

COMPARING INVESTMENT EFFICIENCIES FOR OIL AND GAS PROSPECTS IN SOUTH AMERICA

Konstantino Zorbalas

Wintershall Ag, Germany

SUMMARY

The new millennium is nearly upon us and the petroleum industry is experiencing a low oil price world. Many companies believe prices will remain low for a few more years, if not longer. If true, such low prices will force changes in behavior with implications for private as well as national oil companies and energy markets in general. For private companies a low price world will generate even greater pressure for cost cutting. It is true that a streak of six straight years of spending growth in the E&P business globally dating back to 1992 should end in 1999. However, in petroleum, investment is essential simply to stand still. Hence once the initial reduction in capital expenditure has taken place, the focus will switch to long term investment for profit which will add shareholder value.

In this paper the potential of the South American oil and gas industry will be reviewed and investment efficiencies amongst the South American countries will be compared. The leading source of investment in South America is capital emerging from foreign companies' budgets. The attractiveness of the region is attributed to rapidly growing energetic demand as part of efforts to secure fuel for electric power generation and the increasing liberalization of regional hydrocarbon state industries. The latest will allow private corporations to form alliances with public entities in parts of South America where exploration, production, refining and distribution was in the past virtually a monopoly and ruled by the state.

INTRODUCTION

Looking back in the last ten years of the evolution of the petroleum industry in South America, it can be clearly identified that privatization and deregulation were the two main elements that took place in most countries. This was an effort from local governments to bring economic growth in the oil and gas industry, increase employment, boost productivity and on the same hand decrease the deficits caused by inefficient state sectors.

Being at a footstep away from a new century it is clear that the South American petroleum industry has redefined its role. The recent formation of mergers and strategic alliances between firms and state in search of added value gave the incentives for an integrated energy industry. This integration process begun a few years ago, continuing a global trend. Governments are restructuring their energy sectors in an effort to attract private investment. As examples, Venezuela expects to attract more than \$30 billion in private investment in its oil industry over the next decade. Colombia, now the fourth largest oil producer in South America is looking to reform fiscal terms in order to attract investors. Finally Brazil, after decades of state monopoly has begun to allow foreign participation in its energy sector. Many foreign companies are quickly positioning themselves to exploit the changes in South America's energy industry, a region that holds enormous potential. As a result, stand alone oil, gas, transportation and electricity companies are disappearing, consolidating and forming previously unheard-of partnerships and strategic alliances. These new companies redefined as integrated energy entities cover the entire span of energy from hydrocarbon to electricity.

Integration is most evident in the gas market in South America. Countries like Argentina, Bolivia, Peru and Venezuela with significant gas reserves have clear margins for exports in new markets. On the contrary, Brazil, Chile and Uruguay have significant unsatisfied energy demands and most importantly are lacking natural gas. In these countries gas currently accounts for less than 10% of available energy sources. The solution to the needs of both groups is simply to integrate. Indeed, recently privatized corporations succeeded in negotiations and striking deals where governments have been discussing for long time with no results.

GENERAL OUTLOOK IN SOUTH AMERICA

South American Reserves as U.S. Strategic Supply

In the past decade oil reserves of South America were recognized as vital U.S. alternative source of crude imports outside the Persian Gulf region. The crude oil exports are expected to continue growing strongly in the next 15 years with the U.S. being one of the main beneficiaries. "With proven oil reserves amounting to 13% of the world total and oil production at only 8.5%, Latin American oil appears to be under exploited, which is why it is expected the countries of the region to make better use of their resources from now onwards" said Sheik Zaki Yamani chairman of the 1997 CGES annual conference in London. U.S. has for some time sought to diversify its oil imports away from the Middle East, which opened new markets to the reserves of South America (see Figure 1). The short-haul crudes from nearby South America are more attractive to the U.S. refineries, which no longer want to keep excessive stocks. Also, Latin American companies are investing in U.S. refineries to secure markets for their oil. Venezuela has the potential to raise production capacity the fastest and most of this extra output is expected to go to the U.S.

Natural Gas and its Role in Power Generation

Gas demand is expected to rise in South America in line with global trends as domestic use increases and gas-fired power generation grows further. Fuel oil demand is expected to lose market share to gas for electricity generation in the next decade. Venezuela ranks 7th in the world's gas reserves by country with 143 Tcf of proved reserves. Together with Argentina had a nearly 1 Tcf each of gas production in 1997 with clear increasing trends over the past five years. This steady increase of gas production could create an oversupply of LPG in countries like Bolivia, which cannot absorb the extra LPG and will be looking for export markets. In addition many new LPG plants under construction will prompt a quick rise in regional LPG supplies. As a result some producers are risking adding LPG supplies too quickly which could overwhelm demand depending on the country and the markets they serve ⁽¹⁾.

Deepwater Reserves

South America is a region of promise in the future deepwater activity; ranking third in the share of deepwater wildcats drilled in water depths of 200 m. or more. As a hydrocarbon province, Brazil, with giant deepwater fields on stream in its Campos basin is by far the region with the best long-term prospects. The second largest deepwater liquid reserves, 19 % of worldwide deepwater reserves (see Figure 2), lie in Brazilian waters of which 46% are in Marlim and Marlim Sul fields alone. Recently Petrobras, the company with the largest experience in drilling in deep waters in the world, completed a more than 1850 m. water depth well at the Roncador field ⁽²⁾, a new world record. 152 deepwater wells scattered between Honduras and Chile are already drilled in South America most of them in the late 1970's - early 1980's. From those, Petrobras drilled 141 wells in Brazilian waters in the Campos and Santos basins alone. 37 of them lie in waters exceeding 1000 m. deep. Exploring in deep waters is barely more risky than in any other kind of terrain. Of course the logistics are very much different but Petrobras has sustained a 50% success ratio in deepwater drilling until 1996. The performance may be due to a very good continuity of the turbidite plays from shelf to deep waters. The Campos basin has not yet reached a mature stage in deepwater exploration. The recoverable reserves in the basin were recently estimated at approximately 14 billion boe ⁽³⁾.

Pipeline Construction Outlook

At today's battered world's energy market, the effects are clear in reduced plans for new pipeline construction. Plans for worldwide pipeline installation and construction in 1999 showed a 28% decline compared with plans announced a year ago for 1998 and beyond (see Figure 3). Despite effects of the economic downturn, Latin America expects to see addition of significant construction in the near future where the gas-grid evolution is still under progress. International investors see South America as the most attractive region in the gas market which will require an estimated \$100 billion in energy project financing up to 2005 of which half is expected to be spent on pipelines alone. This is attributed mainly to the replacement of traditional fuels by natural gas as it makes up an increasing proportion of power generation in the region. In 1997, natural gas was responsible for 11 % of the region's power capacity

and its share is expected to rise by 17% by 2010 with a corresponding decline in oil and hydroelectric power ⁽⁴⁾.

One of the most ambitious projects in South America is intended to supply gas to the Brazilian market. In August 1997 work begun on building the 3186 km, 32 in. pipeline from Rio Grande in Bolivia to Sao Paulo and along the Brazilian coast to Porto Alegre, capital of Rio Grande do Sul state. The Bolivia-Brazil pipeline will be constructed in two phases with a first leg of 1970-km (750 km in Bolivia and 1220 km in Brazil) which is already completed and a second leg of 1180 km solely in Brazil which is scheduled to be completed in November 1999. It has a throughput capacity of 30 million m³/d (1.06 Bcf/d) of gas and will cost a total of more than \$2 billion. Petrobras has sole responsibility of marketing the gas in Brazil and has estimated demand in three segments. Initially it would transport an average of 5 million m³/d of gas and after completion of the second leg the volume is expected to increase to 9 million m³/d. Later on pipeline capacity will be expanded to 16 million m³/d depending on market demand. But increased natural gas production in Brazil, delays in power generation projects and a deteriorating economic climate may force Petrobras in exercising an option to take only 3.5 million m³/d in the first year as a take or pay contract with YPF.

Joint Ventures and Strategic Positioning

A widely accepted synergy in the oil business, the formation of joint ventures, is also taking part nowadays in South America. Just to start the list, the extra-heavy oil production from Venezuela's Orinoco belt in form of joint venture deals has begun. If this and other projects go forward as announced, nearly half a million b/d of upgraded crude will be coming from this region in the next 3-4 years. Developing and marketing this resource will cost an estimated \$12-13 billion just for the initial projects identified so far. Why the extra-heavy crude oil projects will attract investment is analyzed later in the Venezuela outlook.

Repsol as the sole bidder, acquired a 14.99 % stake in Argentina's YPF with a \$2.01 billion investment. It appears to be only Repsol's first step in a quest for a full takeover or at least some form of operational control over the largest privately owned oil and gas company in South America. The two companies are highly complementary: Repsol is strong in refining and marketing while YPF is strong in the E&P side. YPF, with its large natural gas reserves and upstream operations, complements Repsol's gas marketing tasks conducted by Gas Natural in which Repsol holds 45.3 % stake. The Repsol-Gas Natural group is the largest distributor of natural gas in Latin America where it distributes gas to four of the seven major cities: Monterrey, Rio de Janeiro, Bogota and Buenos Aires. "YPF's stake acquisition fits very well into Repsol's strategy to develop an integrated gas chain from production through distribution to power generation" said A. Cortina, Repsol's chairman. This last point is particularly relevant in South America where, as previously discussed, power generation is providing much of the momentum for gas development.

Amoco Corp. became the second largest operator in Argentina behind YPF after taking 60 % of Bidas' assets and forming Pan American Energy. The new company has an output of 14000 b/d and 1.5 billion boe of reserves. Amoco, now merged with BP, is also the largest contributor in finding and developing the gas reserves of Trinidad and Tobago.

During the third round of marginal and inactive fields in Venezuela (June 1997) both local and foreign corporations mainly in a form of joint ventures bided more than \$2 billion for winning acreage offered by the state. The third highest bid was casted by a joint venture formed of four, Chevron, Statoil, Philips and Arco. Similar alliances between multinationals and strong players in South America were seen in the exploration bidding in October 1997 in Bolivia. Many foreign companies have formed joint ventures with Petrobras in the recent opening of the Brazilian oil industry. Additionally, a lot of participation is expected in the upcoming May 1999 bidding process of acreage mainly concentrated in Brazil's offshore basins.

Fiscal Terms and Tax Incentives

A recent study ⁽⁵⁾ indicated that there is a global trend of decline in the government take of oil and gas deals between private corporations and the local governments. This holds true also in South American countries where local administrators seek ways to provide incentives for private investment. Effectively oil-producing governments have been using their national oil companies as tax collectors for the nation.

But in today's low oil price world, is the private sector that can generate greater revenues more quickly and at lower costs. An obvious solution for the producing governments is to allow foreign companies to access and develop their reserves by providing favorable fiscal terms and increase the private's party share in the deal. In a low price world access to low cost reserves becomes imperative.

It was previously discussed that gas has an increasing demand as a commodity in the South American energy market. It is a more desirable fuel over oil for electric power generation and for environmental reasons. The economics of gas is often less attractive than oil. The production recovery of gas fields is longer than of those with oil resulting in a slower recovery of the investment. In many countries gas markets are limited and in most cases new expensive gas pipelines and distribution systems need to be installed in order to deliver the gas in the market. Prices for gas at the wellhead are usually lower than for oil on an energy equivalent basis. It would be logical to assume that many South American governments would have more favorable fiscal terms for gas than for oil in order to stimulate gas development. Low cost gas could be used in many ways to increase activity in certain industries. Also, improved terms for gas could result in better overall exploration economics which often results in the discovery of more oil as well as gas. However, most governments in South America still require identical fiscal terms for gas and for oil. A clear exemption is Trinidad and Tobago that seems to promote gas development with attractive fiscal terms (see Figure 4). This fiscal system is discussed in detail later in the Trinidad and Tobago overview. Also Bolivia introduced a new petroleum law on April 30, 1996. The new terms are considerably improved over the terms applicable to past contracts. These past contracts are now converted to the new system.

VENEZUELA

Venezuela's ambitious target to double current production to over 6 million bbl/d by the year 2006 has very little chance to be materialized with today's oil price outlook. The reason is that local economic conditions do not support the \$65 billion development plan announced by Pdvsa before the oil price slump. Currently Pdvsa is facing a 525,000 bbl/d cutback to 2.85 million bbl/d, which was agreed between Venezuela, Mexico and Saudi Arabia in an effort to boost world oil prices. Although Venezuela has been one of the most consistent over-producers within the OPEC, this time new president-elect Hugo Chavez wants to strengthen Venezuela's deteriorating ties with OPEC and promised to honor the full cuts pledged by his country.

In recent years Pdvsa has been in the forefront in the race to strike up deals with foreign companies in order to attract new investment to the state oil industry. The so-called opening policy "apertura petrolera" has opened the doors to private capital in upstream and downstream activities by means of joint ventures and strategic associations. But foreign operators are sitting on hot coals regarding the impact that the newly elected president will have on the local oil industry. President Chavez campaigned on promises of reviewing privatization, imposing moratoriums on foreign-debt payment and limiting investment in Pdvsa which he named "a state within a state". He accused Pdvsa's board of wasteful spending and existence of company's hidden assets without any control and audits. He has promised to institute a "people's government" and distribute the wealth of the country's oil reserves to the people. In addition, Chavez is calling for a major cutback in Pdvsa's funding and its 1999 spending budget. All these made investors very nervous resulting in protests from those that have invested money to help Venezuela meet its capacity goals. However the Venezuelan economy depends on oil which accounts for 75-80 % of total exports and Pdvsa is responsible for half of the government's income. Oil exports depend on production and refining which require continuous input of capital. Since Pdvsa alone cannot generate enough capital to support all of Venezuela's oil projects, foreign investment is essential. It was in recognition of that need that the government in 1992 began reopening the doors of the state oil industry to foreign operators. The Chavez administration promised to respect all upstream agreements and maintain all joint ventures between Pdvsa and the multinational companies.

Venezuela accounts for about 65 % of the 420 billion bbls recoverable of heavy oil around the world ⁽⁶⁾. Five joint venture operations amongst Pdvsa and multinational companies are marching in the Orinoco heavy oil belt and two others are on their way. Required investment could exceed \$9 billion to materialize all these associations. As incentives to third party investments, Venezuela's government has established a special fiscal treatment consisting of a reduction from 68 % to half in fiscal payment thus, contributing to the development of heavy oil's infrastructure and industry. This attributes to Venezuela's continuing effort to exploit the 1.3 trillion bbls of Orinoco belt reserves ⁽⁷⁾ (Figure 5). But what makes these heavy oil conversion projects in Venezuela still money making deals in today's low oil price world? Reserves of

bitumen oil are so huge that average finding and development costs shrink to a negligible \$0.25/bbl. Estimates put the breakeven price at \$8.50/bbl for Mexican Maya crude for the Conoco's Petrozuata JV and at \$6.75/bbl for Mobil's Cerro Negro JV. Table 1 shows a comparison between Orinoco's belt heavy crude production margins with its competition in Canada. Pdvsa, being a partner in all Orinoco ventures, continues to give priority to these deals.

Venezuela will be facing another year of difficult economic and political times. The continuous pressure to raise capital for Venezuela's ongoing projects will leave little room for the Chavez administration to dismantle the "apertura" process. Foreign investors will have to anticipate the local economic volatility, adapt to the changes of the new administration, if any, and reassess their investment strategies according to the consequences these changes might bring.

TRINIDAD and TOBAGO

The most important achievement in Trinidad and Tobago's petroleum industry is the possibility of becoming the world's leading exporter of LNG, methanol and ammonia. Trinidad has efficiently attracted foreign companies to explore and discover mostly natural gas in its offshore blocks. The country's gas reserves have increased dramatically in recent years estimated at 21 Tcf that could last for at least 28 years of domestic and export needs. Amongst the big major oil companies involved in the region, Amoco Corp. is by far the biggest player in Trinidad's exploration having added about 11 Tcf of natural gas to the island's reserves since 1994. Trinidad has favored exploration for natural gas by shifting from licensing and royalty arrangements to mostly 25-year production sharing contracts ⁽⁸⁾. Under the new PSC's government take differentials between oil and gas can be as much as 14 % (see Figure 4). This is mainly due to the fact that the Supplemental Petroleum Tax and the Petroleum Levy do not apply to gas.

The government's push to develop its gas reserves has placed grounds for the largest capital investment in the Caribbean region, the construction of the Atlantic LNG liquefaction plant at Point Fortin in South Trinidad. The first shipments of LNG are due in the second half of 1999. The Atlantic plant has a capacity to produce 3 million tons of LNG per year from its single train construction. 60 % of the LNG output will be marketed in Puerto Rico and Eastern U.S. and the remaining 40 % in Spain. Recently Amoco and Repsol formed a strategic alliance where the latter will commit to buy a total of 5 million tons of LNG per year for 20 years. Enagas, Repsol's subsidiary will be doing the distribution of the LNG to the newest gas-fired generation projects in Spain. Both companies are actively investigating opportunities in nearby Brazil, which is set for significant natural gas growth. Amoco is supplying all of the gas for the first train of the plant and is well positioned to lead supply for its future expansion. Enron is following Amoco as a second largest provider of natural gas and recently had a significant gas/condensate discovery in its U(a) block off southern Trinidad. Enron claimed the finding of the Omega prospect is the biggest gas discovery in company's history and is currently under evaluation.

Trinidad and Tobago's government is seeking more exploration investments offshore with blocks in the Gulf of Paria, off the island's west coast, where neighboring Venezuela has discovered large volumes of nonassociated gas. Both countries recognize that certain benefits could be derived from handling the natural gas discovered in Trinidad. Certainly, Trinidad has a head start with the Atlantic project over neighboring Venezuela, whose \$5 billion Cristobal Colon LNG project is on hold.

ARGENTINA

Gas in Argentina

The Argentine gas industry is considered to be one amongst the region's most developed. After its privatization and deregulation in 1992, gas held second place in primary energy supply accounting for 36% where as in 1997 this share was increased to 46 %. Prior to 1992 the Argentine gas industry operated as a monopoly where YPF, the then state company, was the only one that commercialized gas in the country and Gas del Estado the only company to transport and distribute it. The restructuring of the gas industry started in 1989 with YPF's deregulation and was completed in 1992 with the privatization of Gas del Estado. The industry was divided into many entities separated from production to transportation and distribution resulting in better organization and service and ofcourse it promoted healthy competition. Prior to the 1992 deregulation the Argentine gas industry suffered serious deficiencies. There was an

acute lack of investment and no clear rules in the management of gas supply. In this situation any kind of energy integration agreements with the neighboring countries was simply impossible to achieve. After 1992, the formation of two gas transportation companies and 8 distributors opened new market practices with concession time frame of 35 years and an option for a 10-year extension. Along with free market prices the formation of this new structure put the grounds for long-term investment in Argentina and the requirements for new gas exporting routes in Mercosur were established.

The geographical position of the Argentine gas reserves placed in the center of Chile, Bolivia, Paraguay, Brazil and Uruguay offer unlimited possibilities for business development and growth. Table 2 shows several gas supply projects to Argentina's neighboring countries as examples of new market development.

Still today the natural gas consumption in Chile and Brazil is relatively poor. These two countries also lack sufficient gas reserves for their future demand. This leaves room for future export expansion of the Argentine gas. Brazil is expected to have a drastic rise in gas consumption due to a multitude of planned projects that will require gas as primary energy. Additionally, there is a sharp turn to gas-fired electric generation, which will also trigger increase in gas demand. Similar booming is expected in the industry in Chile. Both countries are expected to at least triple their today's consumption over the next 10 years whereas the use of natural gas in Argentina is expected to increase slightly. Figure 6 shows a projection of gas consumption as a primary fuel over the next decade in Argentina, Brazil and Chile.

In Argentina the main growth drivers for domestic gas consumption will be industry and power where residential gas consumption will remain almost steady. The demand for gas will increase mainly due to the continuous expansion of the gas-fired power generation (see Figure 7) and the prospects of exporting gas to Brazil. Furthermore, Argentine gas can substitute a possible shortfall of scheduled Bolivian gas deliveries through the recently constructed Bolivia-Brazil pipeline. This could result in natural gas production growth of 3.6 % to 7.5 % annually for the next decade. Accelerated production will attract new capital investment in the gas transportation infrastructure since the Argentine pipeline system already operating near its capacity.

The demand potential for natural gas in Brazil is unquestioned but there are some factors that would regulate the Argentine gas export growth. Hydroelectric capacity, which currently has by far the largest stake at power generation in Brazil, is still underway and is likely to persist in the future. Domestic gas supply in Brazil could increase under aggressive exploration now that the petroleum industry is open to foreign companies under the recent privatization program. The amount of future gas reserves discovered as a result of the exploration boom in Bolivia after the 32 in. Bolivia-Brazil pipeline started construction.

CHILE

Chile was the first country in South America to privatize and deregulate its energy industry. As a result, in a country of rapidly growing energy demand, consumption of petroleum products has grown by an average of 7 % annually since 1985. Consumption of 150.000 bbl/d of petroleum products far exceeds Chile's crude oil production at about 9.000 bbl/d. The large gap in crude requirements is met by imports from other neighboring countries and Africa. While the market for lighter products has increased, the market for heavier products such as residual fuel has declined. This is due to the switch of industrial and commercial customers to natural gas, which is increasingly available from its neighbor Argentina.

Planned gas imports to Chile could total 10 billion m³/yr by 2010 and will primarily serve demand in the Santiago area (4.4 billion m³/yr), the southern region (1.7 billion m³/yr) and the northern region (3.4 billion m³/yr). Currently Chile imports an average of 2 million m³/d for the Methanex plant in Punta Arenas (South) and another 6 million m³/d through the Gas Andes pipeline to the Santiago area.

In northern Chile, the Gasoducto Atacama is near completion, which will bring gas produced in Salta province in northern Argentina to a 740 MW combined cycle plant being built at Mejillones. A third pipeline will be operational by the year 2000 and will supply Argentine gas from Neuquen's Loma la Lata giant gas reservoir to Concepcion, Chile. The Gasoducto del Pacifico will deliver 1.5 million m³/d on initial start up and supply could reach 7.1 million m³/d by the year 2010 ⁽⁹⁾. The gas is mainly targeted to boost the local industry's productivity such as refining, forestry and fishery and to satisfy residential market demand. Several industries have already shown interest in converting to gas and thus modernizing their productivity by means of a more economic and cleaner-burning fuel. Such conversion will contribute to

cleaning the atmosphere as it is happening with industries in Santiago, as a result of the Gas Andes pipeline installation.

BRAZIL

It is said that Brazil is today's turmoil area in South America. All eyes are focused in the recent opening of the Brazilian petroleum industry. In 1995 Brazil's government approved a constitution amendment ending Petrobras' monopoly in the petroleum sector and in July 1997 passed a new law which is expected to attract foreign investment in the country. The new hydrocarbon law establishes an inter-ministerial council that will establish guidelines for imports and exports of petroleum products. In addition, a new regulatory body, the National Petroleum Agency (ANP) will be placed in charge of issuing tenders to grant concessions for domestic and foreign companies and will establish rights to explore for and develop oil and gas in Brazil. Foreign companies are now allowed to set up subsidiaries in Brazil and Petrobras, according to the article 22 of the new law, will make available all its technical information and data about Brazil's sedimentary basins. Big multinational petroleum companies are interested in working in the Campos basin, Brazil's principal oil province and one responsible for more than 65% of the country's domestic production of crude oil. The new law establishes that all producing oil and gas fields will remain under Petrobras' control and the government will continue to retain control of the company. It also calls for full price deregulation of petroleum products within 3 years.

Brazil's sedimentary basins cover 6.4 million sq. km, of those 92.9 % will be opened up for public bidding. Of this area, 48 % includes tenders in the "country's jewel", the Campos basin. Petrobras will only control 7.1 % of the total area and will have the choice of operating alone or in association with other companies in form of Joint Ventures. Estimates of the company indicated that partnerships with foreign companies would result in exploration and production outlays totaling more than \$4.5 billion during the next 3 years. So far Petrobras has signed 7 deals with E&P partners only for small upstream Joint Ventures. The first of the deals was signed with the Argentine YPF in October 1998 for a JV in the Espirito Santo basin with a total exploration cost of \$20 million. The second deal was a \$10.4 million JV contract with a Coastal Corp. led consortium for two blocks in the Camamu basin off Bahia state. Petrobras has yet to complete any of the large proposed deals, mainly with big multinationals in the Campos basin, which output growth will depend on. The reason is that most firms are holding out for better terms before signing up. Most companies claim that tax rates on equipment imports are too high and the three-year time limit to declare fields to be commercial is too short. Another issue to be defined is whether exploration and drilling costs will be categorized as operating expenses or capital investment because this will determine the scope of oil and gas profits. In Brazil, previous regulations had allowed Petrobras to consider development drilling in the same manner as exploratory drilling; thus allowing the company to expense all drilling costs in the same category and within the current fiscal year. This is subject to revisions in order to conform to U.S. accounting procedures. The new law No. 9478 establishes four tax equivalents for exploration and production activities:

1. A signature bonus which its minimum value will be defined in the concession tender. This tax is not applicable to the areas kept by Petrobras because there was no bidding in the approval process.
2. Rental fees for the occupancy or retention of an area. These fees will be paid upon taking the title of the exploration and production area. In each concession contract, a unitary amount (Brazilian Real per sq. km) will be specified and used to calculate annual payments. The unitary amount will take into account the geological characteristics of the block and the location of the sedimentary basin.
3. Royalties and rentals are mandatory for all concession contracts signed with ANP. They will be paid on a monthly basis in an amount that corresponds to 10 % of the sales of the oil and gas produced. Until now, Petrobras was subject to the payment of royalties at a rate of 5 %.
4. Special participation, which applies to fields with large production volume or high profitability, will be charged as an extra levy on profits.

In start, exploration and production taxes will be increased compared to the past but then again Brazil wants and needs to attract foreign investment to the oil sector so it would not make sense to overtax it.

The opening of Brazil's oil sector with the first open licensing round is underway. ANP announced the licensing round in December 1998 and will begin opening sealed bid envelopes in May 1999. The first round is offering 27 blocks of which 23 are in the offshore sector. Each exploration block is on average 4500 sq. km, equivalent to the size of 225 blocks in the Gulf of Mexico. All blocks offer exploration and development periods more in line with industry standards of seven to nine years than the three years

allowed to declare a field commercial under JV terms for Petrobras acreage. ANP expects to receive \$1.2 billion in investments in the 27 blocks put out for tender.

Most of the initial focus is on Brazil's upstream sector but companies are also pursuing downstream investments and participation. Similarly with the gas sector in Argentina, Brazil is also switching to gas-fired power generation. Enron Corp. won approval to build a \$500 million 480 MW gas-fired power plant in Mato Grosso State. Two more project agreements, a 500 MW thermoelectric plant in Macae, and a 700 MW thermoelectric plant both fueled by natural gas were signed for construction in Rio de Janeiro State. The power project agreements are part of a broader effort to avoid shortages of electric power in southern Brazil. The government has strongly endorsed expansion of gas-fired capacity to meet future electric demand. All of these projects will utilize natural gas mainly from the Bolivia-Brazil new pipeline.

Plans for a new refinery to be build in the industrial district of Pecam near Fortaleza, Ceara's capital are laid for approval by ANP. This new refinery, which is an investment of Thyssen Intl. part of the German group Thyssen Krupp AG and could cost up to \$2 billion, initially will have a distillation capacity of 110.000 b/d. The refinery will process light crude oil imported from western Africa, particularly Nigeria and Angola. In the second stage the refinery will be expanded to a 200.000 b/d capacity and will be able to process lower gravity crudes from Brazil. All the output of gasoline, jet-fuel, LPG, diesel and fuel oil will be marketed in Brazil's northern and northeastern states. Similarly, an international consortium led by the Korean group SK Global also asked permission from ANP to build a \$600 million refinery at the port of Suape in Pernambuco State. Negotiations are under way not only with ANP but also with Pernambuco State officials. The consortium plans to seek partial funding from IFC and to ask Petrobras to become partner in the plant. Petrobras itself has 10 refineries that manufacture 1.7 million b/d of the 1.8 million b/d of oil products that Brazil consumes. Demand is expected to grow in the coming years but the net crude imports will decline drastically by the year 2005, especially from the Middle East (see Figure 8), which will be substituted from short-haul supply sources from Venezuela and Argentina.

Also at the port of Suape, 30 km south of Recife, the first South American LNG import terminal was announced for construction as part as an agreement between Petrobras and Shell. The terminal reportedly would be linked with one or more proposed thermoelectric power plants in Pernambuco State that would be fed by the regasified LNG. It is expected to have capacity to receive as much as 6 million m³/d of natural gas, which equates to about 1.5 million metric tons per year of LNG. Petrobras and Shell estimated the total investment at \$200 million.

BOLIVIA

An important step was taken in 1996 with the privatization of the Bolivian state owned oil company YPFB. Political difficulties and adversaries along with technical difficulties were the main drawbacks that prevented YPFB from extracting the maximum value of Bolivian resources. The government divided the state firm into two companies, Chaco and Andina, giving 50 % of YPFB to foreign investors. Some of them include Amoco, Enron, Shell and Maxus the subsidiary of the Argentine YPF S.A. Foreign companies cannot only provide the capital but also the know-how to bring value to the Bolivian resources.

In 1998 Bolivia held a major exploration bidding round. More than 20 companies nominated exploration blocks that lay east of and parallel to the Andes from the Peruvian border to the Argentine and Paraguayan borders. A total of 34 blocks were awarded and won as a sole criterion of exploration commitment in a 3 year period, expressed in working units. It is said that explorers have focused their interest in finding more gas reserves that could be exported to neighboring Brazil. There is a debate amongst all major country producers in the Southern Cone whether Bolivia has sufficient gas reserves to meet the expected climbing demand in Brazil. As of January 1997, 4.9 Tcf of remaining gas and 195 billion bbls of oil was estimated as proven plus probable reserves on blocks currently under license. Although the gas reserves were upgraded to 6.1 Tcf on January 1999 after revisions, experts in Wood Mackenzie Consultants Ltd. Said that there is enough room for competition and a need from Bolivia's side to increase current gas reserves. "This leaves the door open," said Wood Mackenzie, "for E&P companies active in Bolivia to pursue aggressively exploration opportunities to supply the shortfall. In addition, there is potential for Argentine producers and increased natural gas production within Brazil to supply the shortfall if Bolivian discoveries are not made or not monetized quickly enough".

Many companies have already started exploration in the recently acquired blocks and some of them have made significant discoveries.

PERU

In Peru the privatization process has begun in the petroleum sector and lately the leading companies in the electricity sector are also open to foreign capital inflows. With the basis of a hydrocarbon law passed in 1993, Copri, Peru's privatization commission was formed with mission to oversee the privatization of state petroleum company Petroperu to the state oil regulatory company Perupetro S.A.

In early 1998, Perupetro S.A. signed contracts to privatize the operation of its oil terminals. Initially, the eight terminals were offered on an individual basis, where as now are offered as three business units of north, center and south regions of which Perupetro will retain ownership and only offer operating contracts. The companies will pay \$3 million upon signing the 15-year operating contract and the government expects to receive \$9 million per year in tariffs. The auction of a 60 % stake in the Talara refinery was also withdrawn as part of the original plan. It may be offered in the future along with the North Peruvian pipeline and the Conchan and Iquitos refineries that are units to be privatized according to Corpi's privatization plans.

High exploration interest ranks Peru's Ucayali basin as one of the busiest in South America. The basin holds 14 exploration contracts out of 29 total in Peru. Many of the biggest multinational corporations are active in the basin where the Camisea complex gas fields draw most of the attention. After twice failing with its negotiations with the government, operator Shell and partner Mobil E&P Peru withdrew on July 1998 from the \$2.5 billion development commitment signed back in 1996. The reason was strictly commercial, focused on the distribution of gas and changes in the tariff structure for electricity, which were not included in the contract and could not be reconciled. Plans included using gas for electric power generation and delivering gas by pipeline to Lima. That left the Peruvian government, which is anxious for the project to get under way, to seek other companies to step in with their proposals in order to meet its goal that Camisea gas will reach Lima by 2003. This will eliminate high LPG imports, it will improve the country's negative trade balance and will partially solve Peru's crude oil deficit. The Camisea complex is located 500 km from Lima and latest evaluations estimate reserves at 11 Tcf of gas and more than 600 million bbls of condensate. The company or consortium that wins the tender to develop Camisea's production can also bid for the pipeline concession. A separate company however will handle the gas distribution end of the project, which was the main issue of dispute between Perupetro and Shell/Mobil.

Apart from the Ucayali basin, Perupetro hopes to promote a strong search of oil in 13 offshore blocks along the lines of international trends of exploring deepwater reserves. The offered blocks consist of an extensive area of nearly 1 million acres extended from Tumbes near the border with Ecuador to Pisco about 220 km south of Lima⁽¹⁰⁾. The campaign is backed by a 1700 km seismic survey made in 1993 and exploratory drilling took place in the northern coast offshore blocks with no activity at the south part. Nevertheless, the blocks in offer in Peru's coastal basins should have large potential and could attract many of the international companies currently operating in the region.

ECUADOR

For Ecuador's economy 1998 was not a good year. For the first time since 1972 crude and petroleum products were no longer the country's largest sources of exporting earnings. Production in 1998 averaged 383.000 bbls/d representing a 2 % decrease from the year before. Ecuador is the fourth largest exporter in South America and the numbers show a fine example of how last year's low oil prices affected oil exporting nations. This year the government has plans to reduce the budget deficit registered in 1998. As part of that campaign it has ended fuel subsidies, increased electricity prices and plans to drop petroleum products price controls and end the state's monopoly on product imports.

Eventhough the new oil minister Patricio Rivandeira announced that there are no plans for privatization of state firm Petroecuador, the government wants to promote private investment. It is pushing legislation that would encourage the establishment of joint ventures between Petroecuador and foreign companies. This program has an aim of \$200 million worth of investment to flow into Ecuador's petroleum industry this year. But many foreign operators have complaint that Ecuador's policies do not favor private companies. An example is the controversial heavy crude pipeline from Sacha oil field in Oriente province

to the Balao export terminal on the Pacific Coast. The construction program of the 514-km pipeline was halted after Congress replaced President Bucharam in 1997 and canceled his controversial domestic initiatives. Foreign companies complain that E&P investments cannot be justified because the existing Transecuadorian trunk pipeline is running at capacity. Nevertheless, Petroecuador announced at the beginning of 1999 that the project has reached agreement between private investors and the funding will be provided by the principal foreign operators in the Oriente oil province (Arco, City Investing, Maxus, Oxy and Oryx). Construction is scheduled to begin in early 2000 with completion planned in the second quarter of 2001. Apart from the oil sector, Ecuador wants to sell at least 51 % of its interests in six electric power plants and related transmission infrastructure. It hopes private investment will end chronic electric power shortages.

One other issue in working in Ecuador is the environmental concerns. Foreign companies cannot operate in Ecuador unless they meet strict environmental requirements that are set by law. Many of the fields that have recently been discovered fall inside National Parks in the Amazon basin. These are areas of biological diversity and have been long protected from outside settlement or disturbance. Strict criticism and opposition arose from many environmental organizations for the development of such fields. Lessons learned include face-to-face discussions with local authorities and organizations are fundamental to find common solutions to such issues. Throughout South America native organizations and environmental groups have often raised objection to oil projects as a way of focusing public attention on social and economic matters. Therefore, oil companies need to understand more about local politics and social structure before they even submit their bidding envelopes.

COLOMBIA

Colombia is one more South American country which economy depends heavily in its oil industry. Approximately 25 % of government revenues come directly from the petroleum sector, either through Ecopetrol's, the state company, crude export earnings or through taxes and royalties. The clear concern in the Colombian oil industry is that without additional discoveries, production is expected to peak at 1 million bbl/d in 2000 followed by a constant decline which will force exports to cease by the year 2006. But what are the causes that put a brake in exploration in a country where 90 % of its prospective areas are untouched?

It is a fact that 70 % of Colombia's oil is produced from three large fields whereas for most other countries the majority of production comes from a wider number of fields. This reliance on large fields creates an unstable production future for Colombia's oil industry. Additionally, the potential production decline and the scaling back in operations of foreign companies have forced the government to revise the licensing terms. In recent contracts foreign firms assume all the exploration risk. If a commercial discovery is made, Ecopetrol can take a 50 % stake, pay back half the exploration costs and thereafter pay half of the development costs. These terms are not attractive in comparison with other South American countries and forced many key-player operators to leave Colombia. This was evident from the results of the July 1998 bidding process where only 3 of the 17 projects offered were allocated. A new bid is postponed indefinitely unless Colombian prospects will cease to be viewed as marginally attractive.

But the main headache of Colombian administrators is yet to be discussed. Colombia is a country that suffered instability due to civil conflicts for over three decades. This is a fundamental problem that caused thousands of deaths and asset losses due to rebel forces attacks and bombings. About 60 attacks on Colombian oil industry facilities have been recorded in 1998 alone and more than 750 attacks have occurred in the past decade. Such incidents caused the death of over 35000 people, have spilled over 1 million bbls of oil and cost Colombia \$250 million in lost royalties. The heaviest loss of life to be associated with such bombing incidents was the recent October 1998 attack to the 820 km Ocesa pipeline which carries crude from the BP operated Cusiana/Cupiagua oil fields to the export facilities of the Caribbean port of Covenias. The government of recently elected President Pastrana is committed to ensure better protection for foreign firms working in Colombia. Additionally, as part of his presidential campaign, Pastrana promised support in establishing a better investment environment in the oil sector, which is a big source of hard currency for the government. Any future reduction of oil revenues will have a counter effect on the national budget as it did in 1998. Nevertheless, initiating any act to improve the fiscal terms for oil industry foreign investment, will contradict with the step process of achieving piece in Colombia. The rebel forces have clearly stated the desire for nationalization of the oil sector. Therefore, as long as the government continues to negotiate peace with the guerillas, it will be difficult to introduce fiscal reforms that will favor upstream opportunities in Colombia.

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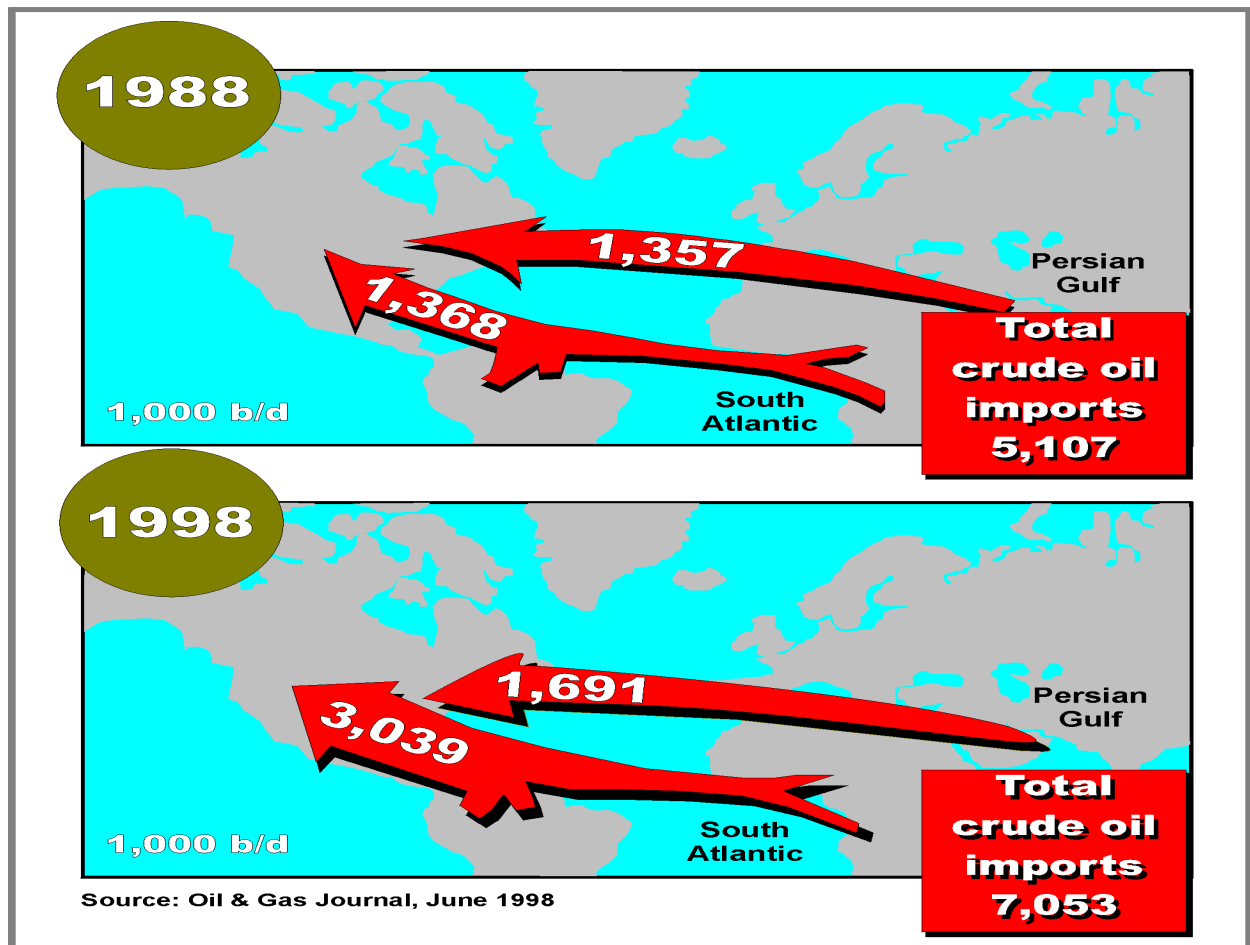


Figure 1. Changes in U.S. crude oil import patterns

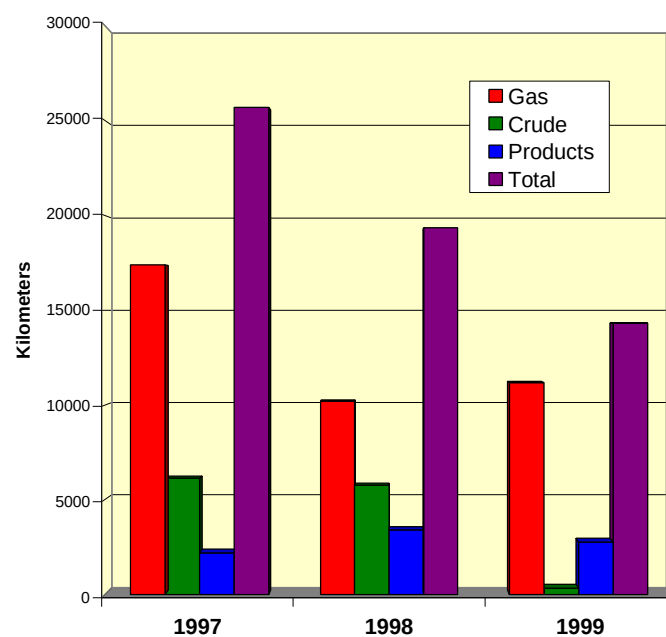


Figure 2. Pipeline construction projections in South America

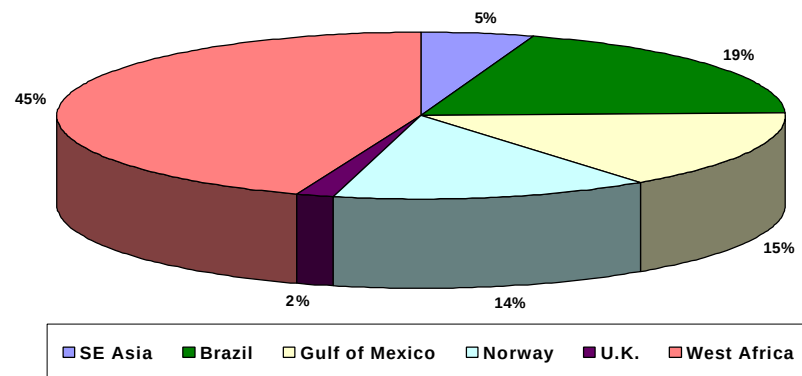


Figure 3. World deepwater reserve distribution

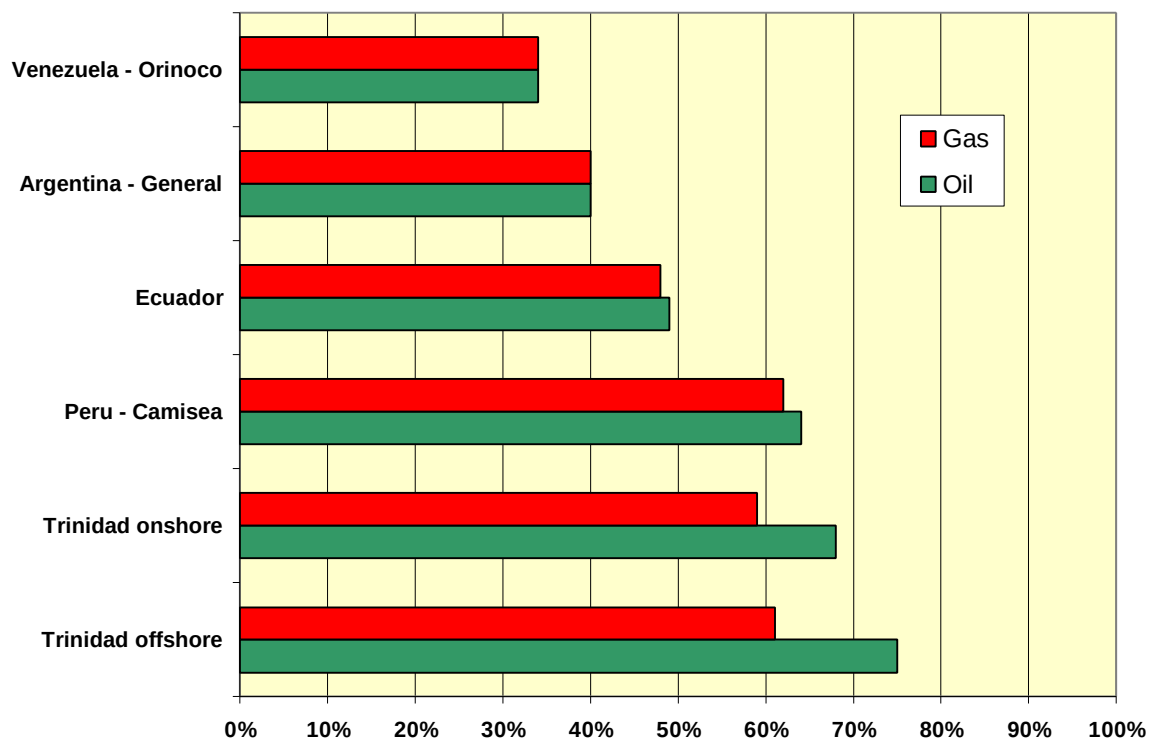


Figure 4. Government take comparison in South American countries

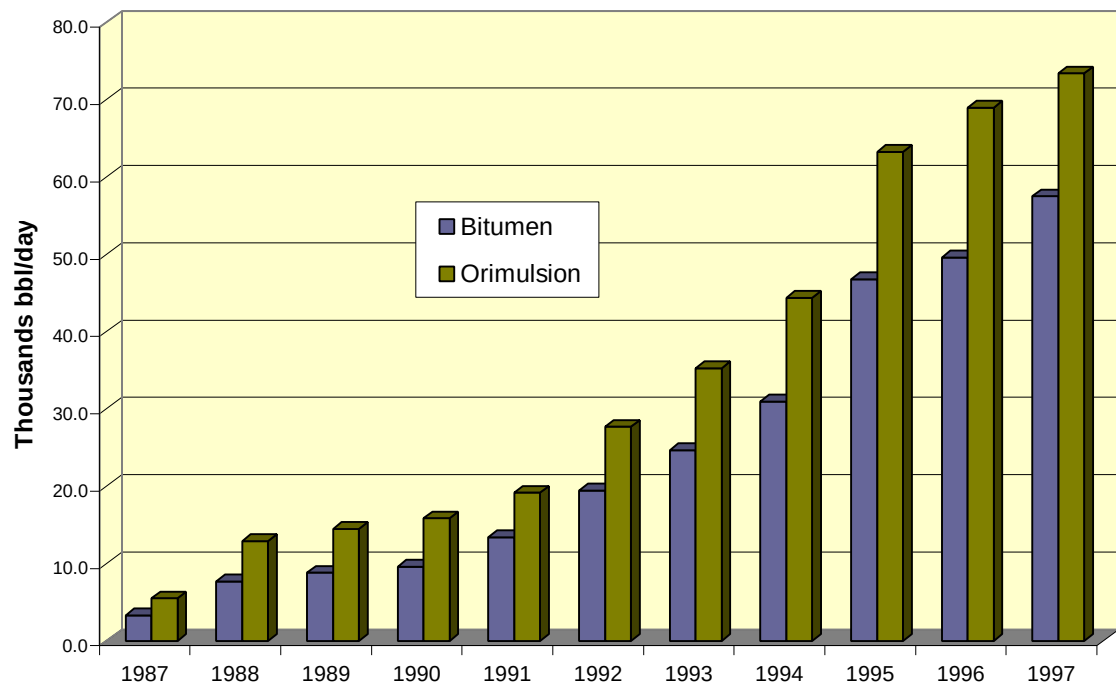


Fig 5. Pdvsa yearly bitumen production

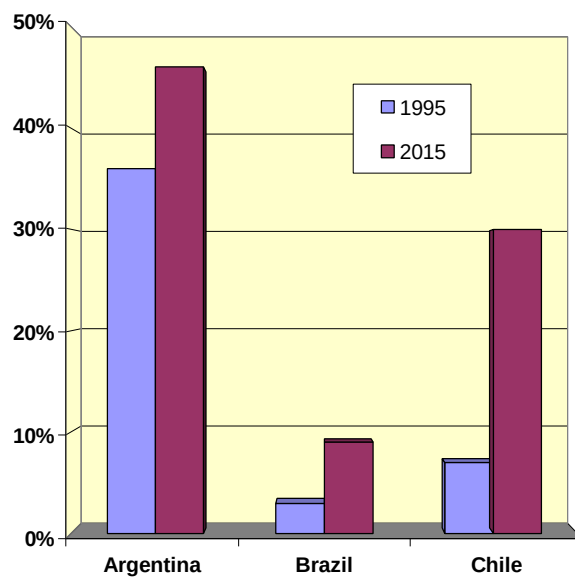


Figure 6. Natural gas share as primary fuel in Southern Cone

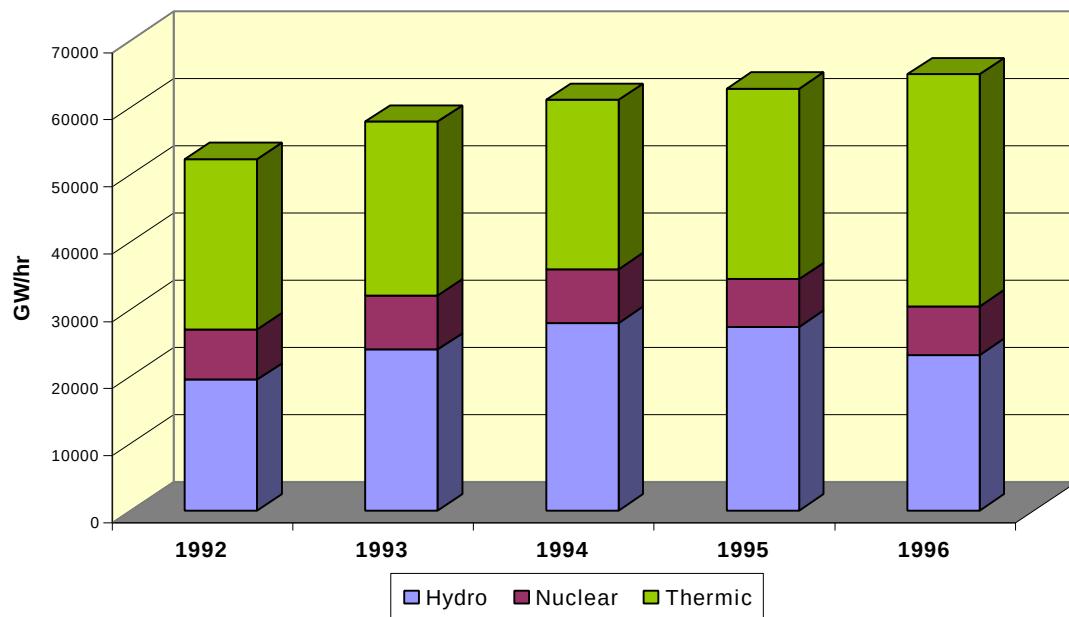


Figure 7. Structure of electric energy generation in Argentina

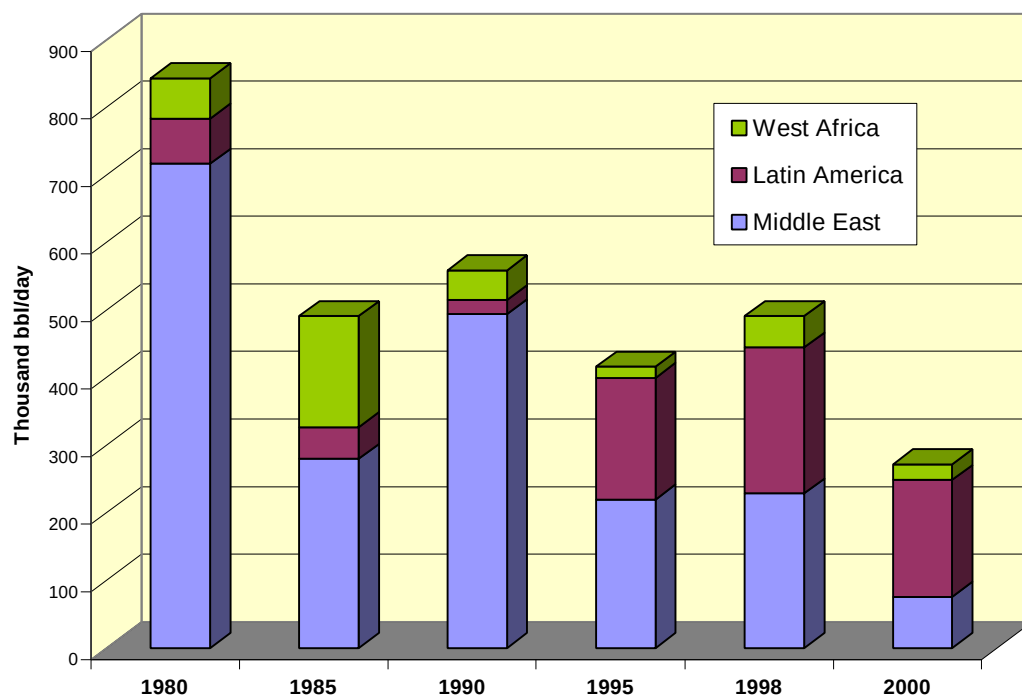


Figure 8. Brazilian crude oil imports by country source

LIST OF TABLES**Table 1. SYNCRUDE CASH MARGINS**

Economic Indicators	Canada	Venezuela (*)
Finding and Development Costs	+0.25	+0.25
Production / Upgrading Costs	+8.75	+2.94
Total Cash Costs excluding Financing	+9.00	+3.19
Differential to WTI	+2.50	-6.00
Cash Margin at \$18 / bbl	+11.50	+8.81
Cash Margin at \$15 / bbl	+8.50	+5.81

(*) Petrozuata Joint Venture
Source: Standard & Poor's

Table 2. EXPORT PIPELINES IN ARGENTINA

Project Name	Investment	Origin	Destination	Capacity	Length	Diameter
	Million \$us			MMm3/d	km	In.
I. To Chile						
Methanex II	Operational	S. Sebastian	Cabo Negro	2	48	
Methanex III	Under study			2.75		
Gas Andes	350 Operat.	Mendoza	Santiago	5.85	287	24
Gas Pacifico	320	Neuquen	Concepcion	3.8	539	20-24
Atacama	750	Salta	Mejillones	8.5	914	20
Norgas	Under study	Salta	North Chile	7		
II. To Brazil						
Cruz del Sur	135	BuenosAires	Montevideo	5	215	16-20
Mercosur	250	Salta	Uruguayana	12	1050	24
Uruguayana	250	Uruguayana	Porto Alegre	9	590	24
Gaucha	Under study	Entre Rios	Brazil	10	440	

Note: It was announced in early 1999 that the projects Mercosur and Uruguayana would be combined to one.

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