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The *Latin America Energy Project* examines the development of the Latin American energy sector in order to: assess its interactions with the Western Hemisphere energy market and links to other markets; facilitate dialogue between the U.S., regional industry executives and private sector companies to further market stability, energy security and investment opportunities; promote policies which provide for sustainable development of the hydrocarbons industry in the region. In addition to this quarterly report, researchers on the *Latin American Energy Project* frequently publish their findings in articles and energy advisories. While focusing primarily on the oil and gas sectors, the project also covers issues related to coal, hydroelectricity and nuclear power.

Notice: The Latin America Oil & Gas Monitor will continue to be released quarterly.

Contents	Page
I. Issue Focus: Venezuela's Orimulsion Production and Marketing: An Overview	1
II. Recent Developments in Latin America's Oil & Gas Sector	9
A. General	9
B. Upstream	11
C. Downstream	17
D. Pipelines	21
III. Statistical Appendix	25

I. ISSUE FOCUS

Venezuela's Orimulsion Production and Marketing: An Overview

Orimulsion is a boiler fuel substitute made from bitumen, water, and emulsifiers, which was developed by the Venezuelan state oil company, Petroleos de Venezuela (PDVSA). The term Orimulsion is a trade name assigned to the emulsion fuel whose bitumen content, called Orinoco, is derived from Venezuela's Orinoco Tar Belt. Orimulsion is produced and marketed by Bitumenes Orinoco, S.A. (Bitor), a subsidiary of PDVSA. It is promoted by Bitor as an economically attractive alternative to steam coal for power generation. In this short paper, we will review the current status and future prospects for the production and marketing of Orimulsion. Since Orimulsion production is closely associated with Venezuela's heavy oil development, we will first examine the country's ambitious heavy and extra-heavy oil conversion projects.

Heavy Oil Development in Venezuela

Venezuela is a country known for its heavy oil reserves. Of the country's 64 billion barrels of proven oil reserves, only 30% is light and medium crude, and the rest is heavy crude oil. Venezuela could contain as much as 289 billion barrels of heavy and extra-heavy oil and 61 billion barrels of light to medium oil as recoverable reserves.¹ The majority of the additional heavy oil reserves is concentrated in the Orinoco Tar Belt, which is located in the southern part of the

Eastern Basin of Venezuela, north of the Orinoco River, and covers an area about 435 miles long and 30 to 60 miles wide.

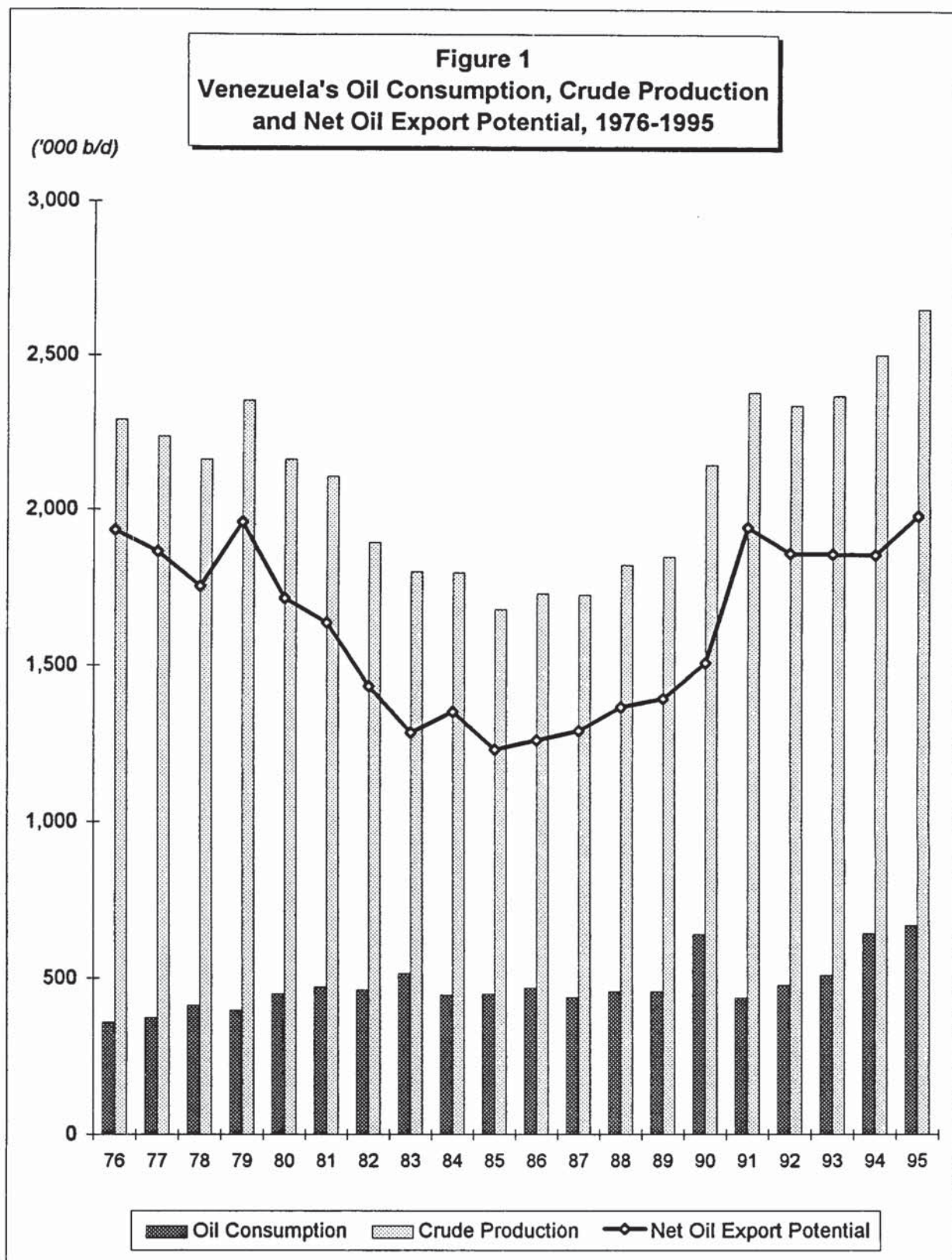
Venezuela is one of Latin America's two largest crude oil producers and exporters second only to Mexico, and is the region's only OPEC member. Following a period of stagnation during the 1980s, Venezuela's crude production and net oil export potential are on the rise again in the 1990s. The country produced and exported approximately 500 thousand barrels per day (b/d) more oil during the first half of the 1990s than during the second half of the 1980s (Figure 1). Venezuela's current crude production capacity is about 3 million b/d, of which heavy oil accounts for about 830 thousand b/d. In 1995, Venezuela produced a total of 2.66 million b/d of oil, 6% higher than its 1994 output of 2.5 million b/d.

The Venezuelan government has long sought to develop its Orinoco Tar Belt, which contains a large amount of heavy-grade oil. PDVSA has been working along two directions in the area: (1) exploring and producing tar sands (heavy and extra-heavy oil) and upgrading them to lighter grades, known as heavy oil projects; (2) producing bitumen (Orinoco) and manufacturing a new boiler fuel for export, known as the Orimulsion project.

At the present time, four major association projects are expected to produce 564 thousand b/d of heavy and extra-heavy crude and convert the crude into 505 thousand b/d of upgraded oil by 2005. Total capital investment of the projects over the next ten years is estimated to be US\$13.3 billion.² The Venezuelan Congress has already

¹ See *Oil & Gas Journal*, August 14, 1995.

² See *Latin American Energy Alert*, March 1, 1996.



approved two of these four projects, which are joint ventures between PDVSA subsidiary Maraven and Conoco of the U.S., and between Maraven and Total of France, Itochu and Marubeni of Japan, and Statoil and Norsk Hydro of Norway. The Maraven-Conoco project, approved in August 1993, is expected to cost US\$2.75 billion for both heavy and extra-heavy oil production and upgrading. The joint venture plans to produce 105 thousand b/d of 20°API upgraded oil from the Zuata region in the Orinoco Belt (Figure 2). The ambitious Maraven-Total project is estimated to cost US\$5.25 billion with ultimate production of 140 thousand b/d of 30°API upgraded oil, also from the Zuata region. The Congress is expected to approve the other two joint ventures during the second half of 1996. One is between PDVSA subsidiary Corpoven and Arco of the U.S. The other one is between PDVSA subsidiary Lagoven and Mobil of the U.S. The Corpoven-Arco project is so far the largest one among the four projects, and it plans to produce 180 thousand b/d of 26°API upgraded oil at a total cost of US\$3.5 billion. The Lagoven-Mobil joint venture appears to be the smallest project, with a total capital expenditure of US\$1.8 billion for 80 thousand b/d of upgraded oil production from the Cerro Negro region in the eastern part of the Orinoco Belt by 2005 (see Figure 2).

By 2000, Venezuela's crude oil production capacity is expected to increase to 4.3 million b/d, of which the heavy and extra-heavy oil will account for about 1.1 million b/d. PDVSA also plans to increase its crude production capacity to 5.6 million b/d by 2005. Heavy oil and upgraded oil are expected to account for a substantial share of the crude oil output in ten years.

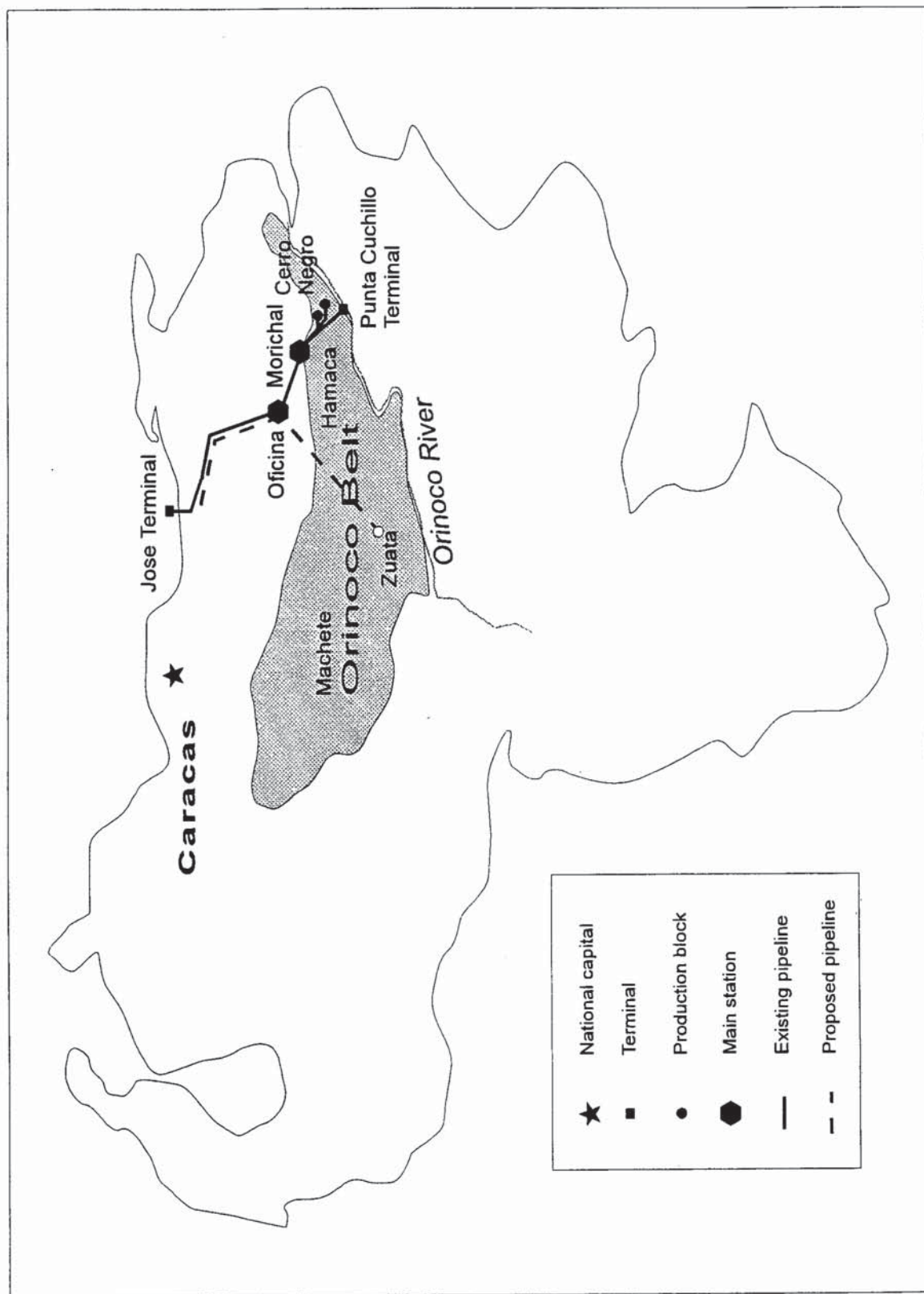
Production and Marketing of Orimulsion: Current Status

The bitumen-water ratio of Orimulsion is about 70:30. Bitumen produced from the Orinoco Belt of Venezuela, or Orinoco, is an extra-heavy hydrocarbon with a gravity of 7.5-9.5°API. After it is emulsified and mixed with water, the resulting Orimulsion has a gravity of approximately 10°API and a high viscosity.

Ever since Bitor started to produce Orimulsion in the late 1980s, the increase in both production capacity and global sales has fallen far behind PDVSA's initial targets. In 1990, Bitor's Orimulsion production capacity was about 2.9 million tonnes per year (t/y) or 48 thousand b/d, and sales were just over 1 million tonnes (17 thousand b/d). At that time, Bitor set an ambitious target of 50 million t/y (835 thousand b/d) for 1996. The plan was revised in 1991 but still called for an expansion of Orimulsion production capacity to 40 million t/y (670 thousand b/d) by 1996. However, as of 1995, Orimulsion production capacity was only 5.2 million t/y (85 thousand b/d). Currently, the only Orimulsion production unit is operated by Bitor and located in the Orinoco Belt's Cerro Negro region (see Figure 2).

Bitor S.A. markets Orimulsion internationally through BP Bitor (a 50:50 joint venture between Bitor and British Petroleum) in the UK, Bitor International in Europe, Bitor America in North American and Caribbean areas, and a joint venture with Mitsubishi of Japan in the Far East and Africa. Because of PDVSA's standing policy of not marketing Orimulsion as a competitor of fuel oil, the use of Orimulsion is mainly in the power sector based on long-

Figure 2. Venezuela's Orinoco Belt and Orimulsion Facilities



term supply contracts. For the same reason, Orimulsion is priced on the basis of coal and is targeting the market of coal-fired plants.

As in the case of production, Bitor has fallen behind its target for marketing of Orimulsion for years. The sales climbed gradually from 1 million t/y (17 thousand b/d) in 1990 to about 2.5 million t/y (42 thousand b/d) in 1994. However, in 1995, sales of Orimulsion jumped 40% to 3.6 million t/y (60 thousand b/d). Table 1 lists the current contracts and likely and possible sales of Orimulsion by 2000 worldwide.

PowerGen is the first international company to sign a contract with BP Bitor to supply 1 million t/y (17 thousand b/d) of Orimulsion to a 550 MW power plant at Ince, UK. Together with another 240 MW power plant at Richborough, PowerGen burns about 1.5 million tonnes (25 thousand b/d) of Orimulsion each year in the UK. New Brunswick Power of Canada is also among the earliest to sign a contract to use Orimulsion for power generation. In the Far East, Bitor is currently supplying approximately 900 thousand t/y (15 thousand b/d) of Orimulsion to power several plants belonging to three Japanese companies: Kashima, Mitsubishi, and Kansai. The first European supply contract outside the UK was with the Danish firm SK Power in late 1994. About 1.1 million t/y (18 thousand b/d) of Orimulsion is needed for SK Power's 700 MW power plant.³ All current Orimulsion contracts for power plants total about 2,200 MW. These power plants require Orimulsion input of about 4.1 million t/y (68 thousand b/d).

Future Prospects of Orimulsion Supply and Demand

The power industry is a fast growing sector worldwide. As more developing countries have embarked on the path toward industrialization and modernization, their demand for electricity has been growing fast. If Bitor can solve a host of problems such as cost effectiveness, environmental impact, transportation economics, and other issues, Orimulsion appears to have a bright future, although its sales in the 1990s are below company projections.

On the marketing side, Bitor SA has been active in expanding the Orimulsion sales by seeking and signing new commercial agreements. In early 1994, Bitor America signed its first long-term contract in the United States with Florida Power and Light. Starting from 1998, Bitor America is expected to supply 4 million t/y (67 thousand b/d) of Orimulsion to the Florida Power and Light for 20 years. Also by 1998, Bitor is expected to supply 750 thousand t/y of Orimulsion to a 350 MW power plant owned by Japan's Hokkaido Electric Power Co. It also has a commercial agreement with the UK's PowerGen to provide another 3-5 million t/y (50-85 thousand b/d) of Orimulsion for power plants with a total capacity of 2,000 MW (see Table 1). In addition, another 200 thousand t/y (3 thousand b/d) is likely to be supplied to Lithuania. As such, the likely sales of Orimulsion by 2000 range from 12.1 million t/y (200 thousand b/d) to 14.1 million t/y (235 thousand b/d), supporting power plants with a total capacity of nearly 6,250 MW.

In early 1996, Bitor made an agreement with Taiwan's Synthetic Rubber and its partners to supply 3.5 million t/y (60 thousand b/d) of

³ The plant is not fueled by Orimulsion alone.

Table 1
Current Contracts and Planned Sales for Orimulsion, 1996 and 2000

Operator	Location	Power Plant Capacity (MW)	Orimulsion Required ¹ ('000 t/y)
Current Contracts 1996			
Kashima Kita	Kashima, Japan ²	225	450
Mitsubishi Kasei	Mizushima, Japan	70	140
Kansai Electric	Osaka, Japan	156	310
Powergen	Ince B, U.K.	500	1,010
Powergen	Richborough, UK ²	240	490
New Brunswick Power	Dalhousie, Canada ²	300	600
SK Power	Asnaes, Denmark ^{2,3}	700	1,100
Sub-total		2,191	4,100
Likely Sales by 2000			
National Power	Pembroke, UK ²	2,000	3,000 ~ 5,000
Florida Power & Light	Manatee, Fla., US ²	1,600	4,000
Hokkaido Electric	Shiriuchi, Japan	350	750
Lithuania	Lithuania	100	200
Sub-total		4,050	7,950 ~ 9,950
Possible Sales by 2000			
TSR ⁴ & Intergen	Lizhe, Taiwan ²	1,500	3,500
Sub-total		1,500	3,500
Total		7,741	15,550~17,550

1. Estimated.

2. Combined capacity of two or more units.

3. Part of the total capacity is fueled by Orilmusion.

4. TSR=Taiwan Synthetic Rubber.

Source: compiled by author from various sources including *Oil & Gas Journal* and *Middle East Economic Survey*, various issues.

Orimulsion for two 750 MW plants, one to be completed in mid-2000 and the other one by the end of the same year. This contract falls into our category of "probable" sales, because it is uncertain whether the independent power program (IPP) will proceed smoothly in Taiwan. Altogether, likely and possible sales of Orimulsion in 2000 could reach up to 17.6 million t/y (nearly 300 thousand b/d), close to Bitor's targeted production capacity of 21 million t/y (350 thousand b/d). By 2000, all likely and possible power plants fueled by Orimulsion could exceed 7,700 MW (see Table 1).

In addition to the agreed or concluded deals, some other proposals are being made in different parts of the world. For instance, Mitsubishi Co. of Japan proposed in early 1996 to build a 1,000 MW power plant in Thailand with various partners, using Orimulsion as the input fuel. The project is one of the independent power programs that have been rapidly developed in Thailand. In addition to the planned Lizhe power plant, Taiwan has some alternative proposals for using Orimulsion. Bitor also has completed feasibility studies for power plant conversions to Orimulsion fuel in Italy, Finland, Denmark, Hungary, Israel, and Morocco, with small scale trials being carried out in Denmark, Italy, and Germany. However, there will be a long way to go before these proposals are finalized and implemented.

On the supply side, Bitor plans to increase the Orimulsion production capacity to about 21 million t/y (350 thousand b/d) by 2000. As part of the build-up, the Venezuelan Congress is expected in late 1996 to approve a joint venture between PDVSA subsidiary Bitor, US firm Conoco, Norwegian firm Statoil, and local group Jandis to build

another production unit with a capacity of 5.2 million t/y (85 thousand b/d) of Orimulsion. The total cost for the project is estimated at US\$320 million. This will raise the Orimulsion production capacity to 10.4 million t/y (170 thousand b/d). In order to meet the target of 21 million t/y (350 thousand b/d) of Orimulsion production capacity by 2000, Bitor has to build two more units with 5.2 million t/y (85 thousand b/d) each. Over the longer period of time, Bitor hopes to raise the total production capacity of Orimulsion to 50 million t/y (835 thousand b/d) by 2030. According to Bitor, the construction of new production facilities is likely to be limited to the Cerro Negro region of the Orinoco Belt prior to 2000, and production sites can be developed in the Zuata region thereafter (see Figure 2).

Despite the ambitious production plans and potential markets for Orimulsion, there are several potential challenges facing Bitor SA and its overseas joint ventures in expanding the Orimulsion production capacity and increasing global Orimulsion sales. The biggest challenge is the availability of capital for Orimulsion expansion projects. To meet the target of 21 million t/y (350 thousand b/d) by 2000, Bitor has to build production units four times as large as the existing one, which will cost about US\$1 billion. The joint venture between Bitor, Conoco, Statoil, and two Venezuelan firms will meet about one-third of the additional capacity requirements. If Bitor goes ahead with its long-term plan to increase the production capability to 50 million t/y, then a capital investment of approximately US\$2 billion (in constant 1996 US dollars) between 2000-2030 will be required. Associated pipelines and other infrastructure to expand the production blocks into the Zuata region will cost more. Given many other priorities of

PDVSA, including refinery expansion, heavy oil upgrading, marginal fields development, and crude oil production capacity expansion, the state oil company may have a hard time to mobilize all needed funds for the Orimulsion expansion. As a result, a substantial part of the funding requirements will have to come from domestic private and foreign investment. For this reason, PDVSA is actively seeking foreign partners in the Orimulsion business, ranging from bitumen (Orinoco) production to Orimulsion manufacturing and marketing. In fact, participation of foreign investors in Orimulsion production and marketing is one of the five areas in which PDVSA is calling for the private sector's involvement in the country's petroleum sector development. The other four areas are (1) reactivation of inactive oil fields through operating contracts; (2) crude exploration and production (E&P) through profit sharing contracts; (3) development of the Orinoco Belt heavy and extra-heavy oil through strategic association contracts; and (4) participation in PDVSA's non-core activities such as power and steam generation, transportation, telecommunication, and computer centers.

The environmental impact of burning Orimulsion and the classification of Orimulsion as oil or coal for both tariff purposes and OPEC policy are two of the other big challenges facing Bitor, as it attempts to expand Orimulsion marketing worldwide. Orimulsion has a sulfur content of 2.7% by weight, which is comparable to high-sulfur coal or high-sulfur fuel oil. In many of Bitor's existing markets such as Japan, the UK, the U.S., and Europe, Orimulsion-fired power plants have to be equipped with scrubbers for sulfur dioxide emission control, which can be very

expensive. Whether or not Orimulsion should be treated as oil or as something else is an issue that OPEC has to work out by itself. PDVSA has done its part by marketing and pricing Orimulsion on the basis of coal and even targeting only the market of coal-fired power plants. In the case of Orimulsion sales to Florida Power and Light, double hull vessels may have to be used to avoid potential oil spills. According to a special study conducted by the PIRA Energy Group,⁴ in all three areas, i.e., environmental impact, OPEC policy, and treatment of Orimulsion for import tariff purposes, Bitor has been quite successful in addressing and solving some of the major problems. Such achievements of Bitor will have a positive impact on the future sales of Orimulsion.

Concluding Remarks

In summary, although Orimulsion is an important new and "revolutionary" fuel for the world's power sector, its rate of market penetration remains speculative during the early 1990s. The Orimulsion sales are now speeding up as we enter the second half of the 1990s. The future of Orimulsion could be even brighter, as Bitor has started to expand its capacity and has signed additional commercial agreements. Now Bitor is more realistic in setting its long-term production and marketing goals for Orimulsion. But for the next five years, whether or not Bitor can meet the export target of 21 million t/y (350 thousand b/d) depends crucially on the funding availability for Orimulsion production facilities and the success of Bitor's marketing strategies in the Asia-

⁴ The PIRA report, entitled *Orimulsion: A Special Study*, is discussed in the *Petroleum Intelligence Weekly*, March 18, 1996, and *Middle East Economic Survey*, January 8, 1996.

Pacific region and Europe. In the long run, as PDVSA has increasingly focused on the development of the country's heavy oil, more feedstock will be available for manufacturing Bitor's Orimulsion. On the demand side, increased consumer interest in Orimulsion and aggressive marketing of this product suggest that this new fuel may play an important role in world power markets over the next decade.

II. RECENT DEVELOPMENTS IN LATIN AMERICA'S OIL & GAS SECTOR

A. GENERAL

Argentina

- (February 1996) A dispute between national and provincial governments compounded difficulties in reforming Argentina's hydrocarbons law. Oil-producing provinces would like more control over royalty charges, environmental regulations, and the enforcement of existing production contracts. The provincial governments have had less power as their shares in YPF have fallen below the 5% needed to maintain a seat on the company's board of directors. Provinces have been forced to sell their shares in YPF to generate badly needed funds to offset their budget deficits.

Bolivia

- (January-February 1996) The Bolivian Government has amended the terms for the privatization of YPFB yet again. Bolivia's latest overall strategy is to capitalize YPFB's upstream operations and transportation assets, sell its refineries and marketing units to the highest bidder, and leave a

substantially smaller, administrative YPFB under state control. The transportation assets will be capitalized as a single entity. However, two of the upstream operators will take 10% stakes in the transportation company. In addition, one of the refining units will be sold together with one of the marketing firms. Some of the changes were made to allow domestic companies and Argentina's YPF to participate in the sale. Neither Bolivian firms nor YPF had qualified to bid under the previous terms of reference. YPF must show a net worth of US\$1 billion and will only be allowed to bid on a specific package of 18 fields, including: Montecristo, Taboco, Bullo Bullo, Carrasco, and Vuela Grande. The remaining fields, including all those currently in production, being developed and explored will be open to all bidders meeting the full terms of reference. The Government intends to issue indefinite concession contracts for the exploitation of these fields. Opening bids are expected in May of this year.

Brazil

- (February 1996) A month-old oil workers' strike in 1995 contributed to the rise of Petrobras' debt by 24% from US\$4.6 million in 1994 to US\$5.7 million in 1995, and to the decline of the state oil company's net profit from nearly US\$1.9 billion in 1994 to US\$570 million in 1995, a 69.5% decrease. The state oil company was forced to import additional refined products during the strike in June 1995, when a substantial part of the country's refining capacity was temporarily shut down. Petrobras' continued subsidies to the country's ethanol industry is also responsible for the lowering of its net profits in 1995. However, the company's total earnings in 1995 amounted to US\$21 billion, 13.4% higher than in 1994.

Chile

- (February 1996) State-owned ENAP's (Chile) 1996 annual investment plan, primarily covering new joint-venture projects with private investors, has caused speculation that the Government may be considering privatizing part or all of the company. Additionally, the hiring of the Argentine consulting company that worked on YPF's privatization, AICC Consultores, has fueled rumors of privatization. However, AICC's main objective is to identify joint-venture opportunities, and analyze the possible sales of ENAP shares or assets in order to fund the company's planned investment activities.

Ecuador

- (January 1996) As a result of a scam to import diesel from Venezuela and sell it at inflated prices, President Sixto Duran Ballen has replaced Frederico Veintimilla with General Patricio Lopez as president of Petroecuador. Further, former General Jorge Mendez replaced Marco Salas as head of Petrocomercial, the company's marketing arm. Others recently appointed to key positions in Petroecuador include Edmundo Brown as head of Petroindustrial, and Jose Paéz as head of Petroproducción. In addition to the leadership change at Petroecuador, a new Administrative Council has been formed with ex-Texaco executive Franklin Velasco, former Petroecuador executive Carlos Morillo, and oil industry insider Diego Armijos. Government officials estimate the State's losses as a result of the price-scam at US\$70 million.

Peru

- (January-February 1996) Despite opposition, and a 48-hour strike in early February by workers at La Pampilla refinery, the privatization of Petroperu was expected

to resume with the scheduled sale of Petrolube on March 27, 1996 (see the following table). Petrolube, the company's lubricants production and marketing arm, reportedly had sales approaching US\$100 million in 1995, and is estimated to be worth between US\$10 million and US\$12 million. The buyer may buy up to 100% of the shares of Petrolube, contingent on how much of the 10% option its workers exercise. Chevron Overseas Petroleum (U.S.) bought bid documents shortly after Copri, the state privatization committee, announced their sale on February 2, 1996. Mobil (U.S.), Pennzoil (U.S.), Maraven (Venezuela), and YPF (Argentina) had already purchased documents in 1994. According to the timetable released by Petroperu, a 60% stake in La Pampilla refinery, and northern jungle Block 8/8X will be offered in May 1996. Bidders will be allowed to bid for only the refinery, or the oil fields if they wish. Identical conditions will apply to the scheduled sale of the Talara refinery with north coast Block X and Block XI (the new name for the Occidental-Bridas secondary recovery project) in July 1996. However, Copri will not permit the same company to bid for both refineries, or for a refinery and the Callao fuel terminal. The sale of Petroperu's oil terminals is slated for sometime between September and December of 1996. Meanwhile, Petroperu intends to offer a 10-year concession for the North Peruvian Pipeline in August 1996. The management contract for the Iquitos refinery is not to be tendered until March of 1997. In hopes of speeding up the privatization process, President Fujimori has appointed Dante Cordova, head of the cabinet of ministers, as president of Copri, replacing Energy Minister, Amado Yatacao. Yatacao had been accused of hindering Petroperu's privatization.

Privatization Schedule for Petroperu

Unit	Date
Petrolube	March 1996
La Pampilla Refinery & Block 8/8X	May 1996
Talara Refinery & Block X/XI	July 1996
North Peruvian Oil Pipeline	August 1996
Conchan Refinery & Terminals	Sept.-Dec. 1996
Iquitos Refinery	February 1997

Source: Petroperu

- (February 1996) Despite the workers' strike at Peru's largest refinery in Talara, 560 miles northwest of Lima, to oppose the sale of the plant, the Government confirms that the decision to privatize Petroperu by the end of 1996 is irreversible. Petroperu employs 5,500 workers, 2,500 of which are employed at the huge Talara plant. Workers are opposed to the privatization, which will also include the sale of the refineries, given that it is expected to result in the loss of 1,200 jobs.

B. UPSTREAM

Argentina

- (December 1995) New natural gas discoveries in northern Argentina may make a natural gas pipeline to southern Brazil economically viable. A recent discovery of at least 7 trillion cubic feet (Tcf) of gas contained in the Aguarague field, developed by a consortium including YPF (Argentina), Tecpetrol (Argentina), and Braspetro (Brazil), could provide exports of 707 million cubic feet per day (MMcf/d) for 30 years. Because industry officials believe that

northern Argentina must have an export potential of at least 1 billion cubic feet per day (Bcf/d) to make a pipeline viable, pipeline supporters hope that nearby fields will be able to provide the needed reserves.

- (December 1995) Argentina postponed bidding for seven, high-risk offshore blocks west of the Falklands (Islas Malvinas) until March 30, 1996 at the request of some oil companies considering projects in the area. The tender is expected to include two or three-year exploration periods. Argentina had expected to offer the blocks in January, following an agreement with Great Britain covering exploration activities surrounding the disputed islands, but potential investors have expressed concern over the economic viability of the blocks in light of the substantial costs involved in exploring them. For instance, each well is estimated to cost between US\$10 million and US\$15 million, in addition to the roughly US\$4 million companies will have to spend on seismic work. Argentina believes that companies will have to drill at least two wells for each block, thus making the minimum cost to explore a single block lay between US\$24 million and US\$34 million. Moreover, oil companies are wary of the fact that the blocks are to be offered under the conditions of the Plan Argentino, which to many firms does not offer very favorable terms. However, YPF, British Gas (UK), ENAP (Chile), and Petrobras (Brazil) are expected to bid, possibly as a group.

- (January 1996) Plans to increase Argentina's crude production by 300 thousand barrels per day (b/d) over the next 5 years, and double the 2.2 billion barrels of oil reserves over the next decade, may prove ambitious, given Argentina's lack of finances and limited upstream potential. Although

since the privatization of YPF, production has risen by about 110 thousand b/d, to around 700 thousand b/d in December 1995, with a reserves to production ratio of only 9 years, Argentina may not be able to fulfill its plans. An increase in reserves, and thus production, is now dependent on investment in exploration of the prospective southern coast of Argentina. YPF, which accounts for about half of all production, will play a key role in achieving the goals. YPF plans to invest as much as US\$15 billion in upstream over the next 10 years, although it had to cut down its upstream spending by 15 percent to US\$1.3 billion in 1996. The Government's effort to attract foreign investors into Argentina's upstream sector by cutting down production-related taxes, such as royalties and income taxes, to lower than world averages, has been successful, but additional cuts are unlikely. The lower potential for new significant discoveries, together with competition to attract foreign investment from other Latin American countries on the verge of opening their upstream sector, will make it difficult for Argentina to achieve its upstream goals.

Bolivia

- (December 1995) The Government has prohibited the state oil company, YPFB, from selling part of its 50% stake in the San Alberto gas field, containing reserves of between 0.6 Tcf and 1.3 Tcf, to foreign oil companies. Exxon (U.S.) and TOTAL (France) had hoped to acquire 20% of YPFB's shares in the field. However, with the capitalization of YPFB pending, some feared the sale would have reduced the company's value.

Brazil

- (December 1995) Through Braspetro, the foreign exploration arm of the state oil

company, Petrobras of Brazil has participated in exploration and production (E&P) activities in Angola, Libya, Argentina, Ecuador, Colombia, the Gulf of Mexico, and the North Sea for years. In 1995, Braspetro made a total investment of US\$127 million abroad. It plans to increase its foreign E&P investment by nearly 51% to US\$192 million in 1996. About one-third of the planned investment will be in Angola, where Braspetro has a 27.5% share in a joint venture with the Angolan state oil company Sonangol, TOTAL of France and Texaco of the U.S. Braspetro's equity oil production in the Angolan joint venture is currently at 17 thousand b/d. It hopes to increase the volume to 27 thousand b/d by the end of 1996. The Brazilian company also hopes to search for oil and gas in some new areas such as Bolivia and Venezuela. Braspetro is a qualified foreign company to participate in the bidding for offshore Venezuelan E&P rights, but has not yet made any investment there. In 1996, Braspetro plans to spend approximately US\$55 million in new projects.

- (January 1996) Crude oil production in Brazil is expected to increase sharply in 1996 to more than 850 thousand b/d, nearly 19% higher than the output of 716 thousand b/d in 1995. The output increase is expected to come from the Campos Basin, the largest offshore oil producing field in Brazil. In the meantime, oil demand growth in the country is estimated to be moderate at 4% during 1996. As a result, oil import requirements for Brazil are likely to decline significantly in 1996. In 1995, Brazil imported approximately 790 thousand b/d of oil, of which 56% was crude oil, and 44% refined products. The imports of products in 1995 were particularly high because of the oil workers' strike in June. In 1996, the

reduction of total oil imports is estimated to be ranging from 100 to 140 thousand b/d.

- (January 1996) Brazil's state oil company Petrobras plans to spend US\$17.1 billion over the period of 1996-1999 in order to boost the country's oil production. Of this planned investment, US\$1.4 billion will be spent by Petrobras' subsidiaries. For 1996, Petrobras and its subsidiaries are expected to make capital improvements totaling US\$3.2 billion, up from US\$2.7 billion in 1995. The four-year investment plan, drawn up by Petrobras' strategic planning department, is focusing on how to boost foreign participation. However, expenditures by Petrobras probably will not allow Brazil to boost its crude production to 1.3 million b/d over the next five years. In 1995, Brazil produced 716 thousand b/d of crude oil, about half of the country's oil consumption. According to Petrobras, a minimum of US\$5 billion and up to US\$10 billion of foreign capital is needed for the country's oil sector. Petrobras is targeting potential foreign partners, such as Texaco, Shell, Exxon and some Japanese companies, to form joint ventures. Private and foreign investment in Brazil's upstream and downstream is now possible after the state oil company's monopoly over the petroleum sector ended in 1995 under new constitutional amendments. However, potential investors have to wait for the approval of the Congress on policies and rules governing the demonopolized industry, due by the end of 1996, before they can proceed with any investment.

Colombia

- (January 1996) American International Petroleum Corp. announced the discovery of an estimated 133 million barrels of oil reserves in the Toqui Toqui field in the

Middle Magdalena Valley. Engineers from Huddleson & Co. (U.S.) say that about 17.3 million barrels are recoverable. However, company officials believe that recoverable reserves could be as high as 24 million barrels.

Cuba

- (January 1996) Cuban officials anticipate a marginal increase in oil production to 11 million barrels this year. The increase is largely the result of increased foreign investment in Cuba's oil industry. Firms from Canada, France, Great Britain, and Sweden operate in 18 blocks. Cuba's domestic production meets approximately 20% of the 55 million barrels the country needs annually.

Ecuador

- (December 1995-February 1996) Petroecuador announced it will begin negotiations with Energy Development Corp. (U.S.) to develop offshore Block 3 in the Gulf of Guayaquil, containing the Amistad gas field, following the disqualification of the BHP-King Ranch Consortium. BHP-King Ranch could not reach an agreement with Petroecuador on a final contract, citing concerns regarding the cancellation of the Transecuadorian pipeline expansion project, and the lack of guaranteed power purchases by the state power company, Inecel. The consortium had planned to pipe gas from Amistad to an on-shore gas-fired power plant, and sell electricity to Inecel. However, the Government declined to guarantee a power supply agreement.

- (January 1996) Occidental Petroleum (U.S.) and Elf Aquitaine (France) have signed E&P contracts with Ecuador. Occidental will explore undeveloped areas of

Block 15 in return for a seven-year extension on its risk services contract for new discoveries. Elf, on the other hand, will swap land it has explored unsuccessfully for an area believed to be promising.

- (January 1996) Although all of Ecuador's oil discoveries since 1985 have been heavier grades, averaging 15° API, the Mantu 1 exploration well drilled by TOTAL (France) in Block 14 has tested at 2,546 b/d of crude, with an average API of 20 degrees.

Mexico

- (December 1995-February 1996) The combination of hurricanes and the peso's devaluation caused a 2.5% drop in crude oil production, and a 7.5% decline in oil consumption in Mexico during 1995. For the whole year, the country produced 2.62 million b/d of crude and 448 thousand b/d of natural gas liquids (NGLs), 2.5% and 1.8% lower than their respective output levels in 1994. Moreover, the consumption of petroleum products declined to 1.43 million b/d. On the positive side, the crude production was recovered in late 1995, and reached 2.76 million b/d in December. In 1995, Pemex produced 3.8 Bcf/d of natural gas, 1.5% lower than the company's annual plan, but 3.7% higher than the 1994 gas output. In December 1995, the gas production was 4 Bcf/d. Mexico also managed to export 1.29 million b/d of crude oil in 1995, only 1% lower than the exports in 1994. At an average price of US\$15.57 per barrel, nearly US\$2/bbl higher than Pemex's original budget of US\$13.6/bbl, the company generated a net oil export revenue of US\$7.3 billion, up US\$1 billion from 1994. In 1996, Mexico's crude output is expected to increase, and may break the 3 million b/d mark temporarily. However, the average crude output in 1996 is expected to

be 2.86 million b/d, 240 thousand b/d more than in 1995. Crude exports are also forecast to increase by 16% to about 1.5 million b/d in 1996.

- (January-March 1996) Mexico's Energy Regulatory Commission (CRE) is currently working on new natural gas distribution rules, designed to establish new geographical distribution zones and determine the future of small local gas distributors. In early 1996, the CRE issued 16 temporary natural gas distribution permits to some of these small companies, most of which are operating in Monterrey and in the northern part of the country. The permit-owners will be given exclusive five-year distribution terms, if they apply for the permanent permits during the first half of 1996. Alternatively, the permit-owners can ask CRE to put out their zones for tendering, and can receive a 12-year concession if they win the tendering. However, they have to compete with other potential distributing companies who enter the tender as bidders. By tendering the new distribution zones, the Government hopes to attract more companies to the distribution business. Separately, the CRE has recently approved Mexicali to be the country's first natural gas distribution concession area. Private domestic and foreign companies are welcome to participate in the tender. The winning bidders will be given 12 years of exclusive rights to develop and distribute gas in Mexicali. Other areas are expected to open in the future.

- (January-March 1996) Conoco of the U.S., and Nova Corp. and Canadian Hunter Exploration of Canada, will be equal partners in a joint venture, which is likely to be set up in Mexico, to develop the Burgos Basin's natural gas fields under a proposal made by these companies to Pemex. The current

Mexican constitution bans exploration of natural gas by foreign companies. However, service contracts are allowed, which are reportedly the contract type that the joint venture will seek. Conoco and its partners hope to further develop transmission and distribution systems, as the Government permits under the new regulations. Total cost of the proposed development programs could be several billion US dollars, over a period of 20 years. The natural gas fields that will be developed, if everything goes smoothly, are considered a natural extension of the South Texas gas basin, where Conoco is currently operating. The Ministry of Energy is currently examining Conoco's proposal. If approved, the project can be integrated into the US and Canadian gas pipeline systems over the long term.

- (February 1996) Although the Tabasco crisis did not interrupt the January crude oil output in Mexico, the state oil company, Pemex, is estimated to have lost about 28 thousand b/d of crude oil and 50 MMcf/d of natural gas during the crisis, as protesters blocked several dozens of producing wells. Up to US\$8.5 million have been lost because of the protests, which targeted a host of issues including Pemex's poor environmental records, and the planned sales of state petrochemical complexes.

- (February 1996) Production costs of Mexico's offshore oil could be low enough to compare with production costs in the Persian Gulf, according Pemex Chairman Adrian Lajous. However, in the northern part of the country, the cost is close to the production costs in South and West Texas of the U.S. On an overall basis, the average production cost for crude oil in Mexico was US\$2.52/bbl in 1995. In comparison, the state oil company Pemex received an average

of \$15.70/bbl for its crude exports in 1995. This is reportedly the first time in history that Pemex has ever revealed its crude production cost. The purpose is to make Mexico's oil industry more transparent.

- (March 1996) Both crude oil and natural gas proven reserves declined in Mexico during 1995. According to one industry source, Mexico's proven oil and gas reserves declined from 50.8 billion barrels and 69.7 Tcf, respectively, at the beginning of 1995, to 49.8 billion barrels and 68.4 Tcf, at the beginning of 1996. Other sources indicated the drop for oil was 1.16 billion barrels, or down 1.8 percent during 1995. Analysts believe that the decline was a result of the lack of exploration activities by Pemex. Top Pemex officials do not think that the particular drop in 1995 should cause big concerns. They noted that the drop in reserves has existed for years, but remain confident that Mexico's crude production can be maintained for many more years. During 1995, the number of exploratory wells drilled by Pemex dropped, but the state oil company had a higher success rate in exploration in 1995 than in 1994.

Peru

- (December 1995) Pluspetrol (Argentina) in conjunction with Korea Petroleum Development Corp. (South Korea) and Yukong Ltd. (South Korea) placed the only bid, for Block 79, under a five-block tender designed to attract more investment to the Ucayali basin. Block 79 is adjacent to the undeveloped Aguaytia natural gas field, where Maple Gas and its partners are developing a natural gas and power project. The consortium headed by Pluspetrol is expected to offer royalties beginning at 19%.

- (January 1996) Owing to disagreements over tax issues, Peru extended the deadline to the end of February, for Mobil (U.S.) and Shell (U.S.) to sign a deal to develop the Camisea gas fields.

- (January 1996) Murphy Oil found two "world class structures" on Block 71, east of Camisea. The company hopes to postpone seismic work to drill a nine thousand foot well in the summer of 1996.

Trinidad and Tobago

- (January 1996) Amoco Trinidad Oil Co. reported that 27.2 MMcf/d of gas flowed from its El Diablo No.1 exploration well off Trinidad's eastern coast. So far, the well hit 540 ft. of gas-rich sands in six zones, and was drilled to a depth of 13,100 ft. With 3 Tcf of reserves, Amoco already holds the highest proportion of the total 8.7 Tcf of reserves in Trinidad & Tobago. Furthermore, the company is pleased with their proprietary, patent-pending, 3D seismic technology used in its exploration program. The company plans to continue drilling for several months. New gas finds will possibly be used to expand the size of the LNG project. Construction of several new gas-fired power plants (currently only one), and pipelines to neighboring islands are also among the options for the utilization of the new gas.

Venezuela

- (December 1995) Maraven (Venezuela) and Chevron (U.S.) have formed a 20-year, US\$2.5 billion supply alliance that will provide feedstock to Chevron's U.S.-based refineries, and develop the Boscan field. Over the first three years of the contract, which has a 10-year extension option, Chevron will invest US\$400 million to boost the production capacity of the Boscan field

to 115 thousand b/d. Under the supply agreements, Chevron's Pascagoula refinery in Mississippi would initially receive 16 thousand b/d of Merey and Lagotrec-M crudes, with volumes increasing to 40 thousand b/d later. In addition, between 15 thousand and 20 thousand b/d of Boscan, Bachaquero, and Maralago crudes are to be delivered to Chevron's refinery in Perth Amboy, New Jersey, to ensure production of at least 10 thousand b/d of asphalt. Chevron and Maraven have also formed a joint venture to process and market asphalt on the West Coast of the U.S.

- (January 1996) Owing to expanded operations at its gas extraction units, Lagoven (Venezuela) boosted its production of NGLs in 1995. Lagoven produced 46 thousand b/d of NGL in 1995. Through the expansion of its Acogas plant in Monagas, and a similar plant in Zulia, the company hopes to increase its production of NGL by 32.5 thousand b/d over the next three years.

- (January 1996) Venezuela's program to reactivate marginal fields has been so successful that the Government plans to open a third round of bidding for additional fields later this year. Output from the ten marginal fields currently operating reached 119 thousand b/d by the end of 1995, exceeding PDVSA's estimates of 90 thousand b/d. With an additional five fields scheduled to begin production this year, PDVSA estimates that the combined output from all the marginal fields will reach 150 thousand b/d by the end of 1996. The fields expected to begin operation are: Maraven fields Colón, Falcon Offshore, Falcon East, Falcon West, and Lagoven's Jusepin. For 1996, officials estimate that a total of US\$800 million will be invested in the program. Plans call for the 15 fields to yield

424 thousand b/d by 2003. PDVSA believes that 30 to 40 marginal fields could be reactivated under the program.

- (January-February 1996) Although Venezuela's "oil opening" was hailed as a success, two of the ten blocks offered did not draw any bidders. El Sombrero, located far from existing infrastructure, was the least prospective block, with estimated reserves of 400 million barrels. However, many were surprised that Catatumbo went unclaimed as well, since it has estimated reserves of between 500 million and 700 million barrels, and is located in the oil-rich area surrounding Lake Maracaibo, near crude pipelines and loading facilities. As for the other eight blocks, once commercial discoveries are made, the companies will form joint ventures with Corpoven, which can hold a maximum 35%-stake. However, under the terms of the contracts, production from these profit-sharing blocks will be scaled back in proportion to their fractions of overall Venezuelan output to meet OPEC quotas. Venezuela is currently overproducing by 300 thousand b/d, but is unlikely to cut output due to the poor state of its economy.

C. DOWNSTREAM

Argentina

- (January 1996) Citicorp Equity Investments intends to sell half of its shares of two Argentine gas distribution firms to Pacific Enterprises International. In the deal which was expected to close by the end of March 1996, Pacific Enterprises will acquire 12.5% of Sodigas Pampeana and Sodigas Sur for between US\$47.5 million and US\$52.5 million. The two gas distributors command 30% of the Argentine market, with sales exceeding US\$535 million in 1994.

- (February 1996) Petrolera Santa Fe (Argentina), a subsidiary of Santa Fe Energy (U.S.), intends to boost output at its Neuquén Basin natural gas processing plant through a US\$200 million expansion project. The improvements should allow the company to raise production at the Sierra Chata gas field from 106 MMcf/d to 160 MMcf/d.

- (February 1996) With recent investments, Dow Chemical (U.S.) holds 25% of Argentina's petrochemical market. In partnership with Itochu (Japan) and YPF (Argentina), Dow spent US\$357.5 million for 51% of ethylene producer Petroquímica Bahía Blanca, and 38% of polyethylene producer Indupa. Furthermore, Dow has also paid US\$193.4 million for a 100% stake in Polisor, a polyethylene producer, and a 21% stake in Ipako. Analysts estimate Argentina's demand for plastics will soon grow at an annual rate of 7%, while Brazil's consumption of plastics is expected to increase more rapidly.

Bolivia

- (February 1996) Soldati Group (Argentina) has been negotiating a joint venture with Petrobol (Bolivia) to establish a network of high-volume service stations under the Puma trade name. Soldati is also said to have found a local partner to create a network of service stations in Ecuador.

Brazil

- (December 1995) In 1994, Brazil began to diversify its gasoline exports destinations, away from the US markets, and toward non-US markets, following the US Government's decision to require foreign refiners to make US-bound reformulated gasoline (RFG) using 1990 US gasoline base lines. By the end of 1994, only about 60% of Brazil's 75

thousand b/d gasoline exports went to the United States, down from 91% in 1988. Recently, the World Trade Organization (WTO) ruled against the US requirements, after accepting the complaints by Venezuela and Brazil in 1994. The US Government promised to appeal the ruling and it is unclear how the WTO will make its final decision. Brazil has not yet decided whether or not it would increase its RFG exports to the U.S. in 1996, due to the uncertainties surrounding the WTO ruling.

- (January 1996) The Brazilian Government has authorized Petrobras to invest US\$120 million, which is part of a larger capital requirement, in a new US\$800 million petrochemical complex. The complex, to be built in the state of Rio de Janeiro near the Duque de Caxias Refinery, is expected to be completed by 1998. The private Suzano, Mariani and Unipar groups are expected to participate in the project. Another Brazilian firm, Norberto Odebrecht Química, plans to supply propane to the facility. Propane is needed for the proposed production of acrylic materials by the petrochemical plant. At the present time, Rio de Janeiro state has to purchase large amounts of propane from other states. The new petrochemical plant, when brought on stream, is expected to produce up to 300,000 tons of polyethylene per year.

- (January 1996) Now that the monopoly of Petrobras has officially ended following the constitutional amendments, the Government is working to implement the legislation. One important feature of Petrobras' monopoly over domestic oil markets has been its control of refined product prices. Under the most recent proposal by the Ministry of Mines and Energy, price controls on refined products will be removed. Apparently, the

Government rejected an earlier, unpublished proposal which called for retaining Petrobras' right to set product prices. However, the new proposal also made it clear that the Government intends to protect the state oil company during the transition to free markets. Some believe that freeing refined product prices may not be finalized and implemented during 1996, because of the domestic political climate, and the upcoming Municipal elections in November. One likely result of the deregulation will be an increase of gasoline and diesel prices, which may delay the Government's implementation of the new regulations.

- (February 1996) A new gas distribution company, Riogas, is expected to be established in the state of Rio de Janeiro, once the country starts to implement the new oil and gas regulatory laws. The existing gas distribution company, CEG, will contribute 17% of Riogas' initial capital of US\$15 million. However, until the full privatization of Riogas, CEG will hold 51% of the new company's voting shares, with the balance being held by Petrobras, through its products distribution company BR and some private investors. While CEG continues to concentrate on its service areas in the city of Rio de Janeiro, Riogas will be developing its network in other parts of the state with the help of Petrobras.

Brazil and Venezuela

- (December 1995) The proposed US\$1.5 billion, 180 thousand b/d joint-venture refinery, to be built by PDVSA and Petrobras in the northern part of Brazil, is being shelved temporarily, waiting for the passing of the final regulatory legislation by the Brazilian Congress to implement the country's new Constitutional amendments. Since the new amendments were approved in

November 1995, there have been many uncertainties with regard to the future of the state oil company. According to local reports, Petrobras is worried about losing a guaranteed market for the above proposed refinery, if the state company cannot control refined product imports to Brazil. However, the final rules governing the product imports are still unclear. In other words, despite the end to Petrobras' monopoly, imports of refined products into Brazil may not be free, and imports may be authorized only to complement the country's own output from domestic refineries.

Chile

- (February 1996) Endesa (Empresa Nacional de Electricidad SA), one of the customers of the GasAndes project, has announced the formation of a new unit to manage the construction of the planned San Isidro power plant in central Chile. The newly established unit is called the *Compañía Eléctrica San Isidro*, and has reportedly offered the US firm, Entergy, a minority stake in the project. The construction of the 370 MW gas-fired power plant is planned to start sometime in 1996, and it is due for completion in 1998. The plant will cost US\$180 million, and will be built by Japan's Mitsubishi Corp., which will also provide a loan for financing part of the project. The project has already signed a contract for the supply of 1.65 MMcf/d of natural gas from the GasAndes project for a period of 25 years.

- (February 1996) The US firm Foster Wheeler entered into a joint-venture agreement with Chile's state oil company, ENAP, and its refining arm, Petrox SA. The shares of the joint-venture company, *Petropower Energía Ltda*, will be owned 85% by Foster Wheeler, while Petrox and

ENAP will hold 7.5% each. The US\$236 million project involves the construction of a refinery and a power plant in Talcahuano, southern Chile. The power project is to supply the refinery primarily, but excess electricity will be sold to local consumers. The refinery is planned to be designed to handle heavy crudes as feedstock.

Colombia

- (December 1995) Colombia hopes to attract foreign investment to build a 100 thousand b/d refinery by gradually raising gasoline prices to international levels by the end of 1996, effectively eliminating state subsidies. In 1995, Colombia spent approximately US\$200 million on gasoline imports to meet its demand. With the country's demand for gasoline projected at roughly 160 thousand b/d by 1998, and about 200 thousand b/d by 2000, the Government is eager to boost its refining capacity from its current level of around 90 thousand b/d. PDVSA (Venezuela) and several British companies are said to have expressed interest in building a refinery. To sweeten the deal, the Government will allow investors in the project to build a chain of gas stations and guarantee at least 25% of the market.

- (February 1996) Ecopetrol (Colombia) plans to sell its stakes in three companies to generate roughly US\$300 million for investment in the Cusiana and Cupiagua fields. The state company intends to sell its 36% interest in the fuel and lubricants distributor, Terpel Antioquía, which reported annual sales of nearly US\$100 million in 1995. Terpel Antioquía also owns five storage facilities and 144 service stations. Ecopetrol will also sell its 60.59% share of Gas Natural, the local gas distributor for Bogotá, and its stake in Invercolsa, a holding

company that specializes in the energy industry.

Ecuador

- (February 1996) The upgrading of La Libertad refinery has been delayed by Petroecuador's board of directors, who temporarily suspended the prequalification process for firms interested in the project. Officials at Petroecuador have expressed concern over what they consider to be an excessively generous rate of return for private parties involved in the venture. Planned improvements to the refinery will allow for the production of unleaded gasoline and will also include the construction of desulfurization units.

Mexico

- (January-February 1996) Owing to a strong opposition from the workers' union and some legislators, the sales of Mexico's five petrochemical complexes have been delayed. It is unlikely that the sales will be canceled, but the postponement of some or all of them is now certain. At the present time, the privatization of the Cosoleacaque ammonia complex is by and large on schedule, but that of the Congrejera and Morelos complexes is delayed. Adding to the complication is foreign and private investors' reluctance to commit funding, since they believe the costly clean-up of the existing facilities is underestimated by the Government. The Government indicates that any bids must be higher than the valuations by Mexican and foreign consultants in order to complete the sales. In the meantime, more and more members of Congress are objecting to the sales. Even the ruling Institutional Revolutionary Party (PRI) is split on the issue. Although the Government still vows to privatize the complexes, many hardline PRI legislators warn that the ruling

party could lose power over the privatization program. At the beginning of 1996, Jesus Reyes Heróles replaced Ignacio Pichado to become Mexico's new Energy Secretary. It is reported that the changeover of the energy minister was partially related to the ineffective handling of the petrochemical privatization, and that the new Energy Secretary was given the mandate to speed up the expansion and modernization of the petroleum sector.

- (February 1996) A coker unit and a gas processing plant are currently being constructed at Pemex's Cadereyta refinery, which is part of the US\$1.1 billion investment made by the state oil company. Other units include hydrotreaters to increase and improve diesel production. The Mexican construction firm Protexa is carrying out the work.

- (February 1996) In order to attract foreign investors into Mexico's gas sector, and the energy industry in general, the Ministry of Energy plans to gradually phase out Government subsidies to retail LPG sales. According to the Energy Minister Jesus Reyes Heróles, the move is intended to assure foreign investors that competition in Mexico's gas and energy markets is fair. Foreign investment is also encouraged in the country's petrochemical and power sectors. It is estimated that up to US\$80 billion will be needed to develop Mexico's energy sector under the Zedillo administration. The Government hopes that 20% of the funds will come from the private sector.

Venezuela

- (December 1995) Through a US\$2.65 million expansion of its Cardón refinery, including the construction of a 36 thousand b/d naphtha reformer, Maraven (Venezuela)

is expected to be able to export 60 thousand b/d of reformulated gasoline (RFG) by early 1996. The company had previously been exporting 20 thousand b/d of RFG.

- (December 1995) PDVSA was expected to announce the first of its planned refinery acquisitions on the U.S. Gulf Coast in January. The company is eager to increase its market share and ensure access to the US market through joint ventures to operate existing refineries.

- (January 1996) Venezuela's Petroleum Investment Fund was expected to issue US\$60 million in bonds to inject funds into an Orimulsion joint venture. The joint venture between Bitor (a subsidiary of PDVSA), Conoco (U.S.), Statoil (Norway), and Jandis (Venezuela) intends to invest US\$200 million in a new production train to supply Florida Light & Power (U.S.) with the boiler fuel alternative.

- (February 1996) PDVSA anticipates having to absorb approximately US\$206 million of the predicted US\$620 million in losses on gasoline sales in 1996. The Government will cover the remaining two-thirds. The Government will probably raise gasoline prices this year to meet requirements set by financial institutions.

- (February 1996) PDVSA hopes to submit to Congress a US\$1.6 billion joint-venture project between Lagoven and Mobil (U.S.) to upgrade 100 thousand b/d of heavy crude from the Orinoco Tar Belt. The project will use delayed coking technology and is expected to offer a rate of return between 15% and 20%.

- (February 1996) Higher production in eastern Venezuela, and the substitution of

Furrial for heavier crudes in Lagoven's Amuay refinery, led to higher sales of the Furrial crude by 43 percent during 1995. While total production of Furrial is estimated at 280 thousand b/d in 1995, as much as 175 thousand b/d were sold to customers in the U.S. and the Caribbean. In 1993, the sales volume was only 57 thousand b/d, while in 1994, it reached 122 thousand b/d. Lagoven hopes to continue to increase its sales volume of the Furrial crude during 1996 to about 200 thousand b/d.

D. PIPELINES

Argentina⇒Chile

- (December 1995-February 1996) The TransGas consortium has signed a 25-year contract with Sipetrol, the foreign branch of Chile's state oil company, ENAP, to buy 16 MMcf/d of natural gas. Meanwhile, TransGas has entered the final stage of negotiations with five remaining candidates interested in supplying a crucial third power generator. TransGas must have the contracts signed before beginning construction of the pipeline in May. The consortium has already finalized agreements with Southern Electric (U.S.) and Intergen (U.S.) to supply two gas-fired power plants, in addition to 200 industrial customers near the Chilean city of Concepción. Meanwhile, the competing GasAndes consortium expects to complete financing for its US\$284 million pipeline. Following the approval of its environmental impact study by Conama, Chile's environmental agency, GasAndes began construction on the Chilean side of the pipeline. Conama's approval requires the consortium to reroute the pipeline from San Bernardo, a suburb of Santiago, to a less populous area. The company has also dug 30 miles of trench and laid 2.5 miles of pipe on the Argentine side of the project.

Argentina⇒Uruguay

- (December 1995) The economic feasibility of both a proposed US\$200 million natural gas pipeline from Argentina to a planned storage facility in Uruguay, and the storage facility itself, has been questioned. With an abundance of existing pipeline capacity and slow growth in natural gas demand in Uruguay, analysts are unsure whether a market exists for the project. Gas demand has been growing at an annual rate of between 3.5% and 4%, while major pipelines have been operating at only 70% of their capacities. However, Uruguay contends that there will be a tender for the pipeline by the end of 1996.

Bolivia

- (February 1996) A consortium consisting of Petromex (Mexico), ICE (Bolivia), Serpetbol (Bolivia), and Petro Sur (Bolivia) secured a contract to construct a US\$40 million, 154-mile long pipeline from Carrasco to the Valle Hermoso refinery in Cochabamba. Petromex, which will have a 20-year license to operate the pipeline, is to finance the project. The pipeline is expected to be completed a year after construction begins in either April or May of 1996.

Bolivia⇒Paraguay

- (December 1995-February 1996) A recent study by the Paraguayan Government may justify the construction of a natural gas pipeline from Bolivia. The study concluded that within the country there are potentially 345 industrial users, 337 commercial enterprises, and 152 thousand residential customers that could switch to natural gas. To meet this demand, the Government estimates that eight natural gas distribution companies would have to be formed. Current plans call for the construction of a 525-mile, US\$150 million pipeline running

from Vuella Grande in Bolivia to Puerto Estrella in Paraguay. Paraguay would like to eliminate its use of wood-burning as a source of energy. Moreover, Paraguay and Bolivia are considering proposals to expand the pipe diameter from 14 inches to 30 inches, and extend the pipeline to Brazilian markets, particularly the state of Paraná.

Chile

- (January 1996) Plans by US companies Williams International Pipeline and CMS Energy to build a 300-mile natural gas pipeline from northern Argentina to service Chile's Atacama desert have been postponed after negotiations with one of Chile's largest economic groups, the Luksic Group, apparently broke off. Moreover, most power generators in the Atacama region intend to meet the growing demand for electricity from new mining projects with coal-fired plants. Power producers cite low environmental pressure in the desert, in conjunction with the availability and relatively low price of coal as reason not to switch to natural gas.

Colombia

- (December 1995) A lack of adequate regulations forced the Government to suspend bidding for the construction of five urban gas distribution networks valued at nearly US\$100 million. Investors have expressed their unwillingness to bid on the projects until the Electricity and Gas Regulatory Commission produces an explicit gas distribution code, which is expected by the end of 1996. The Government, estimated to be losing US\$380 million to US\$400 million per year as long as the project is delayed, intended to reopen the bidding in February or March in the hope of awarding contracts by mid-1996. Under the contracts, companies will be awarded a

monopoly, until 2014, to build and operate distribution networks in the regions of Caldas, Risaralda, Quindio, Valle del Cuaca, and the Centro and Tolima Zone. The systems will link up with the TransGas de Occidente pipeline, being built by a group led by TransCanada Pipelines. The construction of these new urban systems is part of the Government's plan to reduce the country's dependence on hydroelectric power, by encouraging the use of natural gas. Colombia expects to provide gas service to an additional 900 thousand homes by the end of 1998.

- (December 1995) Guerrillas bombed the Caño Limón-Coveñas pipeline three times during the last week of November 1995 in response to a slowdown in government royalty payments to towns affected by the pipeline's operation. The Government has resumed timely payments following the attacks.

- (December 1995) Ocesa, the consortium building the 500-mile long Central Colombian Pipeline, awarded contracts for the construction of transportation and storage facilities. Ocesa granted Distral (Colombia) a contract to develop a new pumping station at Cusiana and improve four other stations along the pipeline. The Techint-Cotelcol consortium (Argentina/Colombia) will build an onshore oil terminal, including the construction of three additional tanks to boost storage capacity by a million barrels, at Coveñas on the Caribbean coast. Saipem (Italy) and Bouygues (France) were awarded a contract to construct a tanker loading unit with a 42-inch sub-ocean line in the Gulf of Morrosquillo. Despite winning the contract to build a 300-mile long section of the pipeline running from Vasconia to the coast, Saipem has subcontracted much of the

work to Distral. The entire pipeline, with a capacity of 500 thousand b/d, will start at the Cusiana and Cupiagua fields and terminate at the Caribbean.

- (January 1996) Ecopetrol has awarded a local firm, Transmetano, a contract to build a 49-mile natural gas pipeline from Sebastopol to Medellín by the end of 1996. The pipeline will have an initial capacity of 67 MMcf/d and cost US\$70 million.

- (February 1996) Enron Corp. (U.S.) has altered the composition of its natural gas pipeline investments in Colombia with two separate deals. Enron sold a 25% stake in the 357-mile Centrigas pipeline to Tomen (Japan). Enron will probably transfer its remaining 50% stake in the pipeline to Enron Global Power and Pipelines. Meanwhile, Enron Corp. purchased a 38.67% stake in Promigas, an operator of 560 miles of gas pipelines, for slightly over US\$100 million, making the US firm its largest shareholder. Interestingly, Promigas owns 25% of Centrigas.

Ecuador

- (December 1995) Although the Government voided the tender to expand the Transecuadorian pipeline, Petroecuador plans to increase the capacity of the pipeline to 365 thousand b/d through debottlenecking and the installation of new compressors. The company also intends to improve the capacity of an export pipeline running through Colombia to 45 thousand b/d. The expansion and upgrades to the pipeline are necessary to combat dwindling export volumes resulting from the production of heavier crudes. According to Petroecuador, the country's exports could drop by as much as 25 million barrels per year if the project is not undertaken. The US\$117 million worth

of improvements are expected to be completed by mid-1997. Petroecuador plans to invest US\$70 million of its own money, with the remaining US\$47 million to be financed by local banks.

III. STATISTICAL APPENDIX

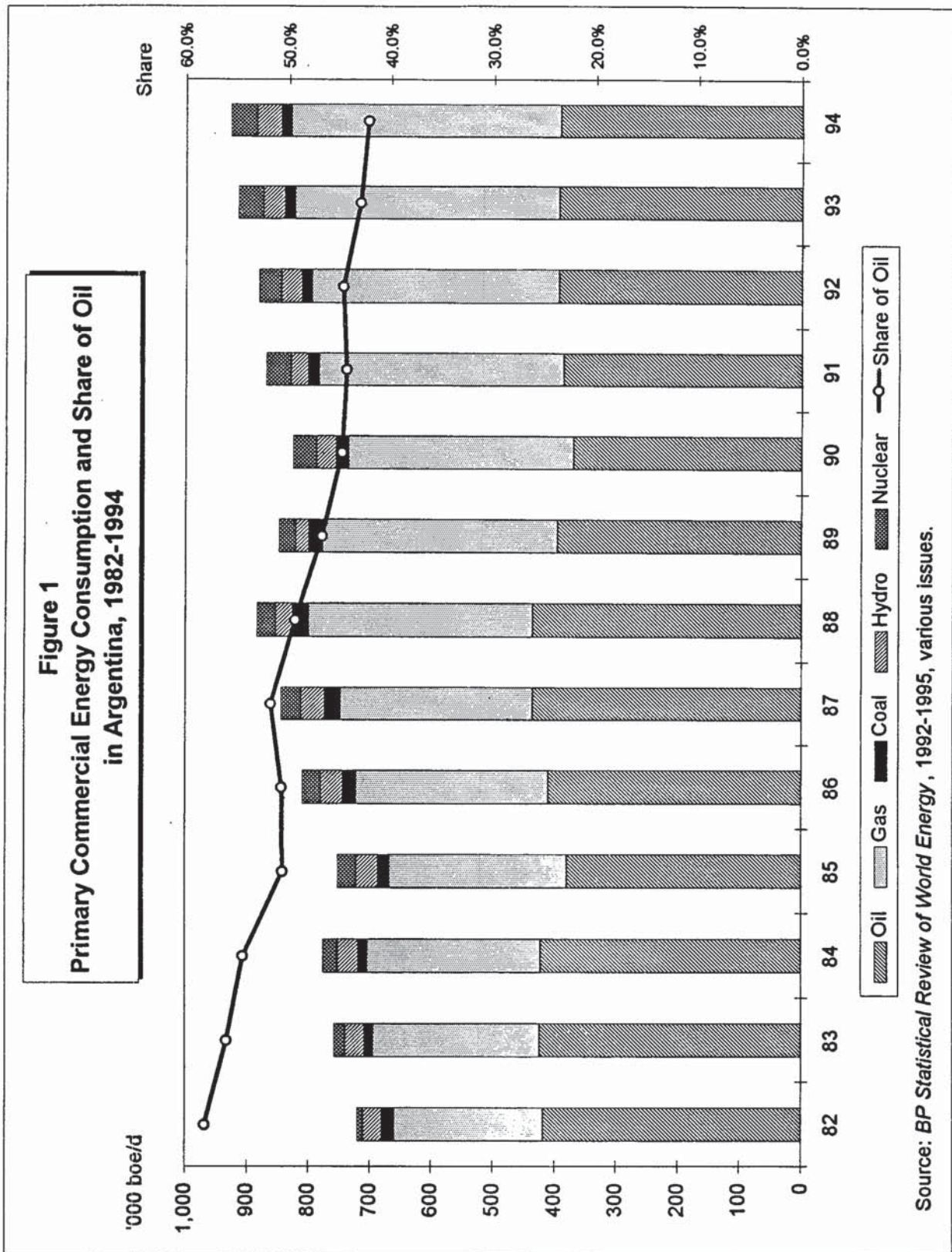
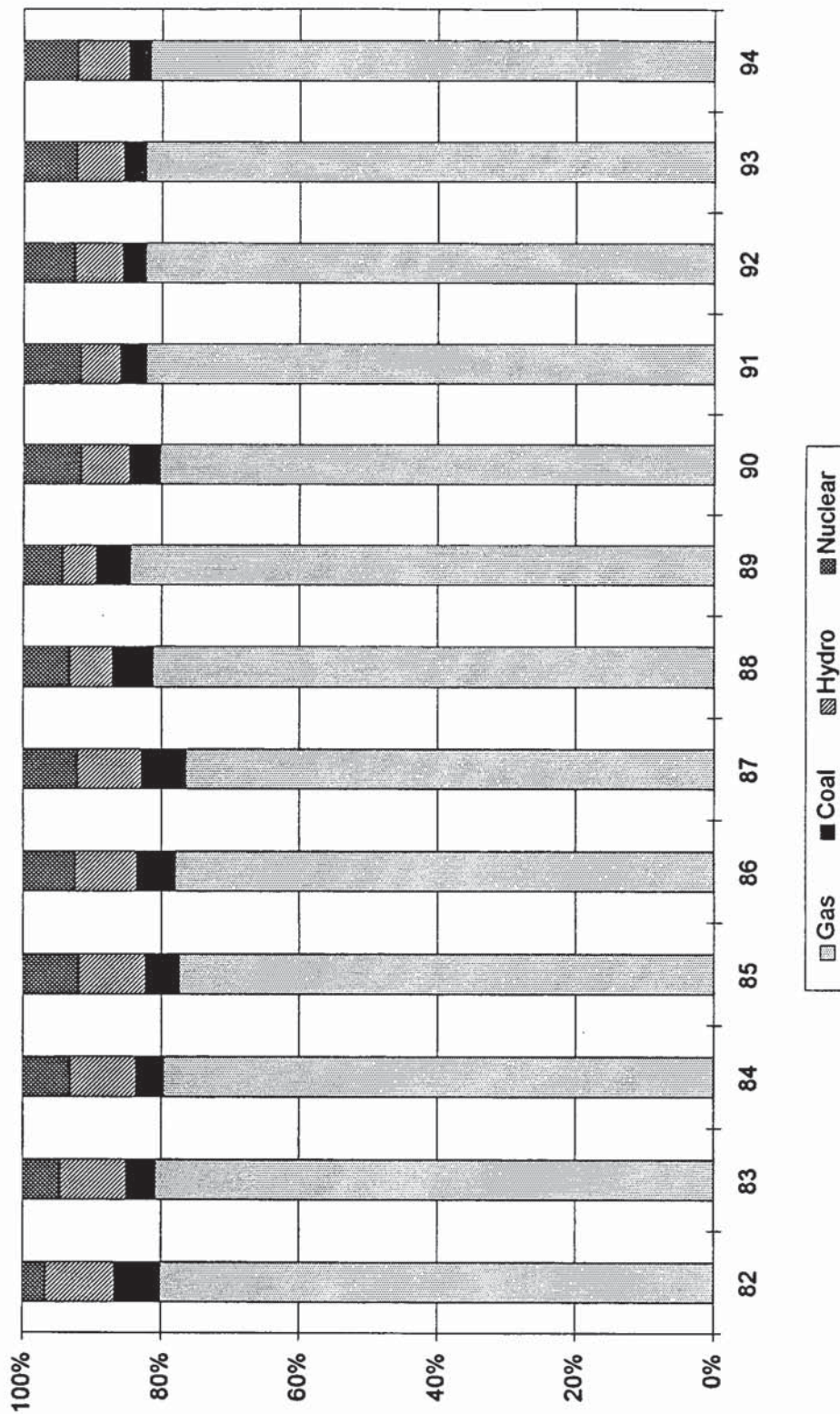
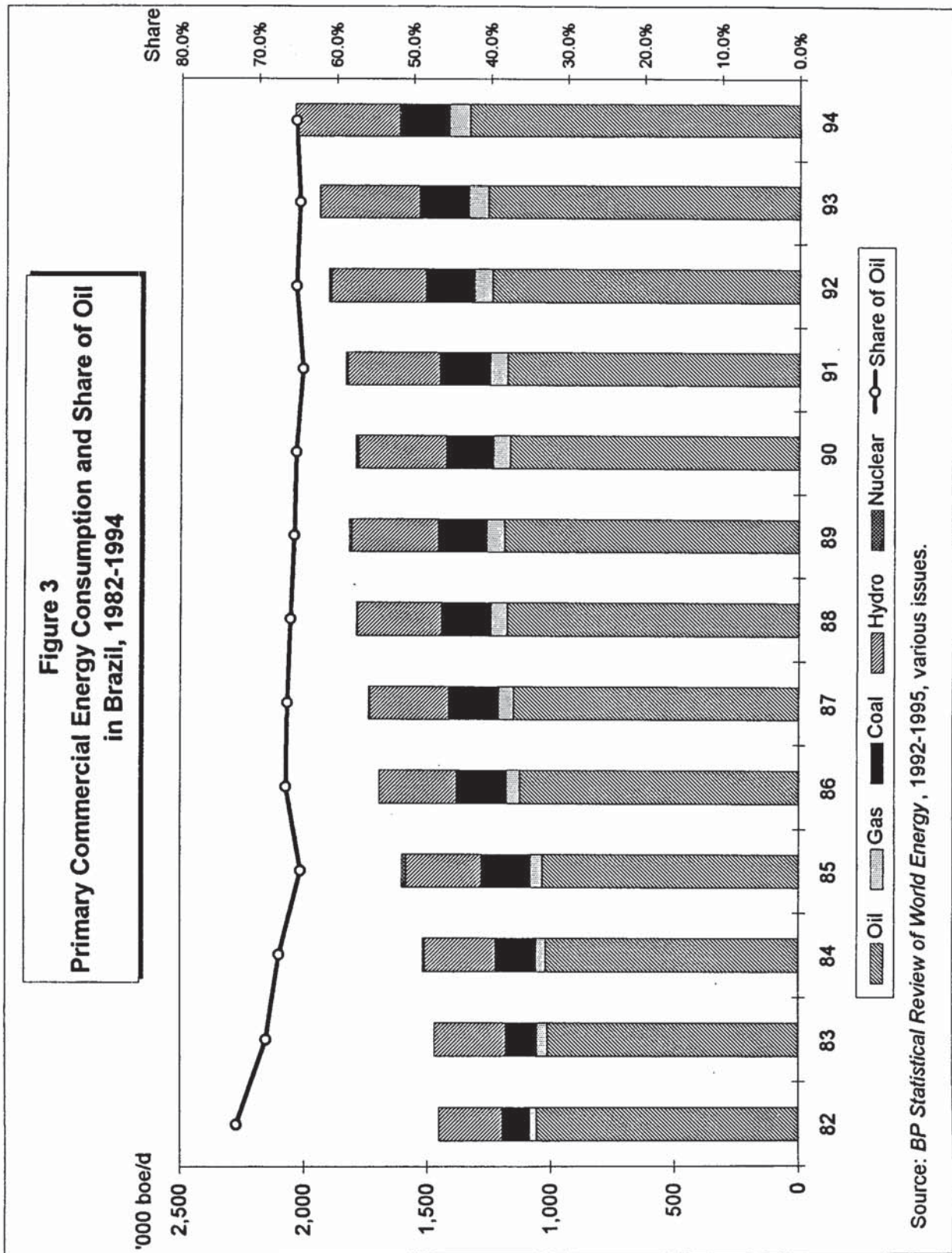
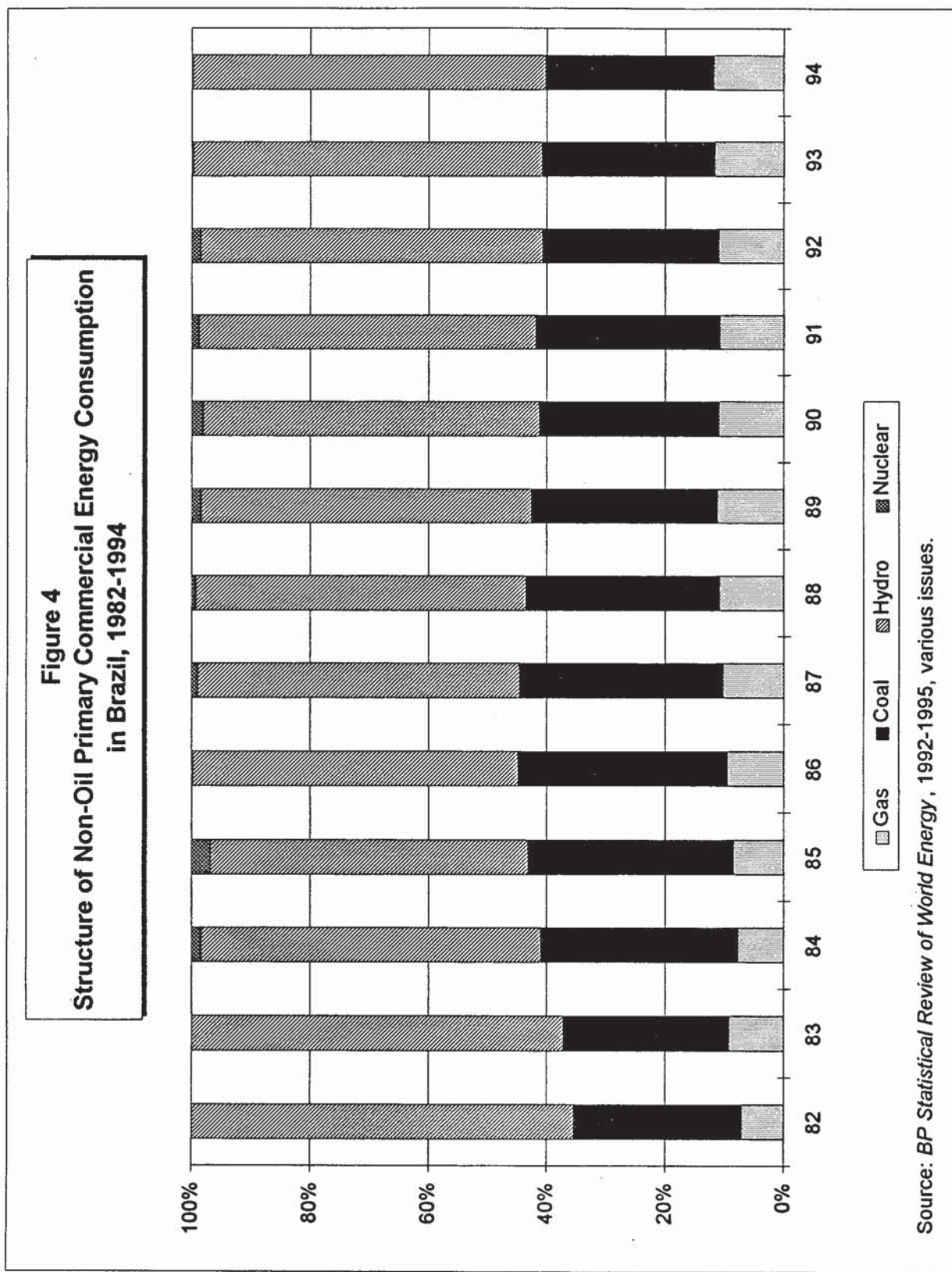


Figure 2
Structure of Non-Oil Primary Commercial Energy Consumption
in Argentina, 1982-1994



Source: BP Statistical Review of World Energy, 1992-1995, various issues.





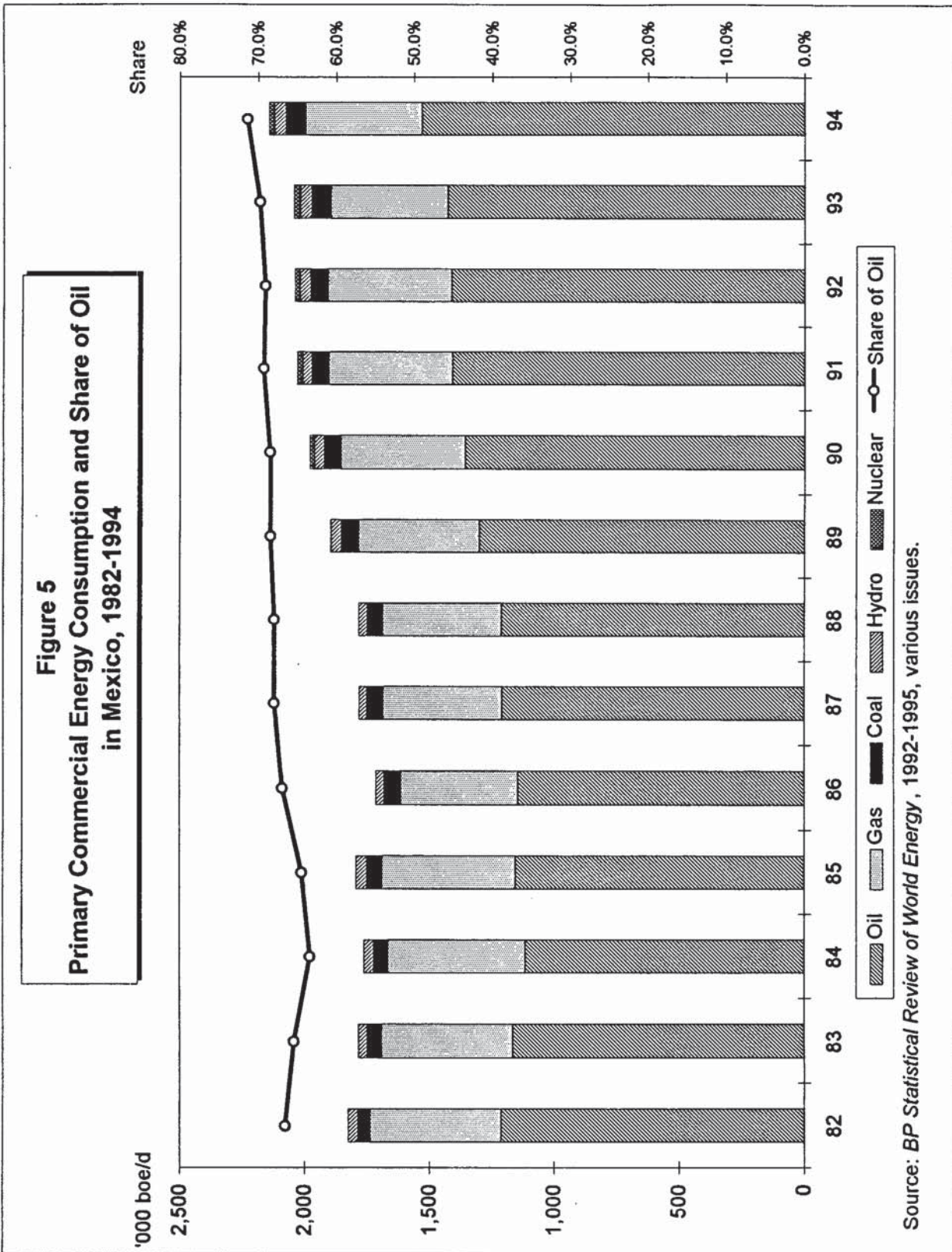
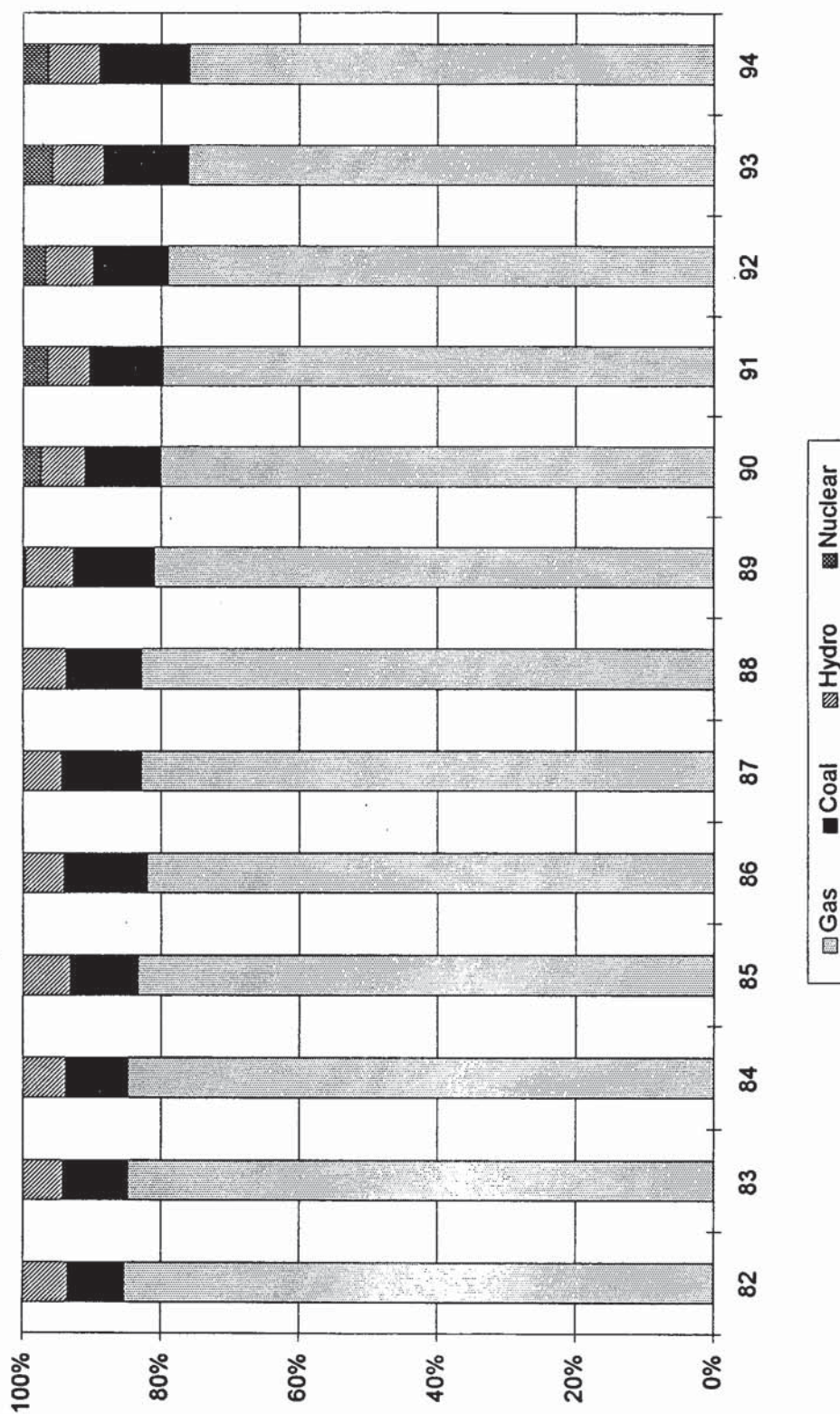


Figure 6
Structure of Non-Oil Primary Commercial Energy Consumption
in Mexico, 1982-1994



Source: BP Statistical Review of World Energy, 1992-1995, various issues.

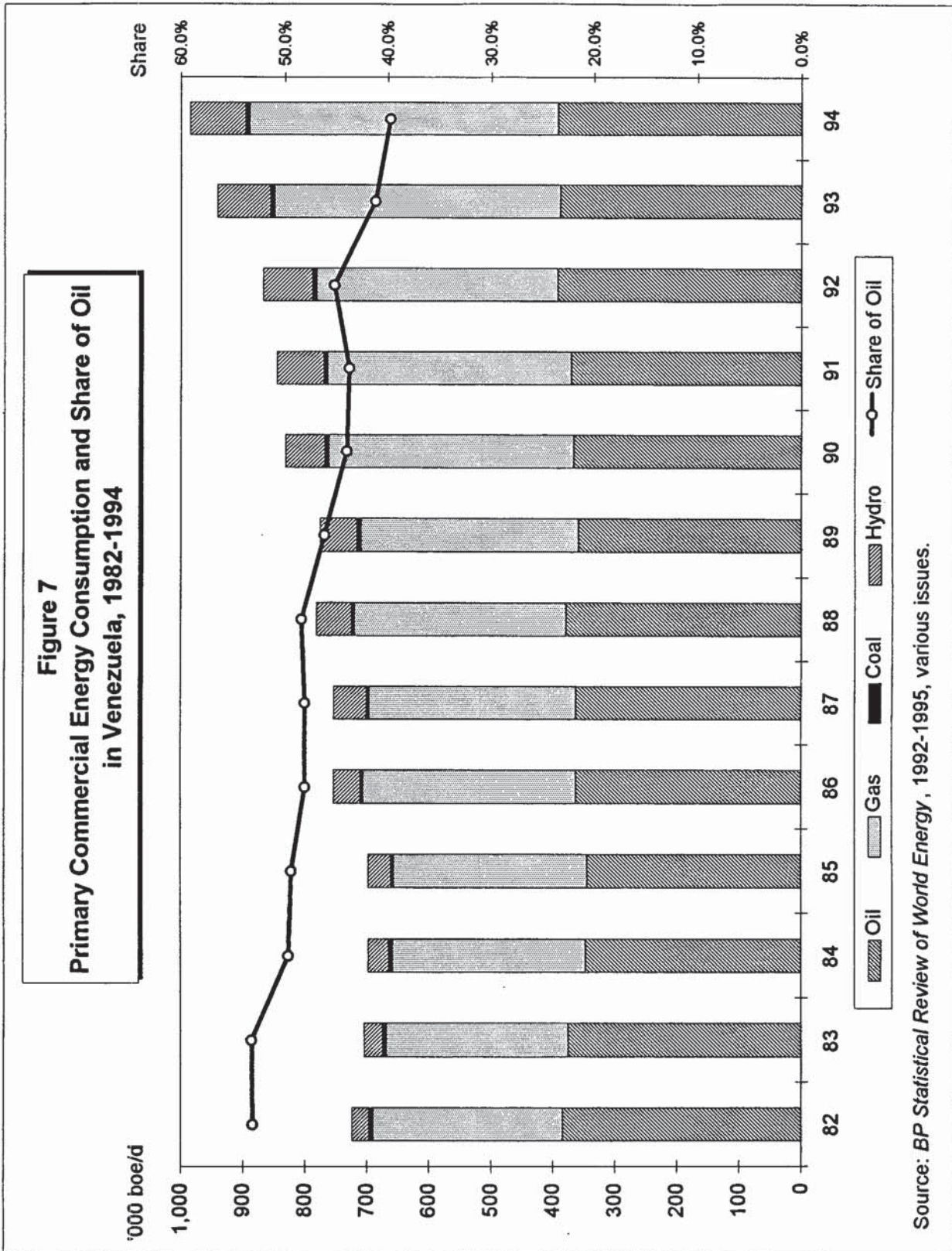
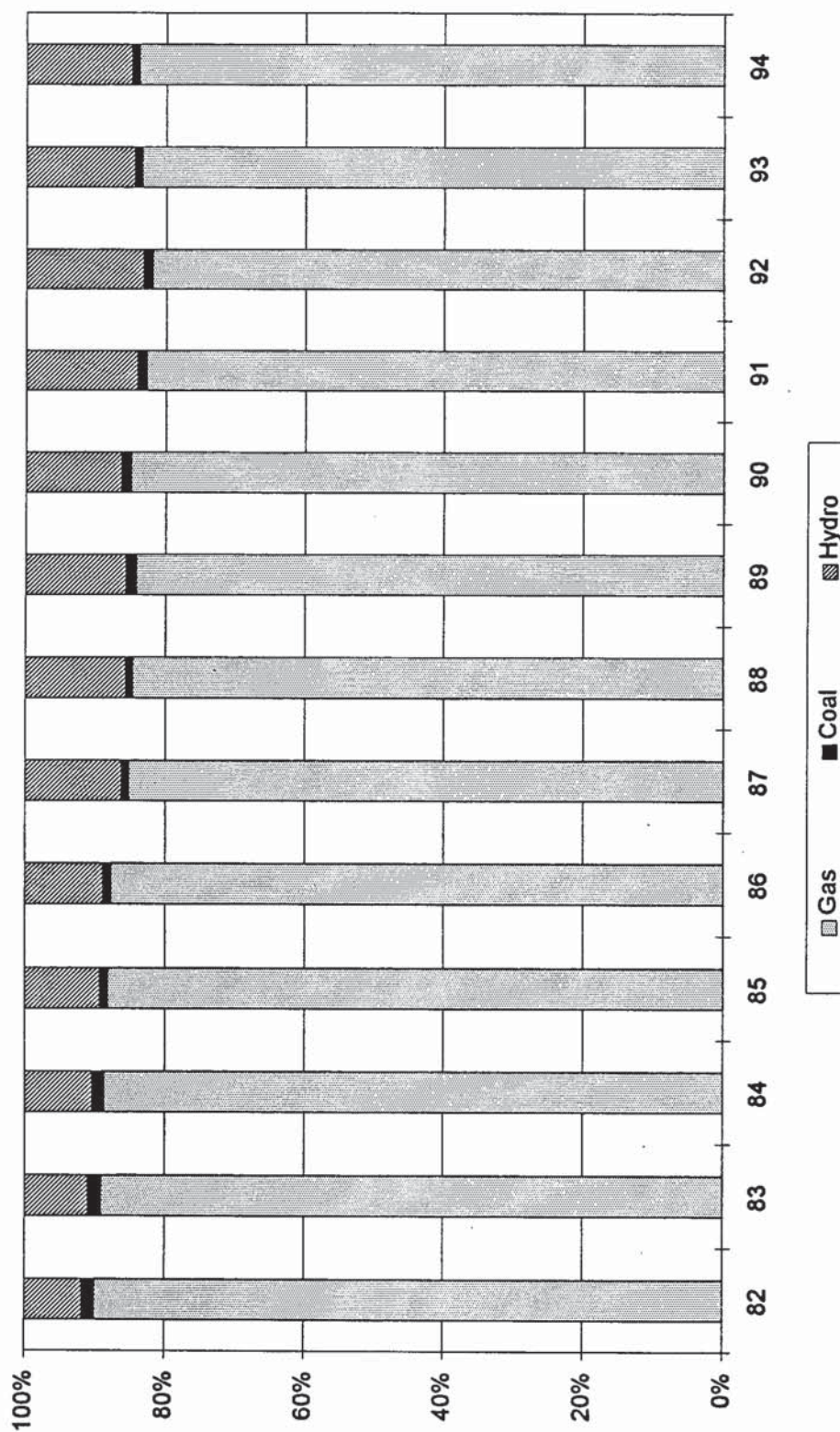
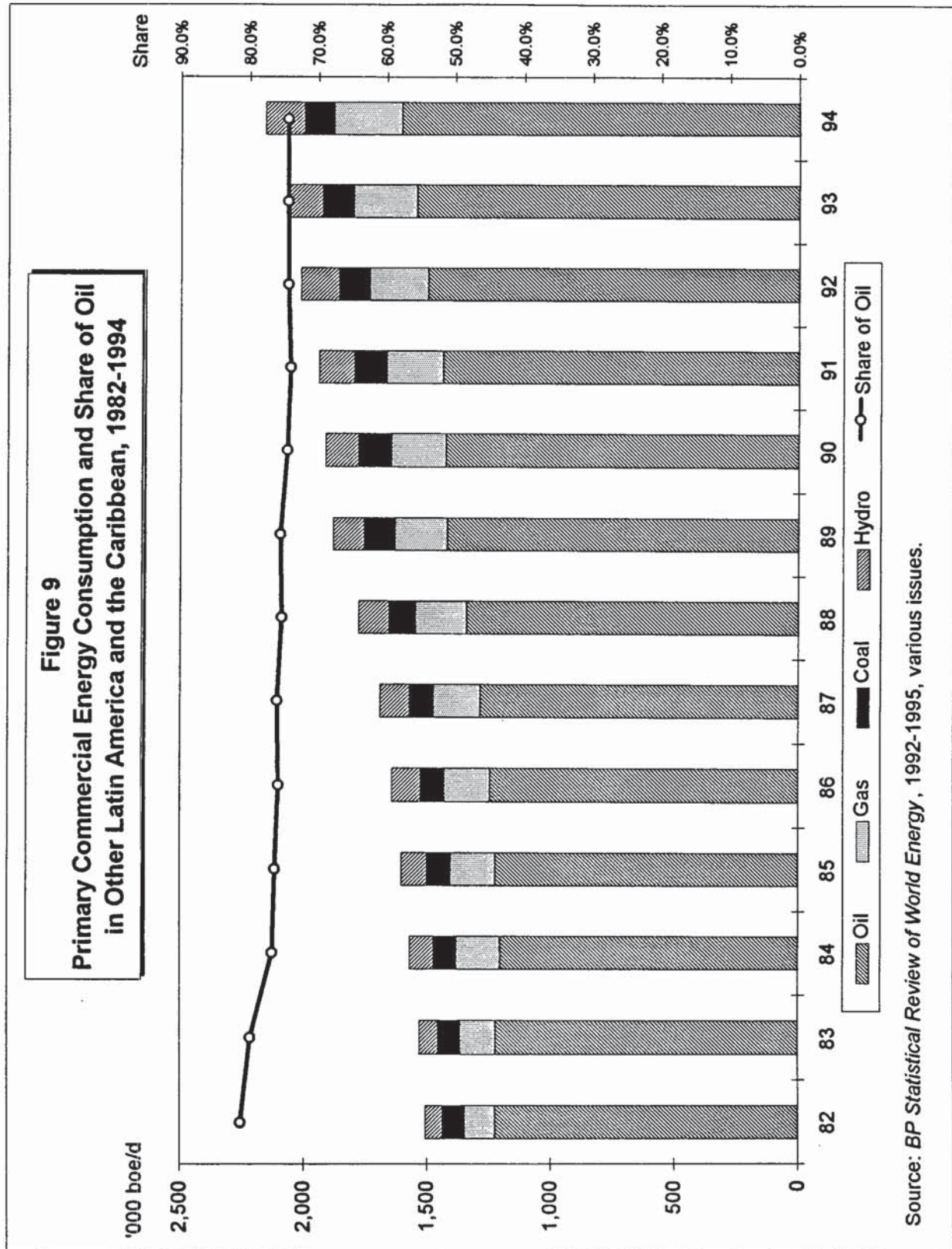
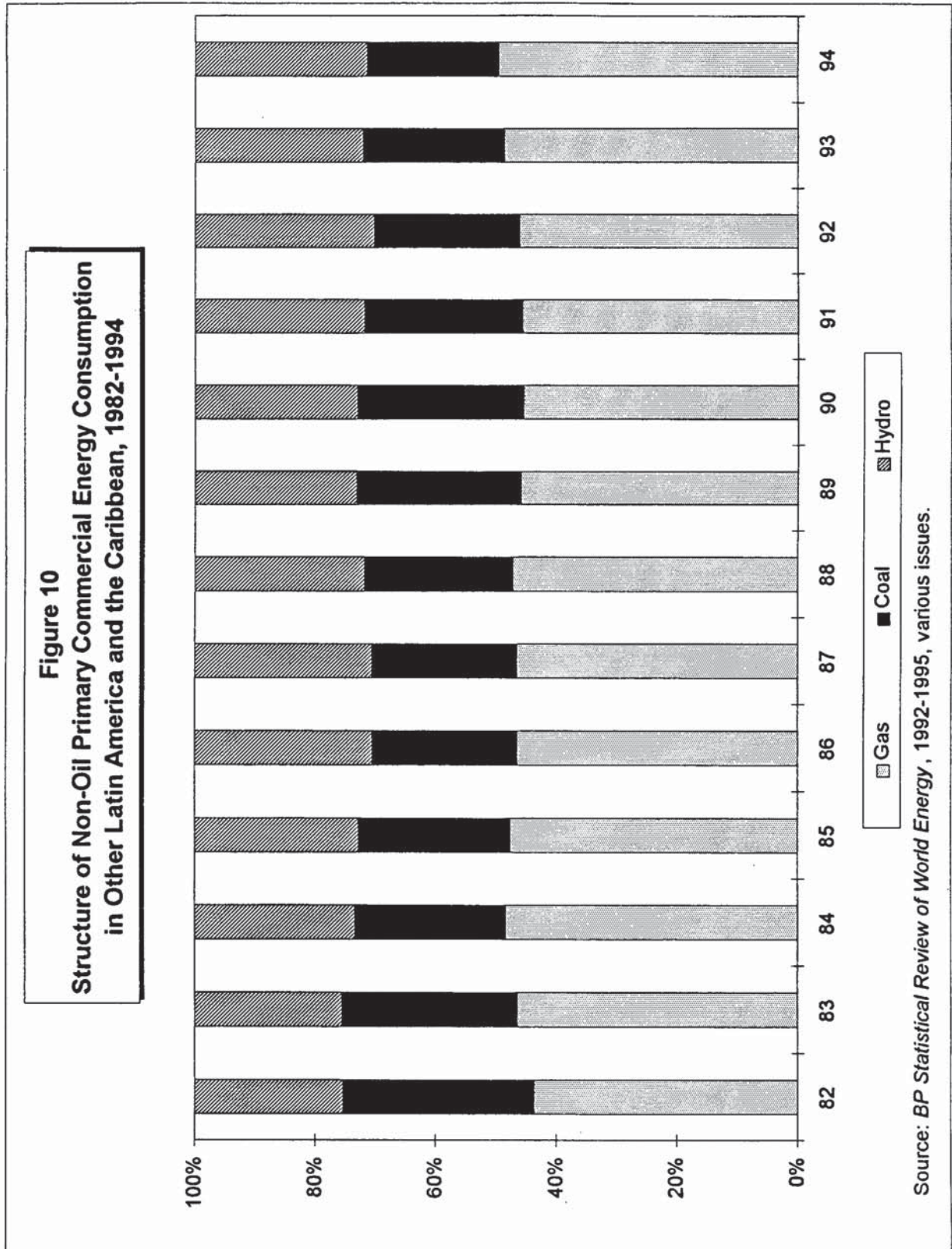


Figure 8
Structure of Non-Oil Primary Commercial Energy Consumption
in Venezuela, 1982-1994



Source: BP Statistical Review of World Energy, 1992-1995, various issues.





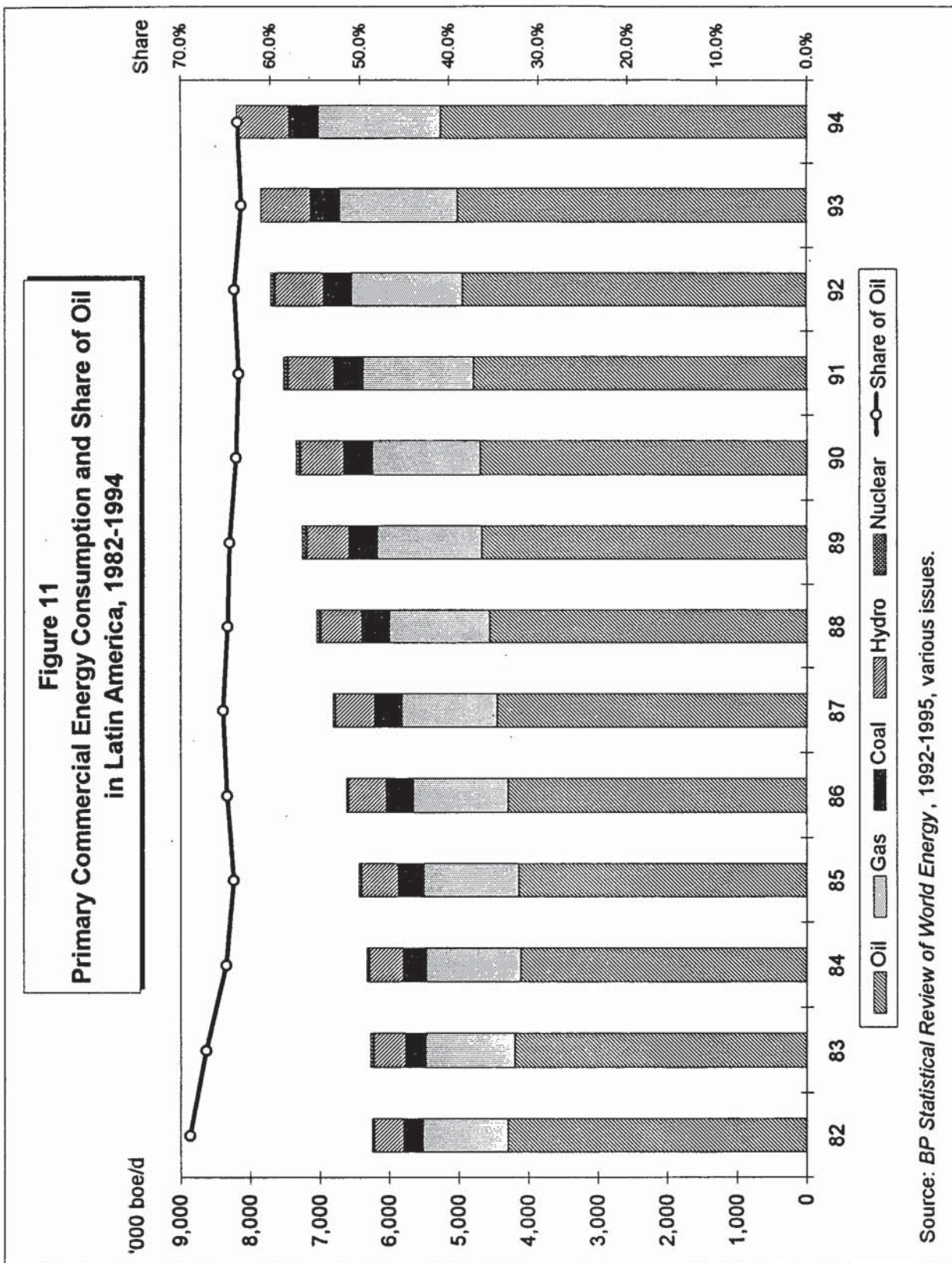
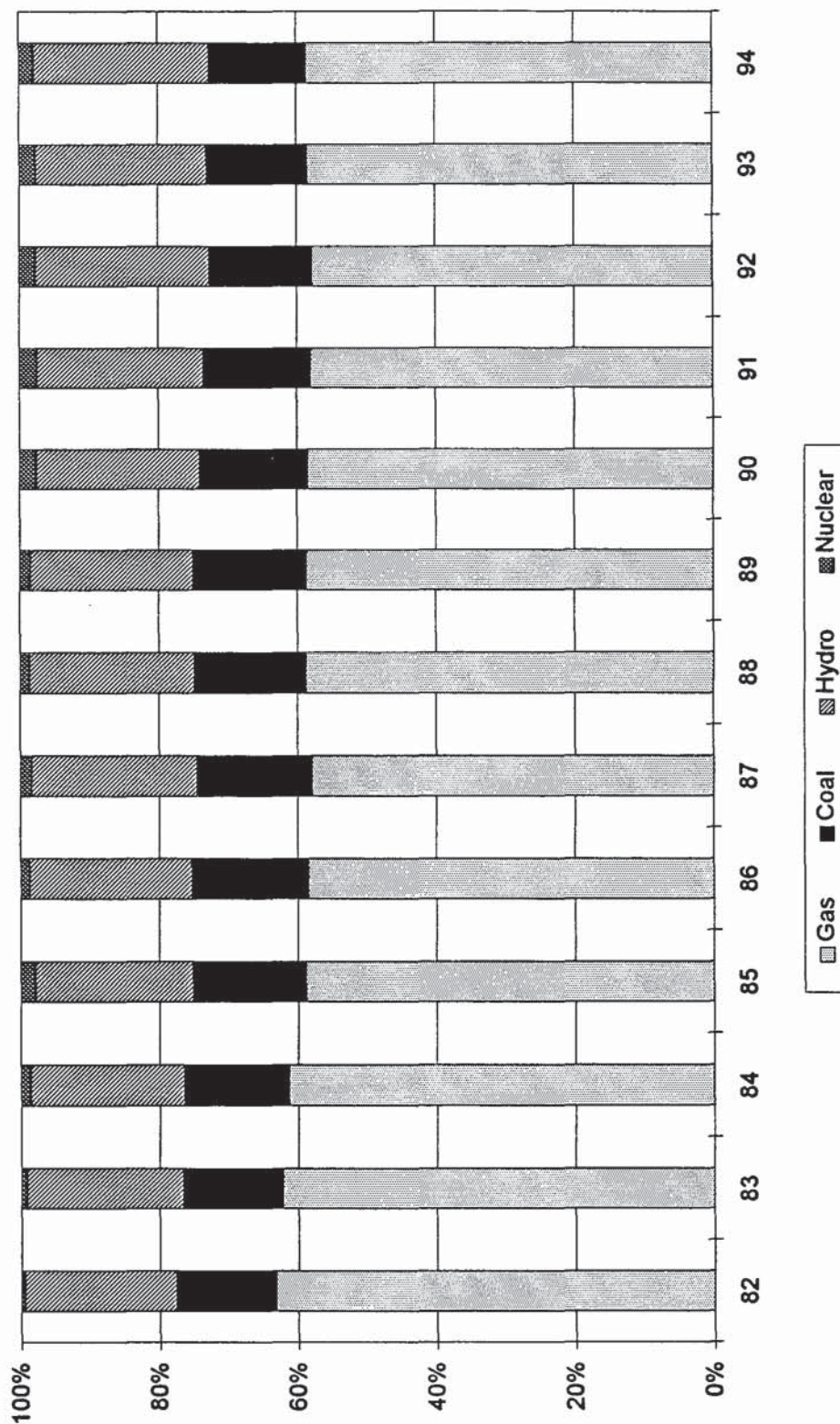


Figure 12
Structure of Non-Oil Primary Commercial Energy Consumption
in Latin America, 1982-1994



Source: BP Statistical Review of World Energy, 1992-1995, various issues.

LATIN AMERICAN ENERGY PROJECT

PREM has been engaged in research on energy and resource issues in Latin America (including the Caribbean) since 1989, a natural step in ongoing research on energy developments in the Pacific Basin. The *Latin American Energy Project* studies the development of the Latin American hydrocarbons sector in order to assess its interactions with the Western Hemisphere energy market and links to other markets; and to facilitate dialogue between the U.S., regional industry executives and private sector companies to further market stability, energy security and investment opportunities; and to promote policies which provide for sustainable development of the hydrocarbons industry in the region.

While primarily focusing on the oil and gas sectors, the project also covers coal, hydroelectricity and nuclear power sectors. In addition, the financial issues and the foreign investment climate in the region, including trends in overall political and economic risk and hydrocarbon investment legislation, are analyzed.

It is hoped that the research projects of the *Latin American Energy Project* in providing valuable information and in-depth analysis on recent trends and future outlook on the region's energy sector, may be used by energy economists, policy makers, corporate executives, and the public to better understand the region's energy issues. The East-West Center provides an objective forum for the exchange of views between industry, government and academia among nations across the Pacific Ocean. As such, its role as a catalyst is exemplified by the efforts of the Program on Resources to encourage and enhance U.S.-Latin American cooperation, as well as the cooperation between Latin America and the Asia-Pacific region.

The *Latin American Energy Project* is headed by Dr. Kang Wu. All research activities at PREM are supervised by its Director, Dr. Fereidun Fesharaki, who is also directly involved in the project.

LATIN AMERICAN ENERGY PROJECT

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Also available in this series: the *China Energy Update*; and the *Pacific Islands Energy Connection*.