PETROCHEMICAL  
SECTOR RESTRUCTURING PROJECT**

Table 3  
1993 PROCESSING SUMMARY

**SUMMARY OF 1993 PETROLEUM PROCESSING IN EACH ROMANIAN REFINERY**

MARGIN AT EXCHANGE RATE = 1,200 LEI/\$

REFINERY	CRUDE RUN PERCENTAGE BY REFINERY		TOLL PROCESS	TOTAL CRUDE THOUS T/YR	GROSS MARGIN, \$/T
	DOMESTIC	IMPORTED			
PETROBRAZI	95%	4%	1%	3,133.0	\$51.48
PETROTEL	51%	49%	0%	2,204.3	\$49.57
RAFO	21%	77%	2%	2,187.0	\$45.75
ARPECHIM	0%	81%	19%	1,985.2	\$37.47
PETROMIDIA	0%	62%	38%	1,710.2	\$35.59
ASTRA	100%	0%	0%	577.6	\$93.24
VEGA	100%	0%	0%	308.8	\$45.36
STEAUJA	100%	0%	0%	245.4	\$83.93
DARMANESTI	100%	0%	0%	395.3	\$80.97
PETROLSUB	100%	0%	0%	420.0	\$12.68
TOTAL ALL REFINERIES	49%	42%	8%	13,166.8	\$46.86

**PRODUCT YIELDS AND EXPORT/IMPORT TABLE**

MAJOR PRODUCTS BY TYPE OF CRUDE PROCESSING	CRUDE PROCESSING		TOLL PROCESS	TOTAL PRODUCTION	EXPORT (IMPORT) OF PRODUCTS
	DOMESTIC	IMPORTED			
GASOLINE	17%	27%	29%	2,927.7	795.3
GAS OIL/DIESEL	25%	30%	34%	3,687.4	594.5
HEAVY FUEL OIL	28%	29%	19%	3,663.0	(1,041.0)
ALL OTHER PRODUCTS	20%	3%	7%	1,751.0	23.0
TOTAL, AS % OF CRUDE	91%	89%	90%	12,029.1	371.8

**ROMANIA REFINERY AND PETROCHEMICAL  
SECTOR RESTRUCTURING PROJECT**

**Demand By Region**

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An analysis of sales of gasoline and diesel by district has been made from data supplied by Peco. This represents only Peco sales and may be distorted by competition in certain areas, but it is broadly representative. Sales are reported by each of the 41 distribution depots, a large number for the volume of throughput. These have been aggregated into regions, as shown below:

	Gasoline		Diesel	
	(Thousand tons)		(Thousand tons)	
	1992	1993	1992	1993
Banat	64	85	108	98
Dobrogea	38	48	184	152
Moldavia	129	151	353	302
Muntenia	399	452	896	772
Transylvania	292	333	473	443
Miscellaneous	2	18	330	329

These data indicate that 42 percent of gasoline demand is in Muntenia, the region around Bucharest that is well served with refineries and pipelines. Dobrogea, on the Black Sea coast, is supplied from Petromidia, but only accounts for five percent of consumption. Moldavia, supplied by Rafo, has 14 percent of the demand. Banat and Transylvania have 8 percent and 31 percent of the demand, respectively. Neither of these regions has refining or substantial pipeline delivery.

The pattern of diesel fuel demand differs from gasoline, because of ships' bunkers in Constanta and consumption by the railways, reported under the Miscellaneous category. Demand for diesel fuel has been more stable than gasoline demand, which grew substantially from 1992 to 1993.

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

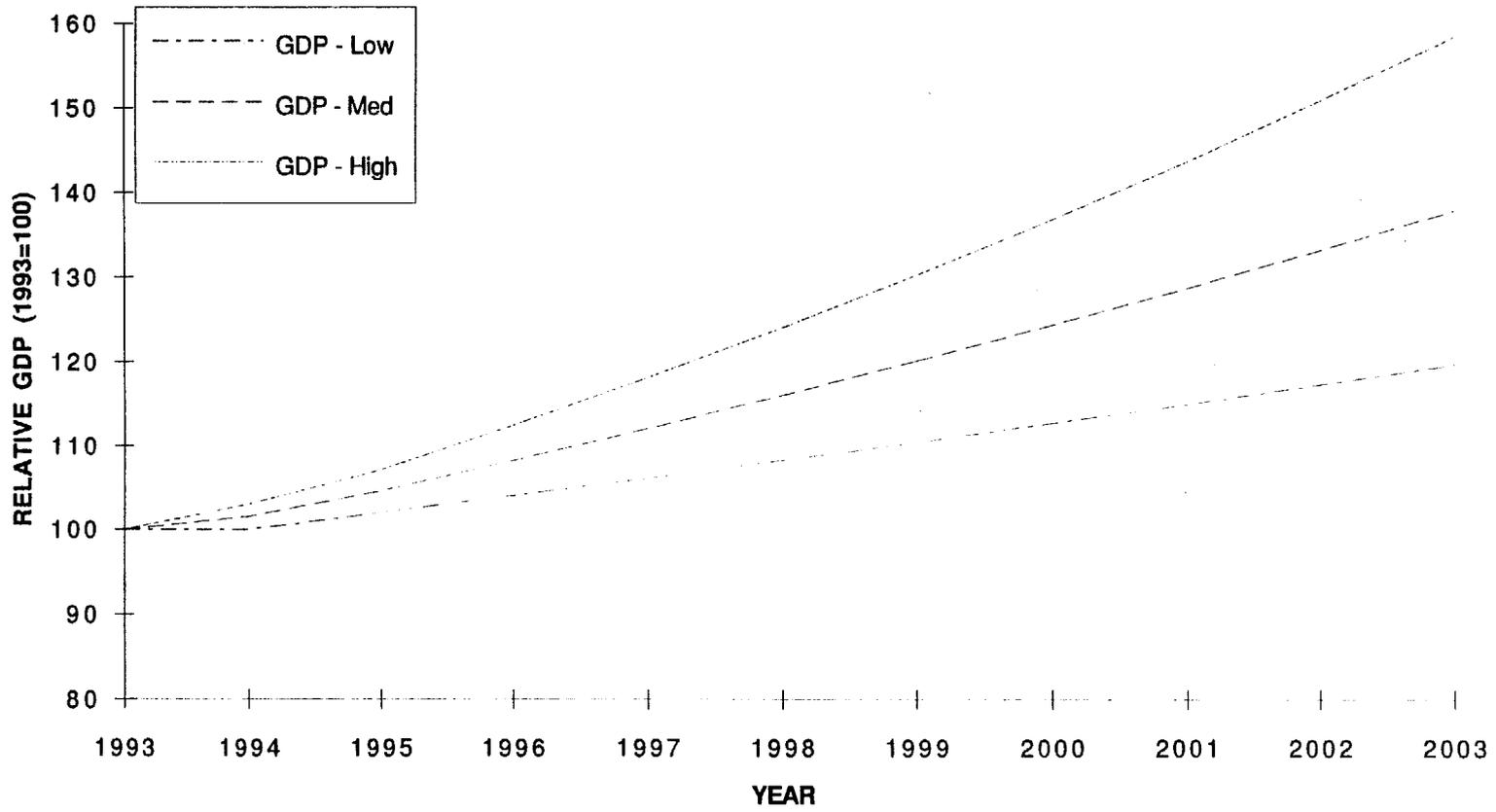
### **PROJECTED ECONOMIC GROWTH**

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After falling sharply for four years, the team was told by Rafirom that a one percent real economic growth was seen in 1993. This has not been officially confirmed, but some evidence of stability is apparent. Industrial output increased by 1.3 percent during the year. Inflation remains high and short-term prospects will depend upon stronger monetary control and the introduction of convertability for the lei. Some believe that these measures will soon be taken. Chem Systems' base-line forecast is for 0 to 3 percent growth in 1994, 2 to 4 percent in 1995, and 2 to 5 percent from 1996 on. Higher growth rates are unlikely until the process of restructuring the economy is more advanced and, in particular, the banking and communications infrastructure is in place. Very low growth rates are politically unacceptable, and will be avoided by borrowing. Romanian national debt has been increasing yearly, but is still relatively low.

For the purpose of forecasting oil products demand, an average growth rate of 3.5 percent per annum is assumed. Figure 2 illustrates the forecast economic growth in Romania over the next decade.

**Figure 2**  
**PROJECTED ECONOMIC GROWTH RATE FOR ROMANIA**



## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

### **Demand Forecast by Product**

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**Naphtha** demand is derived from petrochemical feedstock requirements based upon the Chem Systems study.

**Gasoline** demand is growing quite rapidly because the automobile population is also growing quickly through the import of second-hand vehicles. Furthermore, the growing service sector tends to use automobiles for its activities. This process will slow down, but still a multiple of GDP is expected. In the longer term, the better fuel efficiency of modern automobiles will have its effect on the fleet as a whole. Calculations made with the Chem Systems model, based upon automobile numbers, efficiency, and use, suggest that growth rates of about twice GDP should be used at present to forecast growth in gasoline demand, reducing to 1.5 times GDP in later years.

No analysis has been made of future octane requirements for gasoline. It will be necessary to estimate the quantities of unleaded, regular, and premium gasoline needed to establish upgrading needs for catalytic cracking and reforming in the refineries.

**Kerosene** for home heating will expand at GDP rates. Jet kerosene is difficult to predict. More international flights may be expected, but more fuel efficient planes are being purchased. On balance, a GDP growth rate is suggested.

**Gasoil** for diesel engines is likely to grow at more than GDP due to growth in the service sector and recovery in the agricultural and construction sectors. Little use is made of gasoil for heating.

**Lubricant** demand is currently about 75 percent for industrial, and 25 percent for automotive use. The latter will grow with the fleet, although longer service intervals in new vehicles will limit growth. The industrial sector will grow at GDP rates.

**Fuel oil** demand for power stations is expected to stay flat. Renel, the electrical utility, forecasts a two percent growth rate for electricity demand, because energy conservation is being practiced as higher prices bite. The nuclear power station at Cernavoda will start the first line in late 1994, and the second, if it can be financed, in 1998. Fuel oil is the marginal fuel, and problems have arisen because currently available grades cause corrosion and fouling. The power stations were designed to operate on fuel oil from domestic crude, which is low in sulphur and in metals content. Other users of fuel oil will grow at GDP rate. Renel's forecast demand for heavy fuel oil is flat at 3.0 million tons per year until 1998, then declines by about 10 percent after the second nuclear unit is brought on stream.

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

**LPG** demand for domestic cooking and heating is growing faster than GDP, and new bottling stations are being built. It is also produced from gas fields, but the growth in demand must be satisfied from the refineries production.

Forecast of product demand for the next 10 years are shown on Table 4 and Figure 3.

### **Trade**

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At present Rafirom trades refined products for crude oil, selling gasoline and gasoil and claims to cover about 70 percent of the hard currency cost of the crude. The balance of the cost is made up by converting lei to dollars through a commercial bank. Heavy fuel oil is imported. Rafirom has projected a substantial increase in trade without offering any market analysis to justify this assumption. Since many other countries are also exporting products, the Black Sea/Eastern Med market could become saturated. No precise calculations have been made showing the marginal value of production from additional crude run. A simple analysis based on 1993 actual production on imported crude shows that the Petromidia refinery is best positioned for exporting products economically.

Table 4 shows the incremental performance of the major refineries running imported crudes to produce exportable white products. At 1993's yield structure on imported crude, all refineries ran at a deficit of hard currency. With the planned revamp and modernization programs, this situation could change. In the absence of a detailed analysis, it is prudent to assume that exports should remain at current level and not exceed the capacity of Petromidia to produce exportable products. In 1993, exports of white products totaled 1.4 million tons from crude/product swap trade deals. Another 700 thousand tons were exported through toll processing deals in 1993, but probably not economically. This level of export exceeds Petromidia's capacity to produce white products running at its full nameplate capacity of 3.5 million tons per year. As can be seen from Table 4, all other refineries would pay a heavy penalty in hard currency exchange to run incremental crude to export products.

**ROMANIA REFINERY AND PETROCHEMICAL  
SECTOR RESTRUCTURING PROJECT**

**Table 4  
ROMANIAN REFINED PRODUCT DEMAND  
ACTUAL 1989-1993 AND FORECAST 1994-2003**

**ACTUAL DEMAND HISTORY**

PRODUCT	1989	1990	1991	1992	1993
NAPHTHA	1499	1130	756	563	727
GASOLINE	608	1153	982	920	1430
KERO/JET	273	318	160	150	387
GAS OIL	3966	3889	3436	3084	3124
FUEL OIL	7207	8829	7227	5774	6000
OTHER	1397	1234	1079	1069	1000
<b>TOTAL</b>	<b>14950</b>	<b>16553</b>	<b>13640</b>	<b>11560</b>	<b>12668</b>

**FORECAST DEMAND FOR NEXT FIVE YEARS**

PRODUCT	1994	1995	1996	1997	1998
NAPHTHA	828	857	935	1021	1115
GASOLINE	996	1034	1089	1148	1211
KERO/JET	278	278	283	287	291
GAS OIL	3144	3174	3258	3346	3434
FUEL OIL	6555	6444	6654	6365	6072
OTHER	887	924	1094	1033	1096
<b>TOTAL</b>	<b>12688</b>	<b>12711</b>	<b>13313</b>	<b>13200</b>	<b>13219</b>

**FORECAST DEMAND FOR FOLLOWING FIVE YI**

PRODUCT	1999	2000	2001	2002	2003
NAPHTHA	1217	1328	1449	1581	1726
GASOLINE	1279	1352	1429	1511	1598
KERO/JET	296	300	304	308	314
GAS OIL	3527	3625	3726	3830	3938
FUEL OIL	6086	6102	6118	6135	6153
OTHER	1163	1234	1310	1389	1592
<b>TOTAL</b>	<b>13568</b>	<b>13941</b>	<b>14336</b>	<b>14754</b>	<b>15321</b>

**Table 5**  
**ROMANIA REFINERY PERFORMANCE ON INCREMENTAL**  
**TON OF IMPORTED CRUDE ON EXPORT PRODUCT VALUES ONLY**

**HARD CURRENCY FOREIGN EXCHANGE VALUE**

	IMPORT/EXPORT VALUE, \$/T	DOMESTIC* VALUE, \$/T	REFINERY RUNNING IMPORTED CRUDE AND PRODUCING EXPORT PRODUCTS					AVERAGE OF ALL REFINERIES
			PETROBRAZI	PETROTEL	RAFO	ARPECHIM	PETROMIDIA	
IMPORTED CRUDE	\$100.00		\$100.00	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
LPG		\$108.33	\$2.83	\$4.07	\$2.16	\$2.14	\$3.59	\$1.85
GASOLINE	\$164.22		\$38.50	\$47.42	\$40.72	\$43.02	\$47.39	\$43.91
KERO/JET		\$229.33	\$0.00	\$0.00	\$0.63	\$0.00	\$3.14	\$1.10
DIESEL OIL	\$159.63		\$44.09	\$43.17	\$50.27	\$46.21	\$51.45	\$47.80
HEAVY FUEL OIL		\$62.33	\$21.82	\$19.36	\$18.70	\$20.99	\$10.38	\$17.97
AROMATICS		\$305.98	\$3.23	\$0.00	\$0.43	\$0.00	\$0.00	\$0.00
COKE		\$53.18	\$0.67	\$0.00	\$1.06	\$0.00	\$9.09	\$0.67
ALL OTHER		\$125.00	\$0.00	\$1.97	\$2.95	\$4.28	\$2.33	\$0.00
MARGIN (LOSS)	SOFT CURRENCY		\$28.55	\$25.40	\$25.93	\$27.42	\$28.52	\$21.60
PERTON CRUDE	HARD CURRENCY		(\$17.41)	(\$9.41)	(\$9.01)	(\$10.77)	(\$1.16)	(\$8.28)
	TOTAL MARGIN		\$11.14	\$15.99	\$16.92	\$16.65	\$27.36	\$13.32

**IMPORT/EXPORT VALUES BASED ON 1993 AVERAGE COST OF IMPORTED  
CRUDE AND AVERAGE REVENUE PER TON OF EXPORTED PRODUCT**

\* ALL OTHER PRICES AT DOMESTIC PRICES CONVERTED TO \$ AT

1,200 LEI/\$

**THE ABOVE MARGINS INCLUDE VALUE OF PRODUCTS LESS COST OF CRUDE.  
NO ALLOWANCE FOR FIXED OR VARIABLE REFINING COSTS, RAFIROM FEE, OR  
CRUDE OR PRODUCT TRANSPORTATION COSTS WERE CONSIDERED.**

**OTHER COSTS OF PROCESSING IMPORTED CRUDE AND EXPORTING PRODUCTS:**

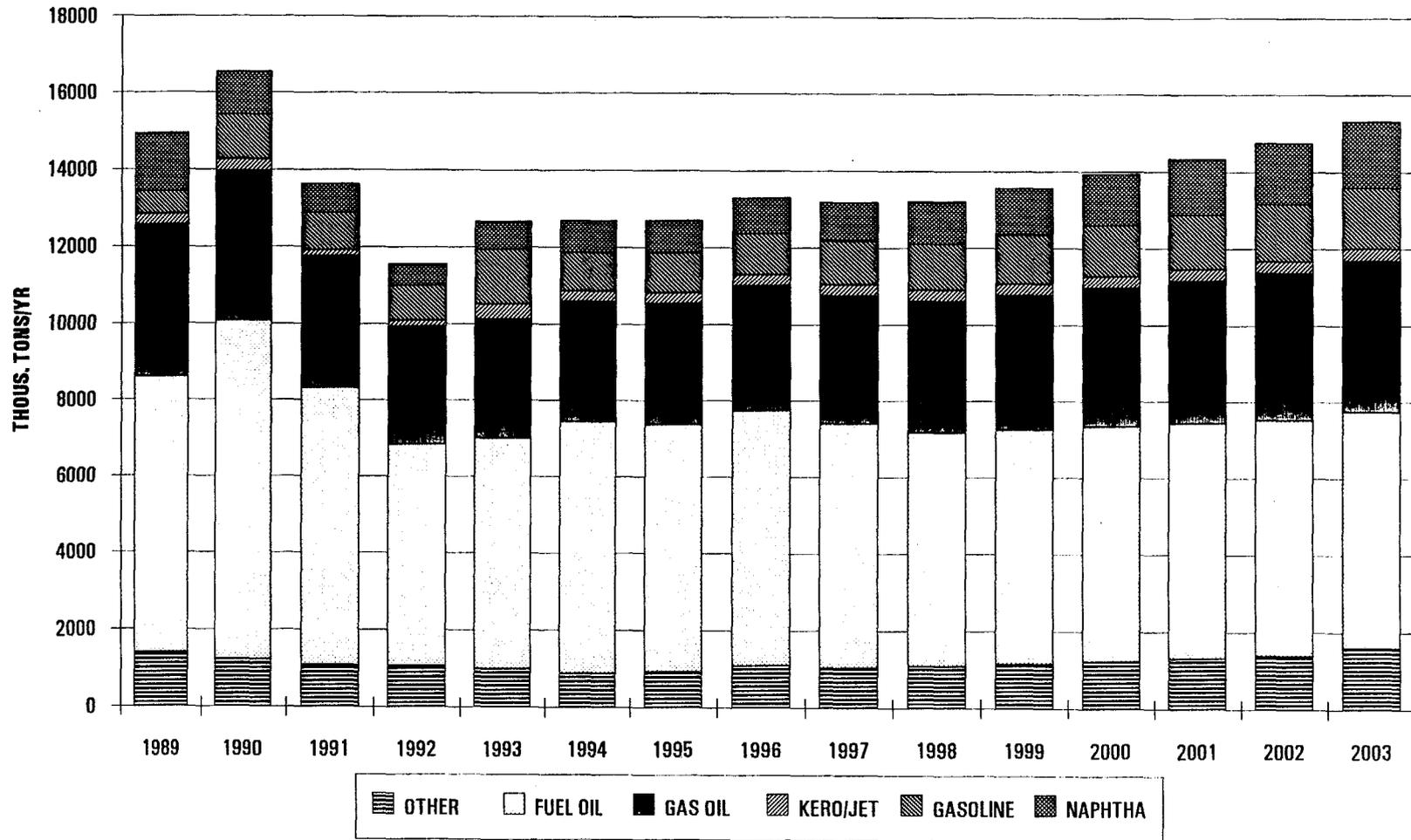
	LEI/TON	\$/TON
OIL TERMINAL CHARGES		\$1.22
CONPET P/L TARIFF	2,400	\$2.00
RAFIROM COMMISSION	540	\$0.45
PETROTRANS P/L TARIFF, OR	estimate	\$5.00
RAILROAD PROD. TRANS.	"	\$10.00
TOTAL OTHER COSTS	2,940	\$8.67

**SUMMARY:**

Processing imported crude and exporting products in 1993 provided some foreign exchange but not enough to pay for the crude imported! Petromidia had the best performance on imported crude due to its location and yield. The inland refineries are at a disadvantage to Midia due to transportation costs associated with crude and products.

Figure 3

ROMANIAN REFINED PRODUCT DEMAND ACTUAL/FORECAST



Bechtel/Chem Systems

ROMANIA REFINERY AND PETROCHEMICAL  
SECTOR RESTRUCTURING PROJECT

## **REVIEW OF RAFIROM'S REFINERY RESTRUCTURING STRATEGY**

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The terms of reference, as defined by USAID and the World Bank, requested a review of the Rafirom report Restructuring Strategy of the Refining Industry in Romania, September, 1993, from a point of view of meeting the demand over a period of 10 years. The following sections discuss this strategy in detail.

### **RAFIROM'S OBJECTIVES**

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Rafirom's objectives, as outlined in the Refinery Sector Restructuring Strategy, are to:

- Provide realistic and efficient use of domestic and imported crude oil resources, so that the needs of the domestic market for petroleum products can be met while allowing the sector to develop the profit necessary to finance the modernization and decommissioning required to rationalize the refining industry
- Rationalize the use of existing production capacities and sector infrastructure to reduce the refining costs and to improve the technical and economic viability of the sector
- Increase the production of competitive fuel and petrochemical products, from both a price and quality point of view, to improve the export necessary to provide hard currency required for raw materials and technology and equipment for the sector
- Structurally reorganize the sector units to provide competition and self regulating mechanisms such that privatization of some units can be initiated
- Establish the government policy and institutional laws and regulations required to allow a free-market competitive pricing system in petroleum products in Romania; also, allow these prices to be subject to the world market price forces such that Romania's refining industry remains competitive in the world market
- Optimize the relationships between sector units to improve technical reliability and financeability while maintaining the environmental quality of life required by Romania's people

These objectives are, on the whole, very good. The concept of competing in the export market for the foreign exchange required to provide raw materials and technology and equipment for the sector may be optimistic.

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

From our quick analysis, we observed that in 1993 insufficient foreign exchange was earned through product exports to pay for the incremental crude required to produce those products, much less the additional technology or equipment to modernize or upgrade the refining sector. Romania does not necessarily have a comparative advantage in processing crude for export, particularly from inland refineries. The narrow concept of attempting to balance trade in oil products alone could lead to suboptimal operation. Most countries balance national trade as a whole, with oil imports offset by the export of a wide range of products. Our opinion is that Rafirom should concentrate on meeting the domestic demand with the inland refineries and utilize Petromidia as an export refinery to minimize the foreign currency required to import heavy fuel oil. After the better refineries are modernized, crude processing for export by them may become economically feasible.

### **RAFIROM'S RESTRUCTURING STRATEGY**

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At the end of 1992 the Romanian refining industry had the nominal capacity to process 34 million tons of crude per year (MTA) in 10 refineries with a total of 20 processing trains or atmospheric distillation units. The actual crude processed in 1992 was only about 9 MTA due to constrained crude supplies caused by the lack of hard currency to buy imported crude. This problem was partly solved in 1993 by the use of crude/product trade deals which allowed the refineries to run over 13 MTA of crude, about one-half domestic and one-half imported. Rafirom's strategy forecasts the processing of 18 MTA in 1994 and 25 MTA in 2000. This forecast anticipates the demand for petrochemical feedstock rising to 2.5 to 3.0 MTA and an export of 6 MTA in 2000.

The Rafirom operating strategy for the period 1994 to 2000 was developed in two stages; Stage I - 1994 to 1997, and Stage II - 1998 to 2000. The first stage is intended as a transition stage where refinery modifications and plant upgrades take place. Although during this stage each refinery will only be operating one train, the other will be kept in standby to allow processing when the proposed plant modifications are made. In Stage II, Rafirom intends to shut down the older trains in each refinery and only operate one upgraded train in each of the five main refineries.

During Stage I the total operating capacity will be 18.0 MTA; and, after the upgrade and debottlenecking is done in Stage II, the capacity will increase to 25 MTA. Three of the small refineries will be taken out of crude processing service and only operate as specialty product refineries using intermediate products from the other refineries.

As is discussed in the Update of Product Demand for Romania section, this forecast of crude processing is too optimistic as it would require a five MT increase in 1994 over last year. Clearly 1992 operation was supply limited,

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

and production levels were constrained by the inability to obtain enough imported crude. The operating level in 1993 is more in line with the market demand in Romania, and future processing levels will follow the growth of domestic demand and not experience large step changes as experienced in 1993 over 1992 levels.

### **REVIEW OF PROPOSED PROJECTS IN THE SECTOR**

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The planned projects for improving and upgrading the five large refineries are estimated to cost \$437 million and include: atmospheric and vacuum distillation unit revamps (primarily heater efficiency improvements), catalytic reformer modernization (including installing continuous catalyst regeneration), fluid catalytic cracker modernization and other product quality improvement projects including new MTBE plants, alkylation units, and isomerization units, and a variety of environmental projects. Two refineries desire to modernize or replace the coker units. A substantial sum is allocated for lube oil projects in several refineries. These perhaps compete with each other.

The six smaller refineries propose to spend \$23 million on small projects intended to improve energy efficiency, specialty product quality, or environmental improvements. It is intended that only two of these smaller refineries continue to process crude. None will be completely shut down, but instead will act as specialty product producers and operate under the direction of larger related refineries. Table 6 summarizes the proposed refinery projects in Rafirom's strategy.

In addition to the \$460 million proposed projects in the refineries, an additional \$51 million is required by Peco to revamp storage facilities and retail stations, and \$19 million is required by the Oil Terminal for metering systems and environmental projects. This totals \$530 million in capital for Rafirom's strategy between now and the end of the decade.

No attempt was made in this mission to verify the capital cost estimates made by Rafirom, or IPIP on Rafirom's behalf, but they may be low due to the large amount of inflation in recent years in Romania. Some of the estimates were made several years ago.

All of these projects were intended to be carried out during Stage I of the development strategy. It is our opinion that the domestic product demand forecast does not warrant this vigorous development plan. Some of these projects clearly have a quick payout without the need for an expanding market. The priority projects are those that reduce the energy consumption in refining crude oil. These are the AVD unit revamps and the economics for each of these should be made on an energy saving basis using 1993 operating levels. Any project with less than a three-year payout (capital cost/annual energy savings) should be very high priority. One-year payout

# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

Table 6

## PROPOSED REFINERY PROJECTS IN RAFIROM'S STRATEGY

Refinery	Project	Schedule	Capital Cost (Million \$)
<b>Petrobrazi</b>	AVD Revamp	1993 - 1995	17.0
	Catalytic Refinery Complex	1993 - 1995	28.5
	High P. Catalytic Refinery	1995 - 1996	7.0
	Catalytic Cracking Complex	1993 - 1995	22.5
	Coker Desulfurization	1994 - 1995	2.5
	Storage Facility	1994 - 1995	6.0
	nC <sub>5</sub> -C <sub>6</sub> Isomerization	1994 - 1995	5.0
	Environmental Projects	1993 - 1995	7.0
	<b>Total Petrobrazi</b>		<b>95.5</b>
<b>Petrotel</b>	AVD Revamp	1993 - 1996	12.9
	FCC Modernization	1994 - 1995	5.0
	Catalytic Refinery Modernization	1994 - 1995	12.6
	Alkylation Modernization	1995 - 1996	2.0
	Coker Modernization	1995	1.0
	Lube Block	1995 - 1996	72.0
	New MTBE Plant	1993	1.0
	Environmental and Other	1993 - 1997	4.7
	<b>Total Petrotel</b>		<b>111.0</b>
<b>Petromidia</b>	AVD Revamp	1993 - (Done)	8.0
	Catalytic Refinery Modernization and FCC Plus Other and Environmental	1994 - 1995	70.0
		<b>Total Petromidia</b>	<b>78.0</b>
<b>Arpechim</b>	AVD Revamp	1994 - 1996	11.9
	Catalytic Refinery #2	1994	1.5
	Visbreaking Modernization	1995 - 1996	6.1
	FCC Revamp	1994 - 1996	16.5
	Steam Boilers	1994	1.1
	New MTBE Plant	1995 - 1996	2.9
	Lube Plant Modernization	1995 - 1997	18.0
	Product Loading Modernization	1995 - 1996	4.0
	Environmental Projects	1994 - 1996	0.6
	<b>Total Arpechim</b>		<b>62.6</b>
<b>Rafo</b>	Catalytic Refinery #2 Revamp	1995 - 1997	14.2
	FCC Revamp and Modernization	1995 - 1997	25.0
	AVD Revamp	1993 - 1995	6.0
	New Coker (800,000 TPA)	1995 - 1997	30.0
	New MTBE Plant (50,000 TPA)	1994 - 1995	10.0
	Environmental Projects	1995 - 1997	5.0
	<b>Total Rafo</b>		<b>90.2</b>
<b>Astra</b>	AVD Modernization and Lube Hydrofining	1993 - 1996	2.0
	Other and Environmental Projects	1996 - 1999	8.9
		<b>Total Astra</b>	<b>10.9</b>
<b>Petrosub</b>	Bitumen Addition and Packing	1993 - 1995	3.0
<b>Vega</b>	Retro Hexane and Environmental	1993 - 1999	1.1
<b>Steaua Romana</b>	4 MW Power/Steam Plant	1993 - 1997	4.4
<b>Lubriferin</b>	Modernization Lube & Grease Plants	1993 - 1996	3.5
<b>Total All Refineries in Romania</b>			<b>460.2</b>

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

projects should be financed with operating funds, as any current year energy savings would be offset with a reduction in fuel (or crude) demand/cost. A detailed analysis of the costs and benefits of each major project should be carried out to determine the priority of development in a cash-short situation. Based on the demand analysis, it does not appear that projects solely based on increasing capacity are justified in the near term.

### **ANALYSIS OF SECTORAL MACROECONOMIC CONTEXT**

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The Romanian refining and petroleum product distribution and sales sector is horizontally structured without competition at almost all levels of the sector. Starting with domestic crude oil exploration and production, only one company is actually producing oil today, Petrom. This may change over time as several other companies have exploration and development contracts in place and are actively seeking new oil finds. Continuing down the pipeline, Oil Terminal and Conpet are the only companies providing crude oil receiving, storage, and transportation services in Romania. They are natural monopolies and will need to be regulated with regard to tariffs and profit. All other petroleum companies are also monopolies, but they should not be. Figure 4 graphically compares the typical market-based petroleum organization with Romania's structure.

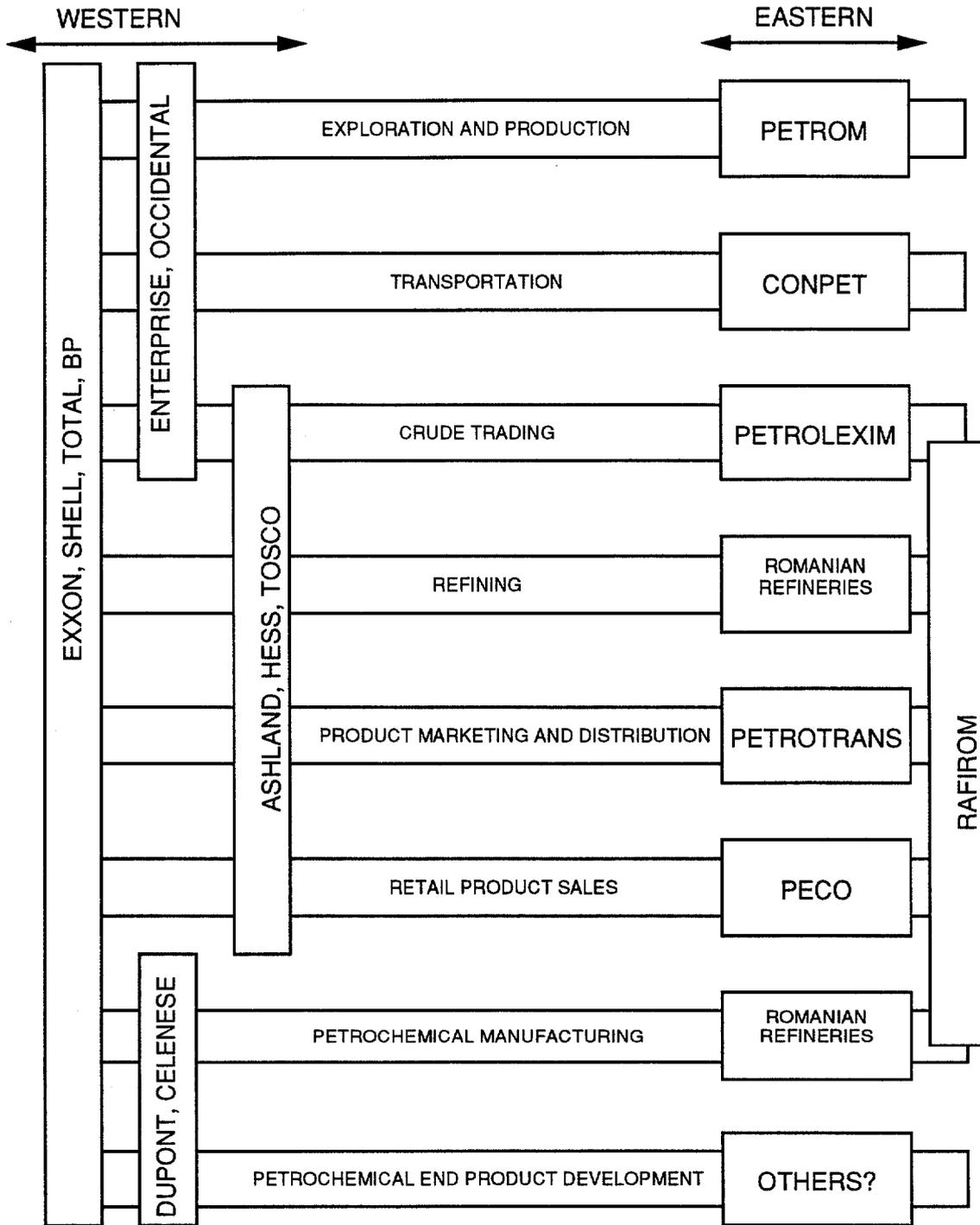
To create competition, and with it natural price regulation, several companies should be processing, distributing, and selling petroleum products. Although there are 200 privately owned gasoline stations in Romania, Peco still enjoys a monopolistic position in petroleum product marketing due to the large number of stations (450), product terminals (41), and LPG filling stations (8). They also have all the experienced people that have been involved with product sales in Romania. Most of the privately owned gasoline stations are owned by individual Romanian citizens in outlying areas of Romania.

It is recommended that Peco's monopoly should be broken by either selling some of its product terminals and retail stations to each refinery or bringing new outside petroleum products marketing companies to Romania to establish new modern retail outlets for products. A combination of both approaches is probably the best way to bring competition to the refining and product distribution/sales area.

# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

Figure 4

## COMPARISON OF TYPICAL WESTERN AND EASTERN PETROLEUM ORGANIZATIONS



## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

### **REVIEW OF PRICING ARRANGEMENTS**

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All prices are still centrally controlled. The Ministry of Finance sets, or approves, the price for all domestic crude, transportation tariffs, refined products at the refinery gate, and retail product prices. The price setting mechanism is performed sporadically (seven times last year) and fixed in Lei/unit. Unfortunately, the inflation rate in Romania was at 350 percent last year and what might have been a reasonable price, as compared to world market prices, when set, soon became a low price. Imported crude prices, however, continue to be U.S. dollar denominated and its cost rises with the inflation rate.

As an example, the gasoline price at the pump in Romania was last set in November 1993 at 400 Lei/L, with a 1200 lei/\$ exchange rate. This pump price was \$1.25/gallon in November, now it is only \$.87/gallon at the current exchange rate of 1720 Lei/\$. This pricing system seriously impacts the refining industry that buys crude oil at current world prices today and waits 45 to 90 days (transportation, processing, distribution, and retail) to sell products from that ton of crude.

We recommend that the petroleum product pricing move toward a market-driven competitive price, but of course, this requires competition in the product marketplace. In the meantime, a modification to the pricing system could be made to allow product prices to be formula-driven based on current imported crude price in Lei/ton using current exchange rates. Another approach in central pricing would be to have a maximum price that can be charged and allow retailers to compete for market share by discounting the price below that level.

### **ANALYSIS OF HISTORICAL FINANCIAL PERFORMANCE**

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The historical financial performance of the petroleum refining sector in Romania is very difficult to analyze in a short survey trip. The refineries claim to be profitable, but all the costs and prices are so distorted by averages that it is difficult to know the true financial results. There are some things that can be stated about the financial status; however, the accounts receivable due from large customers is still a big problem. Toll processing under recent contracts appears to be losing money. The lack of a convertible currency, coupled with a high inflation rate, is seriously impacting profitability.

Large customers like Renel and the railroad traditionally pay late for products purchased. Even with an interest charge on late payments (120 percent), which is rarely collected, the loss due to inflation is enormous.

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

Toll processing in 1993 amounted to 1.1 MTA or about eight percent of total crude run. The toll processor used comparable crudes to those Rafirom was importing, but they negotiated product yields that seem to be better than refineries are actually making. This toll processing was discontinued in May 1993 after access to hard currency for crude purchases was made available with product sales.

If the Leu was a freely convertible currency, the purchase of crude oil and other equipment and services could be made without complex trade deals. The refineries could then be optimized to run on domestic demand and export only product that improved the marginal return to the refinery. It may be that the refineries are running too much crude in order to have enough gasoline and diesel to export for crude purchases. These crude/product deals have certainly improved the operation of the refineries in Romania, but they limit the crude purchasers to those companies that can do product swap transactions. This may cost them more than they realize in either higher priced crude, lower priced products, or cost of LC financing.

### **TREATMENT OF INSTITUTIONAL ASPECTS OF THE SECTOR**

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The proposed structure of the petroleum refining sector in Romania should evolve toward a more competitive environment to foster competition and adapt to shifting market demands for both quality and quantity of petroleum products. Presently the sector is composed of several horizontally structured monopolies with no competition requiring government control of prices and tariffs. Those organizations that are natural monopolies should continue as regulated companies that have their tariffs or prices established by an independent government body, such as the National Agency for Mineral Resources (NAMR).

These would include Conpet, the Oil Terminal, and Petrotrans. The other organizations, including the refineries, should become independent of each other and actually compete in the marketplace. Peco, the dominant petroleum retail marketing organization, should be broken up into separate competing companies, including the major refiners or other international oil companies with an interest in getting into the Romanian product market.

### **PRELIMINARY ASSESSMENT OF ECONOMICS OF SECTOR**

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It is very difficult to perform an assessment of the economic performance of the refining and transportation sector due to the lack of real prices between Petrom for domestic crude on one hand and Rafirom and end consumers on the other. It is clear that some domestic prices are still below the international market price for comparable products. It appears from the data provided by Rafirom, that the refining sector is profitable, if users pay their bills on time. The problem of deferred accounts receivable

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

causes a big problem when the inflation rate is as large as it is today. The five larger refineries are all of similar size and complexity, and relative to the rest of Eastern Europe, very technically proficient. Although the gross refining margins (value of products less cost of crude) look attractive, net refining margins may be low, or even negative, due to the low capacity utilization of present operations.

Net refining margins are best when the capacity factor exceeds 85 percent of the design capacity of the refinery. The average refinery capacity factor for 1993 was 65 percent of the total productive nameplate capacity of all refineries.

### **REVIEW OF LEAST COST SUPPLY OPTIONS**

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Since the imported crude is bartered for export white products, it is not clear that Romania is buying the best crude for its refineries. The larger major refineries were designed for Iran heavy crude and this is what is primarily imported. This may be the best crude for the refinery configuration, but an optimization using a linear program could analyze the relative values of various crudes to be run at each refinery.

Romania is importing over one million tons of heavy fuel oil and exporting over two million tons of white products (counting the toll processing as export). Rafirom has already discovered that toll processing may be a money loser and have, therefore, discontinued it. Although a detailed study of least cost supply options has not been done, it appears that Rafirom is directionally in the right place; do not run the refineries to make all heavy fuel oil required, and do export some white products to minimize foreign exchange required to import heavy fuel oil. Whether the balance is right would require further study.

One possible supply cost reduction option that Romania should consider is the importation of a heavier crude, at lower cost per ton, to increase the production of heavy fuel oil and reduce the production of white products. This would move their production into a better balance between light and heavy products and, possibly, improve the overall economics. Another concept that may be worth considering is the exchange of excess light products, for required heavy low sulfur fuel oil, with another Black Sea refiner, possibly Burgas in Bulgaria.

### **REVIEW OF ENVIRONMENTAL IMPACT OF CRUDE PROCESSING**

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The Rafirom strategy recognizes the need to improve the environmental performance of the refineries and has outlined projects in each refinery to accomplish some improvement in this regard. A total of \$17 million in environmental projects has been included in the strategy. We have not reviewed a detailed list of environmental projects proposed, but believe that

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this level of capital is significantly low based on other surveys made in Eastern and Central Europe. Some environmental projects are also economically driven projects, such as energy efficiency, recovery of petroleum products in wastewater, and better tank seals and vapor recovery in tankage. On this basis, we believe that some of the capital identified in other projects also improves the environmental performance of the refineries. A detailed review of environmentally driven projects should be made to prioritize the capital spending plan to obtain the best environmental benefit for the least capital spending. We generally find that 80 percent of the benefit can be obtained with only 20 percent of the total capital required for all environmental projects.

# ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT

## SECTOR DEVELOPMENT SCENARIO

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### ROMANIA REFINERY RATIONALIZATION STRATEGY

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Clearly, an outsider looking in at Romania's refining sector would question the need for five refineries with almost equal capacity (4.5 to 5.0 MTA each) and design capabilities, plus two smaller refineries (at about 0.5 MTA each) for a total of 25 MTA with a domestic market demand of about 14 million tons per year of products in the year 2000. However, last year, Romania had 20 separately operating trains in 10 crude processing locations, with a total crude processing capacity of 34 MTA. The intermediate step (Stage I) of Rafirom's strategy is to shut down 13 of the 20 trains and concentrate its capacity in the best and most modern units, reducing their total capacity to 18 MTA.

Based on 1993 refining throughput, one ton of crude yielded about 0.9 of a ton of products (the balance going to fuel, losses, and unidentified intermediate products used in the petrochemical plants). And, considering that the normal level of refining production to capacity ratio is about 85 percent, 14 MTA of products would require about 18 MTA of normal operating crude unit capacity. Based on our demand forecast, the Stage I level of capacity seems to be about right for the year 2000 demand. Rafirom's strategy of expansion to 25 MTA has been justified based on additional export market and increased petrochemical demand. According to our brief analysis, product export is only marginally profitable and should be limited to the Petromidia refinery.

The question one might ask is "why retain all five major refining processing centers rather than keeping multiple trains at the best and largest refineries?" Obviously this decision avoids the labor and local political problems of completely shutting down a major refining center. This decision compromises the rationalization across all refineries and hurts everyone a little, but no one a lot. With the way that the government is setting crude and product prices, Rafirom allocating crude, and the transportation costs of crude and products being independent of distance transported, it is very difficult to determine exactly which refineries are most likely to be competitive and which are not.

From the Chem Systems analysis on the petrochemical sector, it appears that the Arpechim refinery is best suited for economical petrochemical production. Petromidia is clearly the best refinery for product export. Petrotel is the best refinery for lube oil production and has the flexibility of processing either domestic or imported crudes. These three refineries clearly seem to be "keepers." The other two have balancing positives and

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negatives that make it difficult to determine that should be surplus. Rafo is close to the domestic oilfields and product markets in the northeastern part of Romania, while Petrobrazi is newer and larger.

A more detailed analysis should be performed to determine if a refinery should be surplus and if so, which one.

### **A VISION OF THE SECTOR**

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It is desired to transform the refining sector into a fully competitive industry in which consumers get products at internationally related prices while the companies are profitable. This is best achieved by creating competition wherever possible and regulating prices where natural monopolies exist. At present the entire industry is controlled by the Government of Romania through management of prices.

The Romanian refining industry has some strong advantages that will help restructuring:

- About half the oil requirement for domestic uses is met by indigenous oil, which is low sulfur, although also of a lower yield
- Several refineries are of high complexity, although less efficient and with lower quality products than comparable western refineries
- An extensive pipeline network for crude oil and products
- A population of 23 million people with the potential to increase demand at above-average rates
- Technological skills and experience

On the other hand, the sector has some significant disadvantages:

- Conversion of the economy from central planning to free market is only partially completed; foreign exchange, inflation, and intercompany debt still cause problems for operating companies; the lack of adequate banking, communications, and legal infrastructure puts a full-market economy out of reach at present
- The larger refineries are poorly located to serve the entire market; they are concentrated near the crude oil rather than near the markets

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

- The size of the refineries is relatively small by western standards, and they do not have the capability of desulfurising fuel oil from imported crudes
- The specification of several important refinery products is below the standard required in the European Union
- A number of horizontal monopolies control import, export, distribution, and retail activities
- The system of price control obscures true costs, leads to inefficiencies, and does not provide incentives for cost savings
- Key managerial skills are in short supply, particularly in commercial areas
- The sector needs a large amount of capital for investment and for working capital

The strengths and weaknesses of the sector point the way to regenerating it.

### **STRATEGIES FOR THE GOVERNMENT**

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The following is a discussion of short- and medium-term actions that is recommended to be taken by the Government of Romania, Rafirom, and the refineries to implement the refinery sector rationalization and restructuring program. The proposed strategy is directionally correct, but the timing and priority of investments must be matched to the Romanian market needs.

The Romanian Government should:

- Complete the move to independence for the management and operation of the refining and petrochemical sector in Romania
- Eliminate the setting of domestic crude and product prices based on cost plus concepts and move toward free-market prices for internationally traded commodities
- Develop a formula pricing concept, in the intermediate time frame, to allow prices to follow the international market prices of similar crudes and products, with current exchange rates
- Allow each refinery enough foreign exchange convertability for crude importation and working capital

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

- Foster competition in the product marketplace by splitting up unnatural monopolies, such as Peco and Rafirom
- After competition is established, eliminate formula pricing altogether
- Enact legislation to guarantee protection of foreign investment and free repatriation of profits, thus mitigating an impediment to foreign capital generation
- Establish a reasonable plan of environmental regulations, with progressive steps toward West European standards, to improve the quality of products and performance of refineries without overly constraining the industry's ability to economically survive in the transitional period

Rafirom, in their role of managing the transition, should take the following actions to implement the restructuring strategy:

- Prioritize the refinery development projects to obtain the greatest return for the least capital based on the domestic market demand forecast; many projects yield a near-term savings in energy efficiency and reduction of losses without a large capital expenditure; postpone projects intended primarily as capacity expansion efforts
- Focus product export production at the Petromidia refinery to minimize the crude and product transportation costs
- Promote the refineries expansion into the marketing area by either joint ventures with international companies, obtaining some of Peco retail outlets, or developing their own retail outlets
- Continue to combine the three smaller refineries into the overall operation of larger refineries and eliminate the crude processing at these sites
- Spin-off the Petrolsub refinery as a separate business entity along with Petrom's heavy oilfield production facility, as these two operations should be combined as a single economic unit, probably best operated independently from either Petrom or Rafirom

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

- Concentrate the operation of the inland refineries on domestic markets and improve product distribution by expanding the product pipeline system into Transylvania and the Western Danube, if economically justified
- Allow each refinery to optimize their operation by selecting quantity and quality of crudes to run based on their specific market demands
- Train refinery personnel on refinery optimization, crude and product trading methods, market pricing concepts, and energy efficiency techniques
- Allow each refinery to compete in the market for product sales and let them decide at what price to sell products
- Eventually, each refinery should be an independent economic unit with their own crude trading organization, product sales staff, and project management organization; the market will decide which refinery will survive and which will not
- Rafirom should evolve into a National Refining Association to promote laws and regulations that are in the best interest of the refining sector in Romania; this organization would be analogous to the National Petroleum Refinery Association (NPRA) in the United States or EUROPIA for the European Community; Rafirom could coordinate with the other international technical organizations and publish papers and journals of interest in the refining sector

### **STRATEGIES FOR THE REFINERIES**

Without a comprehensive analysis and discussion, only tentative suggestions can be made. As a first pass, one could consider the following:

- Petromidia
  - Divest petrochemicals to Arpechim, making the refinery more easily privatized
  - Modernize the refinery
  - Provide working capital of approximately \$100 million
  - Allow the company to operate on free-market pricing, primarily for export; consider swap deals with Mol

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

(Hungary) for gasoline to Transylvania in return for exports to Black Sea

- Privatize the company, with some foreign ownership to recoup expenditure
- Look for tax revenue on profits; therefore, monitor transactions
- Arpechim
  - Acquire petrochemical operations of Oltechim, Petromidia, Solventul, Petrobrazi, possibly as a separate petrochemicals company
  - Modernize refinery, but perhaps not lubes
  - Modernize petrochemicals operations: cracker, chlor-alkali, and polymers
  - Provide working capital of \$150 million
  - Allow the company to operate on free-market pricing
  - Privatize the company, possibly to a petrochemical company
- Rafo
  - Combine Rafo, Darmanesti, Carom
  - Consider closure of distillation of Darmanesti
  - Modernize refinery, but question the need for either a new coker or for MTBE at Rafo
  - Look for exports to Moldova, Ukraine, when the economic climate in these countries is healthier; forget exports to Slovakia, Hungary
  - Provide working capital of \$150 million
  - Allow the company to operate on free-market pricing
  - Privatize the company, possibly to a petrochemical company

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

- Ploiesti Refineries
  - Combine Petrobrazi, Protrotel, Astra, Vega, and Lubrefin under one management
  - Close distillation at Vega
  - Close petrochemicals at Petrotel
  - Consider lubes as a separate business
  - Modernize in stages
  - Focus on domestic markets, running domestic crudes
  - Provide working capital of \$150 million
  - Allow the company to operate on free-market pricing
  - Privatize the company or keep in the public sector if not saleable
- Steaua Romana: close
- Petrolsub: Transfer to Petrom, to be operated together with the oil production facilities

### **STRATEGIES FOR THE SUPPORT INDUSTRIES**

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- Petrolexportimport: Privatize to employees as soon as viable competition exists
- Oil Terminal Ltd.
  - Install accurate monitoring and measurement equipment, ensure environmental standards
  - Establish charge structure and regulation
  - Sell to international terminal operator, or to the refinery in consortium, but ensure equal terms for all users

## **ROMANIA REFINERY AND PETROCHEMICAL SECTOR RESTRUCTURING PROJECT**

- Conpet and Petrotrans
  - Establish regulatory structure for pipeline use, ensuring equal treatment to all
  - Investigate the need for Conpet to be involved in rail transfers
  - Sell, possibly to the refineries in consortium, but ensure equal terms for all users
- Peco and Transpeco: Split up into regional companies, give some assets to each refinery

The Phase Two program should implement the restructuring program outlined above and assist the Government of Romania in the transition to a market economy for the petroleum and petrochemical sector.