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Recent Hydrocarbon Developments in Latin America: Key Issues in the Downstream Oil Sector

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I. Overview of Major Issues in the Downstream Oil Sector

Oil Demand and Product Export Availability

Latin America is defined in this report as Mexico, Central America, South America, and the Caribbean islands (excluding Puerto Rico, the U.S. Virgin Islands, and the Netherlands Antilles). This region has long been a net exporter of oil, with crude production well in excess of regional demand.

Oil Production and Reserves. The region's crude oil production rose by 4 percent in 1994, to an estimated 7.64 million barrels per day (b/d), which was about 12.7 percent of total world production (Table 1). The region's 1994 output of natural gas liquids (NGLs)—which are produced by Mexico, Venezuela, and Brazil—was about 600 thousand barrels per day (b/d), or about the same as in 1993. Historical data for crude production and proven reserves from 1975 to 1993 are outlined in Figure 1.

Refinery Capacity. Total refinery capacity in Latin America was 6.3 million b/d in 1994, down from 6.4 million b/d in 1993 and 6.6 million b/d in 1991. Refinery intake was approximately 5 million b/d in 1993, or 78 percent of distillation capacity.

Extraregional Imports. Imports of oil from outside the region in 1993 consisted of about 523 thousand b/d of crude oil and 291 thousand b/d of products (Table 2). The largest share (53%) came from the Middle East, followed by the United States (14%) and Europe (8%). The remainder came from other regions of the world (Figure 2).

Oil Consumption. In 1993 the region consumed approximately 5 million b/d of oil and exported 2.9 million b/d of crude oil and 700 thousand b/d of products. Colombia, Argentina, Brazil, Venezuela, and some of the small producers such as Bolivia, Guatemala, and Cuba are poised to increase their crude oil consumption for the rest of the 1990s. The region continues to do well upstream, while facing serious challenges downstream.

Table 1. Oil Reserves and Production in Latin America and the Caribbean, 1994-95

Country	Reserves in 1995*		Production in 1994**		RP Ratio (years)
	Billion barrels	Share in the region (%)	Thousand barrels per day	Share in the region (%)	
Mexico	50.8	39.3	2,684	35.1	52
Venezuela	64.5	50.0	2,463	32.2	72
Brazil	3.8	2.9	673	8.8	15
Argentina	2.2	1.7	657	8.6	9
Colombia	3.4	2.6	456	6.0	20
Ecuador	2.0	1.6	377	4.9	15
Trinidad and Tobago	0.5	0.4	129	1.7	10
Peru	0.8	0.6	130	1.7	17
Bolivia	0.1	0.1	26	0.3	15
Chile	0.3	0.2	12	0.2	67
Others	0.7	0.5	36	0.5	51
Latin America Total	129.1	100.0	7,644	100.0	46
World Total	999.8		60,412		45
Share of Latin America in World Total		*12.9%*		*12.7%*	

Sources: Oil & Gas Journal; EWC PREM Data File.

*As of 1 January 1995.

** Production of NGL (natural gas liquids) is excluded.

Figure 1
Proven Reserves and Annual Output of Crude Oil in Latin America, 1975-1993

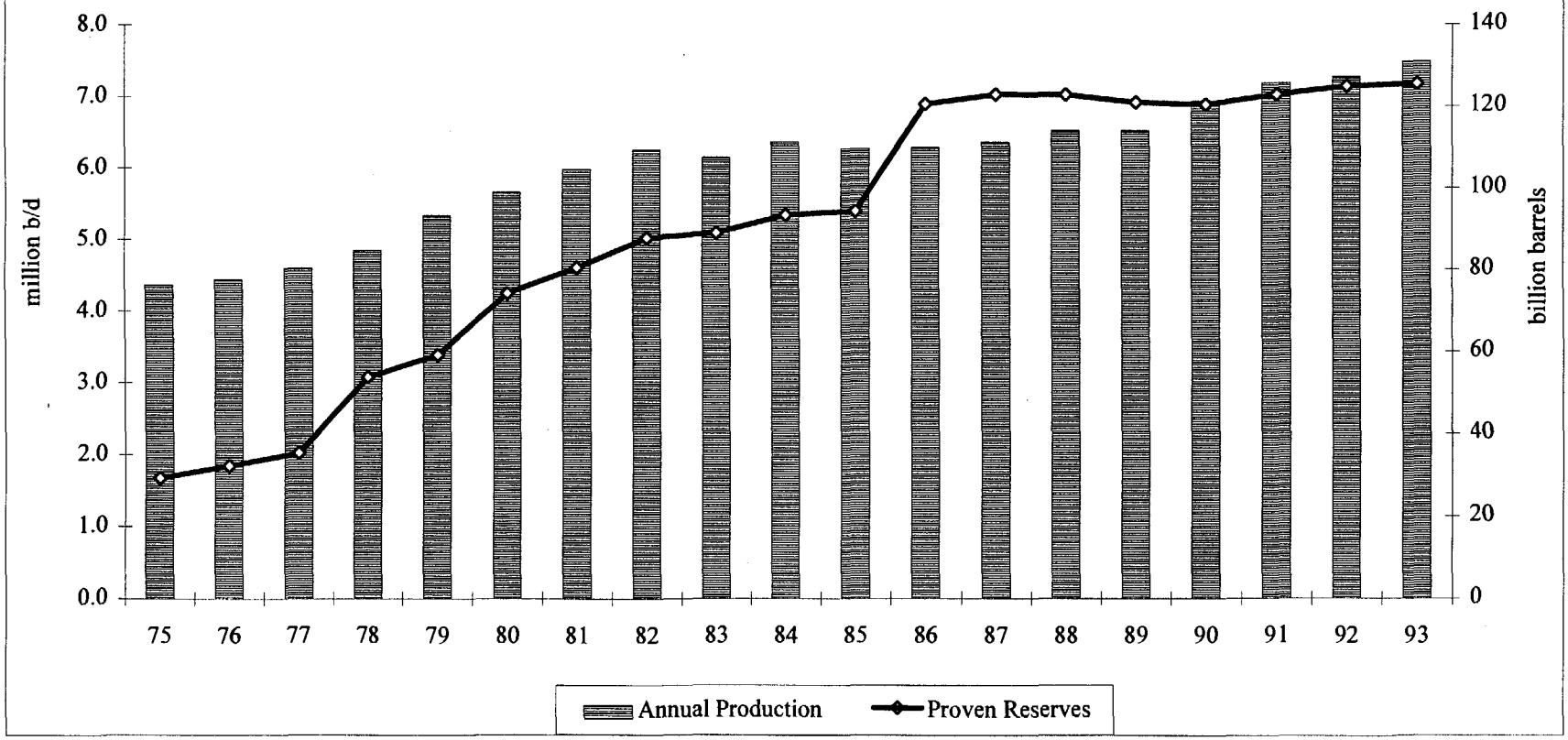


Table 2. Latin American Oil Balance, 1993

Activity	thousand barrels per day
Crude Production	7,346
NGL Production[a]	595
Refining Intake	4,980
Product Output[b]	5,509
Net Crude Exports	2,377
Crude Exports[c]	2,900
Crude Imports[c]	523
Net Product Exports	409
Product Exports	700
Product Imports[c]	291
Product Consumption[c]	5,006
Crude Stock Change	-21
Product Stock Change	94

a. Feedstock for gas treatment plant.

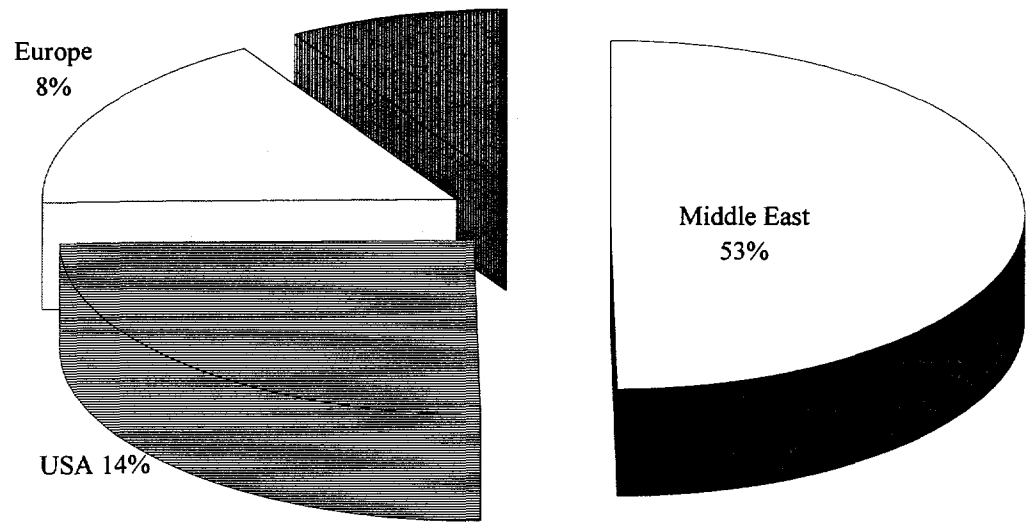
b. Includes LPG from gas plants

c. Extraregional trade only; estimated.

Export Availability of Products. The destinations of Latin America's 1993 oil exports are shown by region in Figure 3. Latin American oil demand during the remainder of the decade is expected to grow at an average annual rate of about 3 percent, raising total oil consumption to about 6.1 million b/d. Since the current refining capacity is barely adequate to meet the oil demand increase, the availability of product exports from the region will be severely limited. Given that the Venezuelan products are largely targeting the U.S. market, the product market in Latin America will become tighter, given the current pace of oil demand growth. Under a high case scenario that assumes average annual growth of 5 percent, oil consumption in the region would increase to 7 million b/d in the year 2000, which is more than the region's current refining capacity. Without corresponding increases in capacity, the volume and composition of oil products available for export could well undergo dramatic changes.

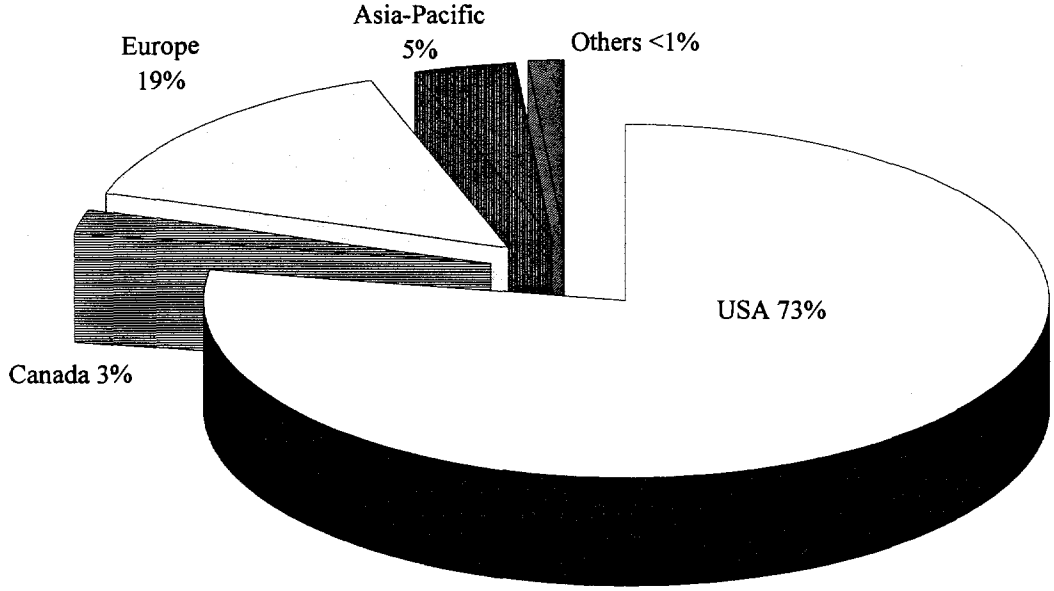
Gas Production and Reserves. Historical data for the region's gas production and proven gas reserves from 1975 to 1993 are outlined in Figure 4. A country-by-country profile of gas production in 1993 and proven reserves as of 1 January 1995 is provided in Table 3.

Figure 2
Origins of Extraregional Oil Imports
into Latin America and the Caribbean, 1993



Note: Total oil (crude and products) imports: 1.4 million b/d; extraregional trade only.

Figure 3
Destinations of Extraregional Oil Exports
from Latin America and the Caribbean, 1993



Note: Total oil (crude and products) exports: 3.83 million b/d; extraregional trade only.

Figure 4
Proven Reserves and Annual Output of Natural Gas
in Latin America, 1975-1993

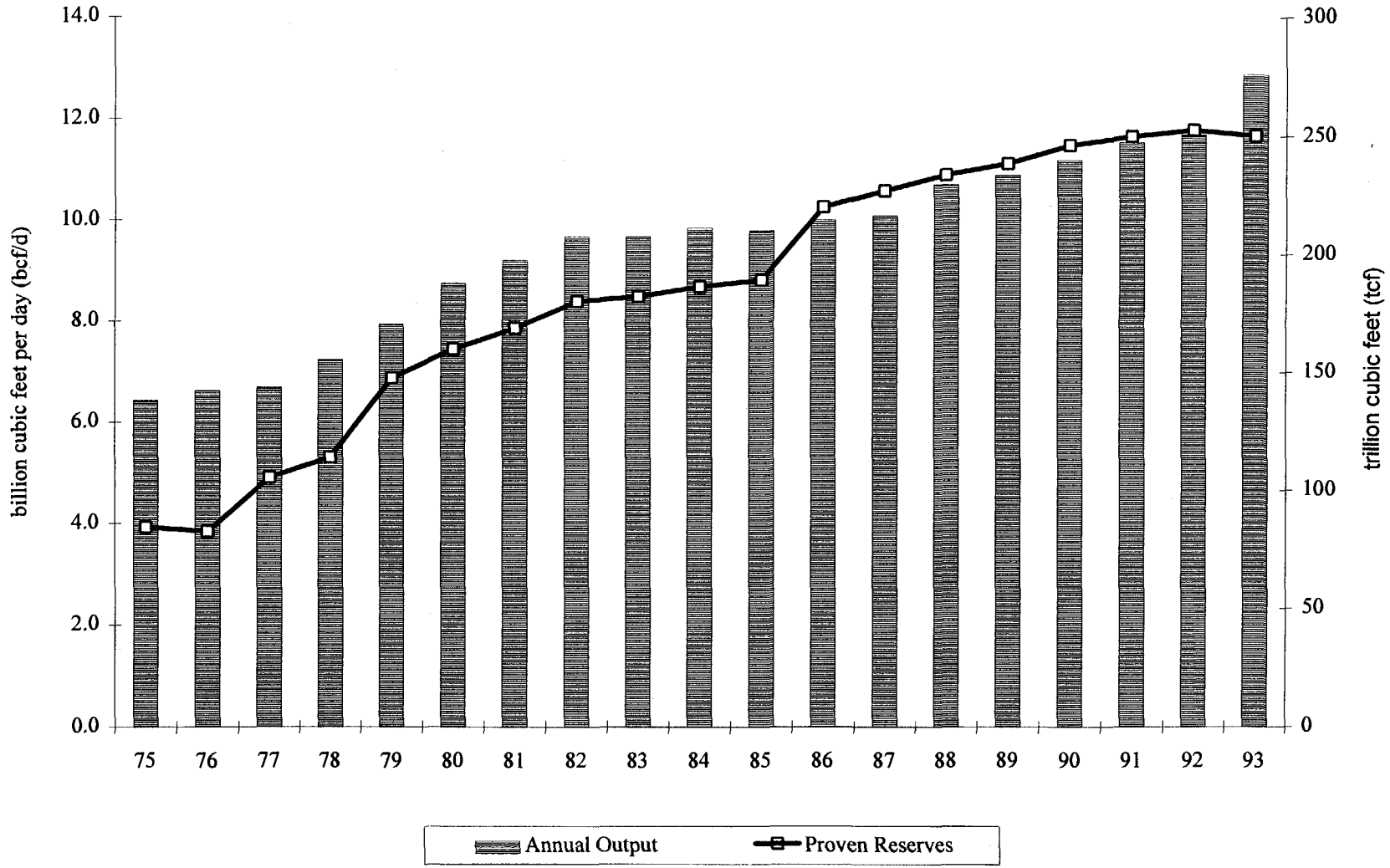


Table 3. Gas Reserves and Production in Latin America and the Caribbean, 1994-95

Country	Reserves in 1995*		Production in 1993**		RP Ratio (Years)
	Billion Cubic Feet	Share in the Region (%)	Million Cubic Feet per Day	Share in the Region (%)	
Venezuela	130,400	50.4	4,098	31.8	87
Mexico	69,675	26.9	3,465	26.9	55
Argentina	18,246	7.0	2,575	20.0	19
Brazil	4,852	1.9	654	5.1	20
Trinidad and Tobago	8,458	3.3	630	4.9	37
Bolivia	4,460	1.7	571	4.4	21
Colombia	7,882	3.0	484	3.8	45
Chile	3,900	1.5	203	1.6	53
Ecuador	3,800	1.5	95	0.7	109
Peru	7,054	2.7	90	0.7	214
Others	115	0.0	3	0.0	121
Latin America Total	258,842	100.0	12,868	100.0	55
World Total	4,980,278		210,635		65
Share of Latin America in World Total		5.2%		6.1%	

Sources: Oil & Gas Journal; OLADE; EWC PREM Data File.

* As of 1 January 1995.

** Commercialized dry gas production only.

Changing Product Consumption Pattern

Economic development in Latin America is creating a change in the consumption pattern, away from fuel oil and toward increased demand for transport fuels, especially gasoline. Between 1985 and 1993, demand for gasoline grew at an average annual rate of 2.9 percent, and the consumption of middle distillates grew at an average of 2.5 percent a year. The demand for fuel oil, however, declined by 0.7 percent during this period, while the average annual growth rate of demand for all refined products was about 1.9 percent.

A comparison of product composition for 1985 and 1993 shows increased shares of LPG and gasoline, with LPG's share rising from 7 percent to 10 percent and gasoline increasing from 25 percent to 28 percent. The share of fuel oil was down from 24 percent in 1985 to 20 percent in 1993.

Refineries Due for Major Investment

The majority of the refineries in Latin America were built 15–20 years ago. Many of the aging refineries are outdated, are inefficient, and cause pollution. In 1991 three such refineries near Mexico City (with a combined crude distillation capacity of 164 thousand b/d) were shut down for political and environmental reasons. During the past two decades, the refining capacity in Trinidad and Tobago has been reduced by nearly half. Without major investment, it has become increasingly difficult for these refineries to meet the growing demand for light products.

Another problem encountered by the Latin American refiners is the declining crude quality in some producing countries. New crudes found in recent years in Colombia, Ecuador, and Venezuela have tended to be heavier than the existing crude slate, which creates challenges for the existing refineries. Therefore, it will be critical for the region to make investments to improve the capability of processing the new, heavier indigenous crudes, so that they can meet changes in product demand and higher product-quality specifications.

Upgrading capacity is needed—especially desulfurization and cracking units. The ratio of cracking-to-distillation capacity, which is a very rough indication of refinery flexibility, is about 28 percent for the region as a whole. By comparison, the ratio for the United States is about 56 percent. A number of countries in the region have announced plans to build secondary facilities, subject to success in securing capital.

Until the beginning of the 1990s, the hydrocarbons sector in many Latin American countries was largely closed to private domestic investment and to foreign investment, either by hydrocarbon laws or (in countries such as Mexico and Brazil) by national constitutions. Over the past few years, in their efforts to increase needed capital, reduce costs and increase efficiency, national oil companies in the region have been undergoing substantial reorganization, including downsizing, demonopolization, and privatization. In the downstream sector, Argentina, Peru, and Chile have opened refineries, either whole or in part, to domestic private and foreign investment. Foreign oil companies already own and operate refineries in Guatemala. Colombia and Trinidad and Tobago have just started to open their downstream sectors. Under the current Bolivian petroleum law, foreign companies cannot participate in downstream activities. However, these restrictions could be eased, since it is expected that Bolivia's national oil company, YPFB, will be partially privatized. On the other hand, Brazil, Mexico, and Venezuela's refineries are still closed to foreign investment (Table 4)

Because of the lack of funding and the needs to revamp and renovate the existing refineries, no massive construction of new refineries in Latin America has been planned. The potential investment opportunities in this area for foreign oil companies, especially for U.S. companies, is tremendous. However, unless the Latin American governments continue to work hard to improve the business climate, massive investment in the downstream sector may not be forthcoming in the near future. In that case, the region may become a net product importer by the end of this decade, even though sufficient amounts of crude may still be exported.

Table 4. Where Direct Private Foreign Investment Is Permitted in the Downstream Sector

Country	Status
Argentina	yes
Bolivia	no[a]
Brazil	no
Chile	yes
Colombia	yes[b]
Ecuador	yes[c]
Guatemala	yes
Mexico	no
Peru	yes[c]
Trinidad and Tobago	yes[c]
Venezuela	no

a. YPFB is being partially privatized.

b. New refineries only.

c. Investment is permitted but none has been made yet.

II. Recent Upstream Developments in the Oil and Gas Sector

Argentina

Rincon is the latest export grade light sweet crude to be put on the market by Argentina. With a gravity of 36° API, and a sulfur content of 0.3 percent, Rincon will flow through the trans-Andean pipeline to Chile, making it ideal for U.S. West Coast or Asian refiners. Also, it will be priced at a discount to spot WTI.

Cominco Fertilizers of Canada has agreed to spend US$4 million on a feasibility study for a new urea plant to be built in the Cutral Coplaza Huincul area. The government of Neuquen Province has agreed to guarantee up to 60 percent of the US$400 million needed to build the plant, and the provincial government intends to transfer the El Mangrullo natural gas field to Cominco. The field could produce more than 80 percent of the 55 million cubic feet per day (mmcf/d) the plant would need, at a cost of about US$0.70 per thousand cubic feet. According to the provincial government, additional supplies could be available at around US$1 per

thousand cubic feet (cf). The price of free market natural gas in Argentina is expected to climb to around US$1.35 per thousand cf within two years.

Total crude production in June 1994 reached a record level of more than 660 b/d. San Jorge, a local independent, accounted for 25 thousand b/d of the total increase between January and June 1994. The company was able to double its output from the Huantrico field, following the commissioning of the 100 thousand b/d trans-Andean pipeline. San Jorge exports over 47 thousand b/d, more than half of which goes to Chile and Pacific markets.

Bolivia

Bolivia's oil production is expected to double, once the gas pipeline to Brazil comes on stream in 1997. The gas project will boost crude and condensate production from the Boomerang, Catari, Carasco, and Bulo Bulo fields. Crude production should reach 55 thousand b/d in 1997, while demand should be only as much as 35 thousand b/d. By the end of 1995, production is expected to already reach 30 thousand b/d, of which 28 thousand b/d will be deducted to domestic supply, and the remainder will be kept in stock. New oil finds in the Madidi block may also boost exports. It is estimated that Bolivia flares or releases into the air an average of 100 million cubic feet per day (mmcf/d) of natural gas, because of the lack of markets and infrastructure for exports. This flaring will cease once the pipeline to Brazil becomes operational. In addition, Yacimientos Petroliferos Fiscales (YPF) of Argentina, along with nine other foreign companies, has undertaken new exploration activities for oil and gas in Chuquisaca, the second largest gas producing department in Bolivia. Production in Chuquisaca currently stands at 120 mmcf/d, about 40 mmcf/d of which is exported to Argentina. According to Yacimiento Petroliferos Fiscales Bolivianos (YPFB), Bolivia may also sign a letter of intent for supply of natural gas to Paraguay, which would entail about a 10 percent increase in production.

Maxus, which has a 55 percent share in Bolivia's Surubi field, has signed an agreement with YPFB for the purchase and transport of its oil. The field has a production of 2,700 b/d. Under the current petroleum law, foreign companies are not allowed to freely dispose of the

crudes they produce, and may not take part in any downstream activities. However, such restrictions may be eased, if partial privatization of YPFB proceeds as scheduled.

French Total has signed an agreement whereby it will have a 32.5 percent share in the Madidi block, located in the northern Andes foothills. Total will also be the operator of this project. It will be conducting seismic studies at this stage, but plans to dig a deep well by the middle of 1995. Other shareholders in the project include Texaco with 32.25 percent, Elf Aquitaine with 20 percent, Shell with 14.25 percent, and Mobil with 10 percent.

It appears that several upstream projects, involving a total investment of nearly US$80 million by U.S. oil companies, have been unsuccessful, and therefore abandoned. Exploration projects were carried out in five blocks that were deemed to have good prospects, located in Carandaigua, Madre de Dios, Ito Villazon, Los Suris, and Caipipendi. Philipps Petroleum, which had been conducting exploration projects in the high Andean plateau in the Curahuara block, also seems to have stopped the exploration.

The draft of a new hydrocarbon bill in Bolivia, which is currently awaiting legislative approval, suggests new openings and opportunities in the upstream sector activities for foreign investors. The law would be designed to be competitive with the hydrocarbon laws of neighboring countries. One of the major changes that are proposed under the new law is to remove the restriction on the disposition of the crude produced by foreign companies. Currently, foreign producers are not allowed to sell their own crude freely. Under the current law, international companies are permitted to take part only in upstream activities, and under concessions or operations contracts with the state oil company, YPFB. The new law would also define the process under which the prices will be deregulated in the country. Since November 1990, when the current hydrocarbons law came into effect, fourteen international companies have signed agreements with YPFB and begun activities in Bolivia' s upstream sector.

The Secure block in Beni and Cochabamba is to be developed by a consortium composed of Elf, BHP, and Maxus, under an operation contract with YPFB. The first exploration field is located near the Surubi field, which is operated by Maxus, and YPFB's Catari field. The consor-

tium is expected to spend around US$2 million by 1996, and will start drilling in three years time.

The plans for capitalization of the state oil company, YPFB, are still quite vague. Under these plans, the government would select an investor who, based on the market value of YPFB, would buy half of the shares of the company, and would also take over the management. This measure would open up the energy industry in Bolivia substantially. One point that remains unclear, however, is whether YPFB would be marketed as a whole or split into downstream and upstream activities. Most government officials in Bolivia believe that by keeping the company whole, it will retain its market value. On the other hand, lending agencies and major oil companies, favor the splitting of the company. So far, as many as twenty-two U.S. and European banks have submitted their proposals for the selection process.

On 9 November 1994 the governments of Bolivia and Paraguay signed a letter of intent to carry out a feasibility study for Bolivia to supply natural gas to Paraguay. According to the agreement, it would take nine months to complete studies on the Paraguayan energy market, the Bolivian gas availability, the route of the pipeline, the financing, and the pricing for gas supplies. By August 1995, all relevant data should be available to draft a preliminary contract for gas exports to Paraguay. The Bolivian state oil company YPFB and Enron of the U.S. are likely to be the partners in supplying the gas. The probable diameter of the pipeline is reportedly to be 10 inches, as the volume of exports is likely to be less than 6 mmcf/d. Paraguay is planning to use the gas in industry and the development of gas-derived plastics plants.

Those wishing to invest in the state oil company of Bolivia, when it is privatized in 1995, may be forced to accept debts of almost US$400 million. Officials of YPFB say the debts of US$381 million, account for about 40 percent of the book value of the company. Most of the money—US$241 million—is owed to the Inter-American Development Bank, while the World Bank is owed US$30 million. A further US$101 million is owed in bilateral loans received from the United States, Canada, Japan, Germany, Britain, France and Switzerland, most of which were provided for the development of oil and gas infrastructure.

Brazil

Crude production in the Campos Basin, the principal oil producing field in Brazil, surpassed 500 thousand b/d in mid-September 1994, and boosted overall domestic production to a record level of more than 750 thousand b/d. Much of the increase was attributable to the coming onstream of the third well in Marlim Stage I, the deepest production system in the world, as well as greater efficiency on the Campos platforms. Moreover, the Brazilian state oil company, Petrobras, plans to increase Campos Basin oil production to 975 thousand b/d by 2000.

Three new discoveries may add as much as 320 million barrels of oil to Brazil's reserves. The most important find of the three was the 1-RJS-499 well, which was tested at 2.6 thousand b/d in November 1994. Reserves are estimated at 175-290 million barrels. The second discovery was 4-RJS-497. Reserves are estimated at 19 million barrels. Both of these wells are offshore. The third strike is onshore with estimated reserves of 9.1 million barrels.

Brazil and Venezuela

PDVSA and Brazil's Petrobras have set up a working group to discuss possible joint ventures, in both upstream and downstream sectors. Upstream, it has offered Braspetro, Petrobras' foreign activities subsidiary, possibilities to explore for oil in the offshore basins of Venezuela. There has been hardly any exploration activities in these offshore basins. Downstream, Petrobras has the opportunity to join PDVSA in some of its foreign refining ventures, in the United States, Europe, or the Caribbean, or possibly its crude export terminal in Curaçao.

Chile

The declining volume of oil produced in Chile has become a major concern for the Chilean government. Domestic production by Empresa Nacional de Petroleo (ENAP) has dropped from 19.5 thousand b/d in 1990 to only 15 thousand b/d in 1993 and about 12 thousand b/d in 1994. Today, domestic oil production is able to satisfy only 10 percent of the domestic demand,

compared with about 48 percent nine years ago. This sharp decline has coincided with a dramatic increase in demand of about 80 percent compared with 1985. Despite relatively good prospects for oil discovery in the Strait of Magellan, the decline in oil production in Chile is irreversible. Thus, the government is enticing domestic exploration efforts through improved contract terms and possibly tax incentives. YPF of Argentina has also made a proposal to Chile for a production sharing contract, but no agreement has been reached at this point. In addition, The government has been encouraging Chilean companies to increase exploration outside Chile. A subsidiary of ENAP, Sipetrol, is currently actively exploring offshore Argentina and in Ecuador and Colombia. The new trans-Andean crude pipeline has already improved the situation in Chile substantially by ensuring a secure supply source. It currently transports some 106 thousand b/d of crude to Chile, thus meeting around 23 percent of oil demand in Chile since it came into operation a few months ago.

Colombia

The developers of the giant Cusiana and Cupiagua fields in Colombia met with representatives of more than 300 engineering, construction and service companies recently to discuss arrangements for awarding contracts for more than US$2 billion in projects to be carried out between 1995 and 1998. The projects include the construction of a 420-mile pipeline system to carry crude from the two fields to the Caribbean port of Covenas, as well as dozens of other infrastructure projects that will allow production to increase from 150 thousand b/d in 1995 to 500 thousand b/d by 1998.

BP says that the giant Cusiana field in the Llanos Basin will be producing 185 thousand b/d by the end of 1995, which will be 35 thousand b/d more than originally expected. BP operates the 1.5 billion barrel field, in cooperation with partners Total, Triton Energy, and Ecopetrol. With the same partners, BP also operates the 500 million barrel Cupiagua field. Production there is scheduled to begin by 1996. During the period June 1993 – December 1994, BP and its partners drilled eight development wells; built a US$200 million production and processing center; and drilled two wells for gas reinjection and two more for water injection. The

partners also built a 23-mile pipeline linking Cusiana with the pumping station at Porvenir, as well as a 60-mile pipeline connecting the La Belleza natural gas field with Vasconia. The storage terminal at Covenas was also expanded from 2 million to 2.5 million barrels in anticipation of increased production.

The start-up of the first production unit at the Cusiana Central Processing Facilities in September 1994 led to some 50 thousand b/d of 36° API Cusiana crude being blended with 45 thousand b/d of 25° API, Shell-produced Vasconia grade and exported from Covenas port beginning at the end of October 1994. The crude is transported via a 20-mile, 20-inch-diameter pipeline to the E1 Porvenir station, where it joins a recently expanded pipeline to the export terminal at Covenas. This pipeline has the capacity to transport up to 75 thousand b/d of Cusiana crude. Three more production units of similar sizes should be on stream, respectively, in December 1994, March 1995, and early 1996. Since 1990, a 10 thousand b/d test system has been in operation in the Cusiana field.

British Petroleum estimated that a new Colombian gas field has a potential 5 trillion cubic feet (tcf) of natural gas and 250 million barrels of condensate. The field, in Colombia's Llanos basin, was first discovered through a well drilled by Maxus Energy Corp. The well, Volcanera 1, is in Colombia's Recetor block. BP, which owned 10 percent of the Recetor concession, purchased Maxus' 53.33 percent stake for only US$10 million in a deal announced in November 1993.

Besides BP, Amoco is also on the way to hold giant gas reserves in Colombia. Moreover, Amoco's find is closer to the major pipelines than BP's, which means easier market access. Amoco's Opon-3 well registered a flow of 45 thousand cf of gas and 2 thousand b/d of condensate. It was drilled in the La Paz formation in the Middle Magdalena Valley, 125 miles north of Bogota, between Medellin and Barrancabermeja. Amoco owns a 60 percent working interest, the U.S. company Hondo has 30 percent, and the domestic private firm Opon Development holds a 10 percent interest. Ecopetrol has the right to a 50 percent working interest upon development.

French Total has signed a new exploration contract with state-owned Ecopetrol to operate the 492 square mile Block 9 in the Llanos Basin. The new acreage lies northeast of the Cusiana and Cupiagua fields, which have so far registered 1.5 billion barrels of crude reserves. Total holds a 19 percent interest in the Cusiana-Cupiagua complex. Block 9 is located in the open plains, like the Caño Limon field, which is operated by Occidental in partnership with Shell, Spain's Repsol, and Ecopetrol. The fields currently produce 240 thousand b/d of 28° API crude.

Ecopetrol has plans to develop Coporo, another giant Colombian oil field. Like Cusiana and Cupiagua, the Coporo field is in the Llanos basin. Seismic studies and other geological indications have made it a top candidate for another big field. According to Ecopetrol, the new field could contain as much as 1 billion barrels of oil. The company plans to develop the field with its own resources and will not invite foreign companies to participate. Drilling of an exploration well is expected to be completed by June 1995.

Ecuador

Texaco has reached an agreement with the Ecuador Ministry of Energy for environmental cleanup in the Oriente region. The accord is awaiting formal approval from President Sixto Duran-Ballen. Texaco will meet the entire costs, but insists on sharing proportionate costs with Petroecuador, its former consortium partner, as it had previously demanded. Petroecuador controlled 62.5 percent and Texaco owned the remaining 37.5 percent stake in the consortium. Although Texaco agreed not to set a financial limit for the cleanup operations, it rejected a demand for the construction of a hospital in the former consortium area. However, the company will build schools and first aid stations, cover up crude draining pools, decontaminate polluted areas, and construct a plant nursery and fish ponds to restock the rain-forest and the rivers.

The Ecuadorian government disqualified a total of five bids on five blocks in the seventh round of international tenders for various reasons, as announced by the Energy Ministry, in July 1994. The Amoco-Mobil consortium bids for Oriente blocks 19 and 21 were denied; so were Tripetrol's for Oriente blocks 11 and 18, and Huffco-Louisiana Lands's for Gulf of Guayaquil

Block 3. In the meantime, the ministry negotiated with the following companies which presented the second best initial tender: Santa Fe Energy for Block 11; Amoco-Mobil for Block 18; Tripton Energy Corp. for 19; Oryx-Santa Fe Minerals for block 21; and Sipetrol-Clapsa for Block 3.

Mexico

The already-tight international crude market will be even tighter next summer, as 150 thousand b/d of Mexican Maya crude is to be diverted from the open market to feed a new 50 thousand b/d coker at the 216 thousand b/d Deer Park Refinery in Texas, which Pemex owns jointly with Shell. For 1995, Mexico plans to maintain overall crude exports, including 1.3 million b/d shipments to the Deer Park refinery. The 1.3 million b/d includes 800 thousand b/d 22° API Maya crude, 330 thousand b/d 39° API Olmeca, and 170 thousand b/d 34° API Isthmus.

Spending on exploration by Pemex will increase by 20 percent in 1995, according to Pemex officials. Of Pemex's US$8.7 billion budget allocation for 1995, the Exploration-Production Division would account for more than 50 percent, subject to legislative approval. Crude, rather than natural gas, will be the main focus of the exploration effort, since the returns are bigger and more immediate. However, Pemex's 1995 budget may be problematic, given the precarious situation surrounding the peso and stock market crises in late 1994 and early 1995. Efforts would be made to divest the company of secondary petrochemicals plants or to seek strategic alliances to run these plants with private sector partners. Legislation opening secondary petrochemicals to private investment was passed during the 1988-1994 presidency of Carlos Salinas, but so far little interest has been shown in the Pemex plants.

Peru

Murphy Oil Corp. has signed an E&P contract with Perupetro that gives the Arkansas-based independent up to seven years to develop the 1.259 million hectare Block 71 in Peru's central jungle. The exploration contract, which calls for a minimum investment of US$36.5 million for

aerial and seismic studies and the drilling of five exploratory wells, is the first to be struck between the state oil regulatory agency Perupetro and a foreign oil company, since Perupetro took over contracting for the Peruvian government in November 1993. Perupetro officials said the contract will be the benchmark for future deals between foreign firms and the Peruvian government. It grants a thirty year term if oil is discovered, and forty years in the event of gas discovery. A sliding scale royalty payment based on world prices and production totals is also part of the contract terms.

Petroperu pledged in September 1994 not to impose any price and output controls on winning bidders in the upcoming privatization process of the state oil company. Petroperu president Emilio Zuñiga, ruled out the formation of a regulatory commission to monitor private sector firms in the post-privatization petroleum industry. The privatization began in November 1994, with 60 percent of the state's interest in two key coastal refineries being offered. The same 60:40 ownership scheme will be used later for Petroperu's coastal and jungle producing fields Blocks 10 and 8, respectively, while the Northern Peruvian pipeline is now scheduled to be offered as a ten year concession.

Encouraged by the foreign interest in Peru's rebounding exploration sector, Perupetro is now preparing for an international bidding round with a clean slate. Perupetro has redesigned the country's oil map in preparation for the upcoming licensing rounds. The new oil maps, which erase numerous unclaimed blocks, identify those areas where contractors are currently operating. Contractors to be selected during upcoming bid rounds will be given wide leeway to draw up block boundaries for exploration packages. Perupetro also canceled contracts for four blocks with companies that have fallen behind on work programs or failed to reach agreement on terms under the new hydrocarbons law in September 1994. The reclaimed areas include Block Z-1, Block 50, Block 16-A, and Block S-3.

Trinidad and Tobago

A new gas discovery off the east coast of Trinidad by Amoco Trinidad Oil Co. brightens the horizons for the liquefied natural gas (LNG) project backed by Amoco, British Gas, Cabot LNG, and the National Gas Company of Trinidad and Tobago. The new gas discovery was in the southwest Galeota area, about 40 miles off the southeastern coast of Trinidad, and is estimated to have reserves of up to 1 trillion cubic feet of natural gas. The final decision on the project is expected by mid-1995. The LNG plant, if approved, is planned to come on stream by 1999. Two engineering and design contracts for the project have already been awarded. A joint venture between Chiyoda of Japan, and Hudson Engineering (a subsidiary of McDermott) of the United States won the design contract of the 400 mmcf/d plant, and Air Products and Chemicals has won the contract for the design of the detailed liquefaction process.

Venezuela

In a bid to achieve its aim of producing 3 million b/d or more, Petroleos de Venezuela (PDV) is signing turnkey drilling contracts. This is a short-term move and signals a softening of the tough opposition to foreign involvement. Production sharing deals seem likely. PDV is currently attempting to draw up terms for production sharing contracts, and is peering over the shoulders of countries such as Colombia and China for indications of how to go about it.

As part of PDV's attempts to tender 20 thousand square kilometers in profit-sharing contracts, BP may invest up to US$ 1 billion in Venezuela over the next few years. Since 1984, Venezuela has made wildcat finds of 12.5 billion barrels, making it a worthy risk. However, with the state's profit share possibly running higher than 80 percent, the winning bids will be those that offer the thickest slices of their own profits, after having paid 67 percent in taxes and 16.6 percent in royalties.

By February or March 1995, PDV expects to be examining proposals from foreign parties wishing to invest in the Venezuelan oil industry. The next wave of foreign involvement will be under the profit-sharing model. Prequalification will cost US$50,000, and will be followed by a

US$500,000 guarantee. Companies will be expected to invest in exploration programs to the tune of between US$40,000 and US$80,000. After prequalification, companies will be given 120 days to formulate proposals and participate in the bidding. Under current terms, the state would keep up to 90 percent of the profits of such ventures, including income taxes, royalties, and the new profit tax.

Corpoven, a subsidiary of PDV, signed a letter of intent to work with America's Arco in producing and upgrading extra-heavy Orinoco crudes. The deal, details of which will be submitted to the legislature by the end of 1995, comes in hot pursuit of two others, one with PDV's Maraven and America's Conoco for US$1.7 billion; and the other with Maraven, Total, Itochu, and Marubeni for US$3.1 billion. The Corpoven-Arco deal means that both partners will invest US$200 million initially, with early production expected to be 40 thousand b/d, reaching 200 thousand b/d in 2006. The project is part of Venezuela's plan to reach a production capacity of 4 million b/d by 2002.

By the end of 1995, PDV's production will reach 3.155 million b/d—its highest since the company was nationalized in 1976. Plans also include increasing the country's exports to more than the OPEC-agreed quota. During 1995, Venezuela plans to export 2.387 million b/d, while the OPEC quota allows exports of up to 2.359 million b/d. At an average price of US$13.50 per barrel, 1995 exports should bring the country a hefty US$12.3 billion.

All set to increase its strength in Venezuela is Mobil Oil Corp. The company has plans for a joint venture in the Orinoco Oil Belt and has been closely studying the profit-sharing schemes of PDV. Mobil may take advantage of the PDV schemes that allow foreign exploration resulting in a joint venture with PDV if anything is found. Mobil has also been conducting a feasibility study on processing the extra heavy Orinoco crudes. This would entail a US$2.1 billion investment to process 100 thousand b/d of 9° API gravity crude to 31° API crude. Rates of return may be in the range of 13-15 percent.

As part of its plans to renovate its marginal fields through foreign involvement, PDV affiliate Maraven struck a deal with a consortium led by Tecpetrol of Argentina. The deal for the

Colon field also includes Nomeco Oil & Gas of the United States, Corexland of France, and Canada's Wascana, through its subsidiary in Venezuela; the exact shares of all the partners is not yet clear. The agreement could see production at the field rise from its present 5 thousand b/d to around 80 thousand b/d by the end of the century. This would be a significant boost to the production totals of PDV's marginal fields, which are currently 45 thousand b/d, with seven of the fifteen fields in the scheme in production. PDV aims to produce 200 thousand b/d from its marginal fields by the year 2000. Tecpetrol will invest US$160 million in the twenty-year contract which is effective immediately. In the first three years it aims to produce 23 thousand b/d, excluding the current 5 thousand b/d. Seventy abandoned wells will be reopened, fifteen exploratory wells will be drilled, and forty-five advanced development wells using horizontal drilling techniques will also be drilled.

Venezuela and Mexico

Venezuela and Mexico renewed the San José Accord under which they sell 160 thousand b/d of crude to a host of regional buyers. The crude is sold at market prices, and credit is extended when the price rises above US$15 per barrel. Among the eleven potential buyers, Barbados, Belize, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Jamaica, and Nicaragua are the current recipients. Supplies to Panama were halted because of nonpayment. Honduras has not received anything for more than a year, following the privatization of its oil industry. And supplies to Haiti are under a UN embargo.

III. Recent Downstream Developments in the Oil and Gas Sector

Argentina

EG3 is a name to look out for in the future: a new consortium formed by Astra (with a 32.5 percent share), Compania General de Combustibles (32.5 percent), Isaura (32.5 percent), and small shareholders (2.5 percent) It is set to challenge YPF, Exxon, and Shell in Argentina's retail gasoline and diesel market. The companies of the new firm—which already controls 11

percent of the country's 450 thousand b/d products market and has 650 retails outlets—were expected to merge their downstream operations by 1 August 1994, and the consortium plans to increase its refinery capacity by 50 percent over the next three years.

Refiners are making slow but steady moves toward producing cleaner fuel following news that the legislature was considering a law to mandate the use of lead-free gasoline. The use of unleaded gasoline in June 1994 was only a few hundred barrels per day behind that of leaded, marking an increase in the use of unleaded gasoline of 1,500 percent.

YPF is striving to penetrate the very competitive Chilean gasoline retailing market by the end of March 1995. It appears that negotiations are ongoing between YPF and two of the Chilean distributors, Gazpesa and Comar. The competition will be very tight, particularly since 67 percent of the gasoline market is dominated by Esso, Shell, and the Chilean firm Copec

YPF has announced plans to establish a subsidiary in Bolivia which would pursue joint ventures with local firms in refining and distribution areas. Other smaller Argentine producers such as Astra are also considering entering the Bolivian market. Several months ago, YPF signed an agreement with Bolivia to pursue exploration and production activities in that country. This appears to be part of YPF's strategy to increase its presence in the Andean region.

Argentine producers and refiners are experiencing a worrying start to 1995, as the Mercosur economic block, which joins Brazil, Argentina, Paraguay, and Uruguay, came into existence on January first. They are concerned that the relaxation in tariffs, which is an integral part of Mercosur, will mean cheap refined products flowing in from Brazil. YPF, Esso, Shell, and the EG3 consortium, which between them control all but 5 percent of the Argentinean downstream market, are concerned that Petrobras, the Brazilian state oil company, will export naphtha and lubricants to Argentina at low prices, without allowing Argentina to make similar moves in Brazil. Petrobras has expressed a serious desire to increase its presence in Argentina.

Esso Sapa, the Argentinean affiliate of Exxon Corp., will spend US$400 million over the next four years increasing its runs at its two refineries in Campana and Galvan. Their joint capacity at present is 106,500 b/d, and while it is as yet unclear what expansions are planned,

officials say they will also improve product quality. In 1994, the company added two tankers to its Argentinean fleet, and in doing so increased its ability to import crude by around 20 percent.

Chile

Canadian petrochemical company, Methanex, plans to more than double the capacity at its methanol plant in southern Chile, from the current 800 million tons per year. The US$275 million expansion project is scheduled to begin in early 1995 and be completed by the middle of 1996. The project would provide a sizable customer to the natural gas pipeline project from Argentina to Chile. Novacorp. of Canada, which owns 24 percent of the shares in Methanex, is also a partner in the GasAndes pipeline project.

Refiners in Chile have shown interest in additional volumes of the Rincon de Los Sauces crude currently flowing through the trans-Andean oil pipeline. The pipeline, which currently transports 85 thousand b/d of crude to Chile, will reach its maximum capacity of 105 thousand b/d very soon. It appears, however, that Petrox, the refining arm of ENAP, which has an original contract for the delivery of 60 thousand b/d with YPF, would be interested in as much as 158 thousand b/d. This seems to be technologically impossible, without the construction of a pipeline parallel to the trans-Andean pipeline, to transport the incremental supplies.

Colombia

In 1993 Ecopetrol announced the opening of its refineries to foreign and private investment. Two groups of Colombian private investors have recently petitioned the Ministry of Mines and Energy for permission to build small refineries in the south and middle of the country. The proposed refineries by Petrosur SA, a regional consortium based in the southern provincial capital of Pasto, and by entrepreneur Salvador Otero would have crude distillation capacities, respectively, of 10-20 thousand b/d and 15 thousand b/d. The respective projects would cost approximately US$60 million and US$75 million. In the meantime, the government has been drawing up plans to build a 100 thousand b/d, US$750 million refinery near Puerto Triunfo.

However, it is reported that the government welcomes and encourages the private sector to build refining capacity, at least for the time being. Colombia's refineries in Bucaramanga and Cartagena produce a total of 110 thousand b/d of gasoline, but the country must still import an additional 37 thousand b/d, mostly from Venezuela and Argentina. Even so, Colombia subsidizes retail pump prices. Ecopetrol has proposed eliminating the subsidy in order to bring prices up to international levels and help make private refining projects more attractive to foreign investors.

Ecuador

The tender offer to expand and upgrade the 90 thousand b/d Esmeraldas refinery is problematic because of poorly executed bidding criteria. Petroecuador, the Ecuadorian state oil company, was said not to be specific enough with the criteria it established for the project and did not take into account the expected changes in the composition of Ecuador's crude production, which is becoming significantly heavier at around 26° API, down from an average of 30° API. In addition, the sulfur content of crudes from many of the new areas is greater. Petroecuador is seeking to expand the facility to 120 thousand b/d, but officials said the bids they received varied in the size of the expansion. To make matters worse, the proposed expansion of the trans-Ecuadorian crude pipeline remains mired in domestic politics, with the opposition insisting the expansion should be delayed at least until the completion of the results of exploration programs under last spring's seventh licensing round. The government, however, foreseeing increases in crude output during the coming years, believes the expansion of the pipeline now is appropriate. Three energy ministers of President Sixto Duran's administration have been ousted because of government disputes with the opposition-controlled legislature in various areas. The latest impeachment—that of Mr. Francisco Acosta—took place in October 1994, when he was replaced by Mr. Gustavo Galindo.

Mexico and Cuba

A Mexican-Cuban refining venture sets an important precedent for the Mexican oil industry. For the first time, the state oil monopoly Pemex will be investing in a project jointly with the private sector. The project involves finishing the construction of the Soviet-built refinery at Cienfuegos, Cuba, 297 km southeast of Havana, and adapting it to process Mexican crude. The Cuban partner in the venture is the state-owned oil company, Cuba Petroleo (Cupet). The Mexican partner is Mexpetrol, a technology transfer company in which Pemex has the largest single stake (25 percent). Through the Mexican Petroleum Institute and the Mexican export bank, Bancomext, the Mexican government will have a majority holding in the Cuban refinery venture. The basis of the accord will be a debt-for-equity swap, but in addition Pemex and each of its private-sector partners will contribute fresh capital resources. It is reported that the initial overall investment would amount to US$200 million. Mexico would supply Cuba with 65 thousand b/d of crude. That would amount to about half of Cuba's 1993 consumption, far short of the island's needs.

Peru

Peru delayed privatization of its oil industry until 1995. The auction of the company's refineries, its exploration and production blocks, and the pipeline concession was postponed by Petroperu's privatization committee in late 1994. The committee plans to auction a 60 percent stake in Petroperu's Talara and La Pampilla refineries in late January 1995, to be followed in mid-year by a ten-year concession to the 200 thousand b/d North Peruvian Pipeline, north coast Block X, and northern jungle block 8 producing fields. The committee expects to put the North Peruvian Pipeline concession up for auction before it puts up the oil fields, to establish the tariffs for transporting oil. Petroperu's two production blocks produce an average of 44 thousand b/d of crude oil, one-third of Peru's 128 thousand b/d total production. About twenty companies from the United States, Canada, Europe, and Argentina have expressed interest in the blocks, and the fact that the doors are still open to other companies. The companies that win the fields will operate under licensing contracts very similar to those that Petroperu signed in early 1994 with Perupetro, the state oil regulatory company.

Venezuela

PDV's attempts to boost heavy crude sales were rewarded by the news that almost 70 percent (663 thousand b/d) of under-22-gravity went to third-party clients in 1993. The remaining 220 thousand b/d was taken partly by the United States, where PDV's Citgo apparently has more than 40 percent of the East Coast asphalt market, and partly by the company's partnership with Swedish Nynas, which reputedly has more than 13 percent of the European market.

Starting 1 January 1995, the sale of reformulated gasoline (RFG) became mandatory in nine U.S. cities and thirty-five other cities, regions, and states, amid denials from Venezuela that it will lose some of its market share in the United States as a result of a U.S. Congressional vote to establish different standards for domestically produced and foreign produced RFG. Sources in Venezuela say that Venezuela will refer the matter to the General Agreement on Tariffs and Trade. PDV claims the move would cost the industry US$150 million in lost sales by 1997. The dispute is over the decision to allow U.S. refiners to use their own 1990 baseline averages for determining the level of pollutants such as benzene and other aromatics. Foreign refiners have been told they must apply the U.S. industry average for 1990—which they claim is unfair. PDV has already sent a shipment of 1.1 million barrels of RFG, which will account for more than 32 percent of the gasoline market, to the U.S. East Coast. It has been able to meet the requirements of the Clean Air Act only by importing additives such as oxygenates, to upgrade approximately one-third of its RFG. PDV says, however, that it will only continue to do so if market conditions remain favorable. The company will probably export between 50 thousand b/d and 80 thousand b/d of RFG to the United States. This would constitute most, if not all, of its RFG production.

A proposal to build a refining facility in Venezuela's Orinoco Tar Belt to upgrade 100 thousand b/d of heavy Cerro Negro crude (9° API) into 31° API gravity crude has been agreed between Lagoven and Mobil. The project cost is estimated at US$2.1 billion, considerably lower than other similar projects proposed by Maraven-Conoco, Maraven-Itochu-Marubeni, and Corpoven-Arco at estimated costs of US$3-4 billion. The key cost-cutting factor in the Mobil-

Lagoven project seems to be the use of hydrotreating (instead of the hydrocracking technology proposed by competing projects) and also the reduction in the number of desulfurization units.

IV. Pipelines

Argentina

A new natural gas pipeline to Chile, is to be built by a consortium of YPF, America's Teneco, and four other domestic companies. The 250-mmcf/d pipeline, which will cost US$600 million, will start flowing in 1996, and is Argentina's first gas-export project. British Gas will work with two Chilean firms on distribution around Santiago.

The Brazilian government ended talks with Argentina over the planned natural gas pipeline, apparently since the Argentines have not yet proved that there are sufficient reserves to merit a pipeline. Argentinean officials believe that the discoveries can support the US$4 billion pipeline, and that this is a postponement of talks rather than an abandonment.

There are talks about the construction of an underground natural gas storage facility in Uruguay for Argentina. The storage facility would then be connected by a 125-mile pipeline to Buenos Aires. The 1.7 billion cubic meter storage facility would be built by Uruguay's state-owned Ancap near Montevideo. Enron and Gaz de France appear to have already submitted proposals for the development and operation of both the site and the pipeline.

Rising natural gas demand has brought Transportadora de Gas del Sur (TGS) to propose an expansion of the San Martin pipeline, which currently runs at maximum capacity of 530 mmcf/d from the southern fields in Terra del Fuego to Buenos Aires. It appears that there is enough demand to warrant an expansion of the pipeline by an additional 45 mmcf/d of capacity. The currently 1,820-mile pipeline was built in sections between 1952 and 1978. It appears that as much as 30 percent of the natural gas produced in the southern region is currently reinjected, for lack of infrastructure to transport the gas to the markets.

Officials in Argentina say that the GasAndes consortium, headed by Nova Corp. of Canada, is set to lose the deal to construct the trans-Andean natural gas pipeline to the Gasducto Transandino group led by British Gas and Tenneco Gas, who are working in partnership with Chile's oil company (Enap) and electric company (Enersis), and with the Argentinean companies YPF, Bridas, Pluspetrol, Astra, and Petrolero San Jorge. The Nova group—Nova is working with Lone Star Gas and several Chilean companies—was expected to present its proposal to the Chilean and Argentinean governments in September 1994, but its proposal is dependent on existing Argentine pipelines, which is considered by the Chilean government to be disadvantageous. YPF and the other producers in Argentina have already obtained a permit allowing them to export up to 175 mmcf/d to Chile. Both groups are adamant that their projects will go ahead, despite wide agreement that there is not sufficient demand to support two pipelines. There have even been suggestions that the two projects might somehow be merged. Not surprisingly, the decisive factor that determines which project goes ahead is likely to be which consortium can raise the necessary financial backing. The GasAndes project, at US$400 million, is US$270 million cheaper than that of its competitor. Add to that the US$230 million Gasducto Transandino will need to spend on its distribution system and the US$800 million investment in electricity. Both the Argentinean and Chilean governments appear to be in favor of the Gasducto Transandino project, but the official line is that the market will dictate which one becomes a reality.

Bolivia

Skeptics believe that Bolivia may not have sufficient gas reserves to meet contractual obligations to Brazil. To deal with this, the Bolivian state oil company, Yacimiento Petroliferos Fiscales de Bolivia (YPFB), has strengthened its E&P activities to boost its natural gas and crude reserves. In November 1994 YPFB planned to spend US$6.8 million on an exploration well in Chuquisaca, which is the second most important producing area in Bolivia after Santa Cruz. The current natural gas output is 120 mmcf/d, about 40 percent of which is exported to Argentina. YPFB, along with nine other foreign oil companies, is exploring the region of Chuquisaca. It is

reported that Bolivia intends to export gas to Paraguay. For that to be done, domestic annual gas output has to increase by 10 percent.

An agreement was finally reached between Brazil and Bolivia on the US$2 billion gas pipeline project. The deadline to prequalify for bids on the construction was 24 November 1994. The construction bids are to take place on various segments of this pipeline, and the pipeline to Chile. This is expected to allow better participation by the local construction companies in the projects. The first segment due to be built is expected to start in Tarija and run to Chuquisaca in Bolivia. The financial arrangements are expected to be completed by July 1995, and the construction will then begin in August 1995. The 2,115-mile pipeline would stretch from the reserves, which are located near the city of Santa Cruz, and would cross the Brazilian border at Puerto Suarez, finally reaching São Paulo in Brazil. YPFB, Petrobras, and their partners have been trying to negotiate an increase in the contract volume with Brazilian power companies in the São Paulo area. The cost of construction for the Bolivian section is estimated at US$400 million. The pipeline scheduled to be completed in 1997 would be 32 inches in diameter and would supply Brazil with 285 mmcf/d of Bolivian gas during the first seven years of the contract. There is an option, moreover, to expand the diameter, depending on the size of the market. New contracts with São Paulo electricity companies would increase the likelihood of a diameter of about 36 inches. After the initial seven years, the volume of gas is expected to be at least doubled. YPFB and Enron will own 85 percent of the Bolivian section of the pipeline, and the rest will belong to Petrobras and the BTB Group (a consortium of Tenneco Gas, BHP Petroleum, and British Gas). On the Brazilian side, YPFB will have a 20 percent share, Petrobras will own 51 percent of the shares, Brazilian private companies will have 4 percent of the shares, and Tenneco Gas, BHP Petroleum, and British gas will hold the remaining 25 percent. Availability of financing for these projects will depend heavily on the gas reserves and the additional gas found in the country. Discussions are ongoing as to whether the financing could become possible through foreign commercial banks or international financial organizations, such as the Inter-American Development Bank.

To encourage Bolivia's energy integration with Brazil, the World Bank has agreed to provide US$700,000 to Bolivia to carry out a program of certification of probable gas reserves. According to the World Bank report, some 70 percent of Bolivia's reserves currently fall into the category of proven or probable reserves. Fifty-six gas fields have been discovered since December 1993, ten of which are expected to contain in excess of 150 billion cubic feet of gas. Fields owned by the state oil company require work in order to confirm their reserves. Work on existing fields, combined with the confirmation of reserve levels in new fields, is expected to be complete by the end of the first quarter of 1995.

The World Bank has decided to join the Inter-American Development Bank (IDB) and the Andean Development Corporation (CAF) in financing part of the Bolivia-Brazil gas pipeline. The Bank has agreed to provide US$300 million for the US$2 billion project to bring Bolivian gas to Brazilian markets. The IDB is chipping in US$400 million. Petrobras, YPFB, and their partners (Enron, British Gas, Tenneco Gas, and BHP) are putting up US$700 million. And CAF, together with Brazil's Social and Economic Development Bank, will contribute the remaining US$600 million required for the pipeline.

An agreement with a BHP led consortium to construct a natural gas pipeline from Bolivia to northern Chile is under serious threat, following the admission that it would cost too much to be feasible. According to the agreement, BHP and YPFB would hold 45 percent of the stakes each, while Chile's state oil company, Empresa Nacional de Petroleo (ENAP) would hold the remaining 10 percent. The pipeline would supply natural gas for power generation to the industrial areas of northern Chile, near the city of Antofagasta. Depending on the volume of demand, this 500-750-mile pipeline would supply 3.5 mmcf/d of gas in the first year (1996), increasing to a maximum of 6 mmcf/d. Following the discovery of major geological faults along the route, the consortium says the plans are now suspended until studies for an alternative route can be completed, which will take not less than a year. This now means that a rival plan, by CMS Energy and Williams International Pipeline, to build a pipeline from Bolivia to northern Chile is in the leading position. CMS and Williams plan to begin construction in early 1996 and complete it by the year's end. Initially carrying 165 mmcf/d, the pipeline will have a potential

capacity of more than 700 mmcf/d. CMS and Williams will invest US$500 million in Chile, of which US$300 million will go on the pipeline.

Bolivia also plans to build several natural gas fired power plants along the route of the pipeline to Chile in order to serve the towns and cities located nearby. There have also been talks of the possibility of constructing a liquefied natural gas (LNG) plant near the Chilean port of Tocopilla to serve the Asian LNG markets.

Bolivia and Brazil

An addendum has been agreed since August 1994 between Brazil's President Itamar Franco and Bovilia's President Gonzalo Sanchez de Lozada on the 2,115-mile Bolivia/Brazil gas pipeline accord, extending the accord for one year while both sides renegotiate the volume and price of Bolivian gas to be exported. The original accord, signed in February 1993, established an initial volume of 282 mmcf/d and a wellhead gas export price of US$0.90 per million BTU. Bolivia recently claimed that the volume and price were too low for the project to be economically viable. Bolivia was pushing for Brazil to take 424 mmcf/d and for an immediate increase in price. At the insistence of Enron and other participants of the proposed pipeline project, Bolivia was pushing hard for an immediate renegotiation. In the meantime, Brazilian and Bolivian officials reassure themselves, as well as international investors, that the project will proceed and that construction will begin in August 1995.

In November 1994 YPFB and Petrobras began negotiations with Brazilian power companies around São Paulo, regarding the possibility of increasing the volume of gas exports from Bolivia to Brazil. Also participating in the negotiations are YPFB's and Petrobras' strategic partners in the gas project, such as Enron, BHP, Tenneco Gas, and British Gas. According to the plan, the completion of the economic and commercial structure of the project, as well as invitations to tender by prequalified companies, was scheduled for November 1994. Negotiations with lenders regarding funding for the project are scheduled to be completed by March 1995, and by July 1995 final negotiations for funding should be concluded.

Brazil has agreed to increase the size of the Bolivia/Brazil gas pipeline by raising the diameter of the main section of the trunkline from 28 inches to 32 inches. Petrobras has been convinced by its partners in the BTB consortium that a wider pipe makes sense, because it is a standard size (and more frequently manufactured than 28-inch pipe), would therefore be not much more expensive, and would be worthwhile in the future for its greater capacity. The 32-inch pipeline is reportedly capable of carrying almost 1 billion cf/d of gas, which is almost double the previously planned peak flow of 565 mmcf/d from Bolivia and could therefore carry extra gas from Peru or Argentina in the future.

Chile

The competing GasAndes project—comprising Canada's Novacorp. International, America's Lone Star Gas, Australia's BHP, and the Chilean firms Chilgener, Copec, and Gasco—has a proposal for the construction of a 220-mile pipeline from Mendoza to Santiago at a cost of US$880 million. The breakdown of the investment costs is as follows: US$284 million for the transmission line, US$195 million for distribution systems, and US$400 million for the conversion of the Chilgener Renca power plant to gas and the construction of at least one gas-fired power plant. This is much lower than the estimated US$1.6 billion for the competing Gasoducto Transandino project. In the longer term, several other gas power generation facilities are planned by the consortium. The pipeline would initially transport 320 mmcf/d, increasing to 530 mmcf/d by 2016. The decision as to whether to go ahead with this project was expected around the end of 1994. One factor considered a major disadvantage by the Chilean government of the GasAndes project is the fact that it would be dependent on existing Argentine pipeline systems.

Plans have been announced by Gas de Chile, a consortium of Enersis, and British Gas to build a distribution network for the Gasoducto Transandino project. The network construction is scheduled to start in 1997, with a completion date in 2007. The distribution system is planned to cover the central region of Chile: a total of 1,830 miles, from Valparaiso (north of Santiago) to

Los Angeles (south of the capital). The project is estimated to cost approximately US$400 million.

Mexico

Plans to build two pipelines from the United States to northern Mexico continued to face delays in late 1994. Because of skepticism by the U.S. parties about Pemex's ability to comply with its contractual obligations, the possible signing of a letter of intent between Pemex Gas y Petroquimica Basica, San Diego Gas and Electric, and Southern California Gas is still up in the air. Once the accord is signed, both U.S. companies are scheduled to begin work on a 16-inch pipeline that will run from the existing pipeline network in California's Imperial Valley to just outside of the Mexican city of Mexicali. The pipeline's planned capacity will be around 40 mmcf/d. The pipeline will serve the El Rosarito power station near Tiajuana and a planned desalination plant somewhere on the coast of Baja California. Another pipeline linking the Salamayuca power plant in Chihuahua state with El Paso Natural Gas' Texas system has likewise encountered into delays. Sources say the companies involved in the Salamayuca project (General Electric, Bechtel, El Paso Natural Gas, Grupo ICA, and Coastal) are frustrated by the slow pace of progress.

V. Regional Energy Balance

A profile of the overall energy balance for all the countries of Latin America and the Caribbean is provided in Table 5. In 1993, crude oil accounted for 57 percent of Latin America's primary energy production, followed by gas at 17 percent and biomass (including firewood and cane products) at 12 percent. The rest of the primary energy production consisted of hydropower, coal, geothermal power, and other energy sources. Of the total primary energy available to the region, net of exports, 77 percent was transformed into secondary or tertiary energy products for final use.

Table 5. Energy Balance of Latin America and the Caribbean, 1993 (thousand barrels of oil equivalent per day)

	Petroleum	Gas	Coal	Hydropower	Geothermal Power	Nuclear Power	Firewood	Cane Products	Others	Total Primary
Production	8,066	2,386	533	845	22	297	1,107	605	233	14,093
Importation	946	34	202	0	0	0	0	0	0	1,182
Exportation	3,732	34	257	0	0	0	0	0	3	4,026
Inventory Variation	20	0	-14	3	0	3	0	0	-1	10
Unused	0	278	2	80	3	0	0	1	61	426
Total Supply	5,300	2,108	462	768	19	299	1,107	603	167	10,833
Refinery	-5,239	-8							-1	-5,248
Power Plants	-12	-285	-121	-760	-19	-299	0	0	0	-1,496
Self-Producers	0	-59	-20	-15			-7	-34	-17	-153
Gas Treatment Plant	0	-704							-63	-768
Charcoal Plant	0	0					-265		0	-265
Coke/Blast Furnace	0	0	-230						0	-230
Distillery	0	0						-127	-1	-128
Other Centers	-3	-18	0				0	0	3	-18
Total Transformation	-5,255	-1,074	-371	-775	-19	-299	-273	-161	-79	-8,305
Own Consumption	3	237	0	0	0	0	0	135	1	375
Losses	12	128	3	0	0	0	0	0	0	143
Adjustment	6	0	5	-7	0	0	-8	1	8	6
Transportation	0	16	0			0	0		0	16
Industrial	21	468	78	0		0	152	283	71	1,073
Residential	0	110	4			0	638		8	760
Commercial, Pub. Serv.	0	28	0			0	2		0	30
Agric, Fishing, Mining	0	1	0	0		0	48	11	1	63
Construction/Others	2	0	1			0	0		0	4
Energy Consumption	24	624	83	0	0	0	841	294	80	1,946
Nonenergy Consumptio	0	45	0	0	0	0	0	12	0	57
Final Consumption	24	669	83	0	0	0	841	306	80	2,003

Table 5 (continued)

Electricity	Liquid Gas	Gasoline/ Alcohol	Kerojet	Diesel Oil	Fuel Oil	Coke	Charcoal	Gases	Others	Nonenergy Products	Total Secondary	Total
1,133	457	1,597	329	1,381	1,441	38	128	610	53	269	7,436	14,093
54	81	199	27	185	262	16	0	0	1	5	830	2,012
56	40	246	101	276	541	3	0	0	16	42	1,321	5,347
0	-8	-13	-19	5	-57	0	0	0	0	6	-87	-77
0	0	0	0	0	0	0	0	3	0	0	3	429
1,132	490	1,536	235	1,295	1,106	51	128	606	37	238	6,855	10,252
0	163	1,391	329	1,379	1,438	1	0	99	33	196	5,030	-219
1,071	0	0	0	-53	-467	0	0	-79	0	0	1,071	-1,024
62	0	0	0	-21	-31	0	0	-15	-4	0	62	-162
0	290	94	0	0	0	0	0	470	8	66	928	160
0	0	0	0	0	0	0	128	0	0	0	128	-137
0	0	0	0	0	0	37	-1	39	-1	7	83	-150
0	0	112	0	0	0	0	0	0	0	0	112	-16
0	4	-17	0	2	3	-2	0	2	12	0	23	-15
0	0	-17	0	-74	-499	-2	-1	-93	-5	0	-692	-1,562
44	47	76	16	68	122	3	0	215	4	3	597	972
161	0	1	0	0	0	1	4	3	0	0	171	314
0	0	1	0	1	1	0	0	-45	1	0	-40	-35
6	10	1,259	143	833	33	0	0	0	0	0	2,284	2,300
455	30	2	9	112	378	41	90	261	27	0	1,406	2,478
276	384	5	61	11	17	0	30	22	0	0	805	1,566
140	10	3	3	16	8	0	2	1	0	0	184	214
45	1	2	3	175	47	4	1	0	0	0	277	339
4	2	9	1	4	1	0	0	0	0	0	20	24
926	437	1,280	218	1,151	484	45	123	285	27	0	4,976	6,922
0	6	161	1	0	0	1	0	55	1	234	459	517
926	443	1,441	219	1,151	484	45	123	340	28	234	5,435	7,438

Source: OLADE Database (1994).