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Brazil

Brazil is the largest country in South America and has experienced rapidly expanding oil, natural gas, and electricity markets in recent years. The country is in the process of recovering from an energy crisis in 2001.

Note: information contained in this report is the best available as of August 2004 and is subject to change.

BACKGROUND

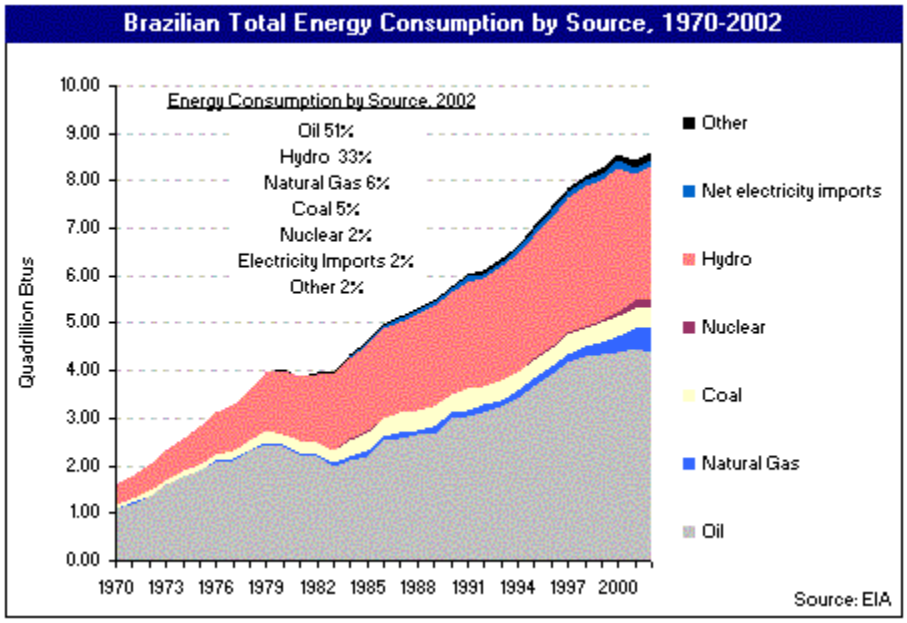
In October 2002, Luiz Inacio Lula da Silva was elected president of Brazil, replacing Fernando Henrique Cardoso. The election marked a return of the left to power, 38 years after a military coup overthrew President Joao Goulart of the Brazilian Labor Party (PTB). During his election campaign, Mr. da Silva promised to lead campaigns against hunger (Zero Hunger Initiative) and for increased social spending in the areas of health, education and public security. To date, the new government has been successful on reforming the pension system and the tax code.

After real gross domestic product (GDP) growth of 1.5% in 2002, Brazil's economy slumped in 2003, contracting 0.2%, the worst performance in more than a decade. Brazil's economy is posed to recovery in 2004 however; in the first quarter of 2004, GDP increased 2.7% compared with the same in 2003. Brazil hopes that increased trade links with China will help boost its economy, as well as attract much needed foreign direct investment. Despite the country's poor economic performance in 2003, the da Silva administration has been consistently meeting and sometimes exceeding requirements of its $40.1 billion Stand-By Arrangement with the International Monetary Fund (IMF). In June 2004, the IMF completed its seventh review of Brazil's performance under the Arrangement, stating that Brazil had met all performance criteria and that structural benchmarks had been completed.

ENERGY OVERVIEW

Brazil is the 10th largest energy consumer in the world and the third largest in the Western Hemisphere, behind the United States and Canada. Total primary energy consumption in Brazil has increased significantly in recent years, growing at an annual rate of 3% between 1992 and 2002,

despite a drop in consumption in 2001. Over the past decade, Brazil has made great strides in increasing its total energy production, particularly with regards to oil. In the early 1990s, for example, Brazil was a large net oil importer, but by 2003, domestic production nearly met domestic demand (see graph). Increasing domestic oil production has been a long-term goal of the Brazilian government. The country hopes to be self-sufficient in oil production by 2006, with output eventually reaching 2.3 million barrels per day (MMBD) by 2010. Also in the 1990s, the Brazilian government introduced new laws which partly privatized state owned oil company Petrobras and state owned utility Eletrobrás. New agencies were established, such as the Agência Nacional do Petróleo (ANP) to regulate the petroleum industry and the National Council for Energy Policy (CNPE) to set energy policy. For the first time, private and foreign companies were allowed to participate in Brazil's energy sector.



Despite these encouraging developments, Brazil's energy sector is still hampered by problems. Energy privatization has stalled, and Petrobras' presence in the oil and natural gas sectors remains pervasive, possibly slowing the devlopment of competitive markets and the attraction of foreign investment. In addition, Brazil is still recovering from the 2001 energy crisis, which forced the government to implement a power rationing program. The crisis highlighted Brazil's dependence on hydropower and its need to diversify the country's fuel mix. Since then, the da Silva administration has introduced new legislation for electricity and natural gas that would help avert a future energy crisis, but it remains unclear whether the new regulations will guarantee supply. Analysts are also skeptical about Brazil's attempt to become oil self-sufficient, questioning how long the country would be able to maintain this status once reached, particularly with a burgeoning population and a recovering economy. With oil consumption likely to increase significantly in coming years, the question remains whether increased domestic oil output will simply offset domestic demand.

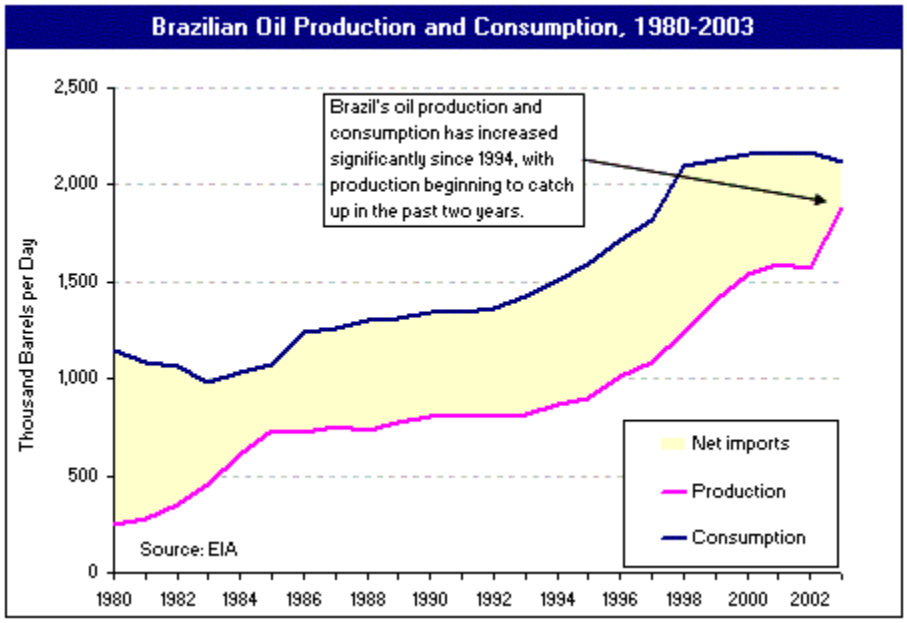
OIL

Brazil contains the second largest oil reserves in South America (after Venezuela), with 8.5 billion barrels as of January 2004. Brazil's proved crude oil reserves will likely increase significantly in coming years, particularly after Petrobras reported in 2003 a number of oil discoveries offshore in the Campos Basin. Initial estimates from the discoveries totaled 2.95 billion barrels of heavy oil. Oil discoveries have also been made in the Santos Basin - 435 million barrels of light oil. Petrobras is currently evaluating these discoveries for possible future development.

Total oil production (including crude, natural gas liquids, ethanol and refinery gain) has been rising steadily since the early 1990s, with an average of 1.88 MMBD in 2003. The offshore Campos Basin, north of Rio de Janeiro, is the country's most prolific oil producing area and has underpinned Brazil’s recent increases in crude oil output (see map). Oil consumption in Brazil also increased in

the 1990s, but has remained essentially static since 1998, hovering between 2.10 and 2.17 MMBD. In 2003, oil consumption dipped slightly year-on-year, to an estimated 2.12 MMBD. Although Brazil's production is increasing, the country still needs to import crude oil to meet domestic demand. Most of these imports are lighter crude oils, which domestic refiners mix with Brazil's predominantly heavy crude oil to refine petroleum products. In 2003, according to Petrobras, 63.7% of Brazil's oil imports came from Africa, 30.9% from the Middle East, 3.1% from South America, 1.4% from Europe and 0.9% from Oceania. Brazil exports petroleum products, as well as heavier crude oil which domestic refineries are unable to refine. China, for example, imports Brazilian heavy crude on a spot sale basis.

Sector Organization



Prior to 1997, Petrobras, which was created in 1953, monopolized rights to explore, produce, refine, and distribute oil in Brazil. Prices for oil were fixed. On November 9, 1995, the Brazilian Congress amended the Brazilian Constitution, authorizing the Brazilian government to contract with any state or privately-owned company to carry out activities related to the upstream and downstream segments of the Brazilian oil and natural gas sector. Accordingly, this amendment eliminated Petrobras' government-granted monopoly. The amendment was implemented by the adoption of the Oil Law, which revoked the country's initial Oil Law of 1953. The new law also created National Petroleum Agency (Agência Nacional do Petróleo - ANP), charged with issuing tenders, granting concessions for domestic and foreign companies, and monitoring the activities of the oil sector, including establishing rights to explore for and develop oil and natural gas in Brazil. One of the main goals behind opening the oil sector was to increase oil production in order to reduce dependence on oil imports and eventually to achieve self-sufficiency.

International Involvement

Despite liberalization of Brazil's hydrocarbon sector, Petrobras remains responsible for nearly all of Brazil's oil and natural gas production. Obstacles to attracting international companies to Brazil's oil sector remain, such as poor drilling results, unclear regulatory regime and taxes, and unattractive licensing rounds (i.e., Petrobras has repeatedly been awarded the best prospects). As mentioned previously, foreign oil companies have only recently been allowed to participate in upstream activities in Brazil. In 2003, Royal Dutch/Shell, in partnership with Petrobras (20%), became the first foreign company to produce oil and natural gas in Brazil. Shell is currently the operator of two adjacent fields - Bijupirá and Salema - in the Campos Basin. In 2003, the fields produced a combined 50,000 bbl/d, which is expected to increase to 70,000 bbl/d. The fields also produce natural gas - 17 million cubic feet per day (Mmcf/d) in 2003. Discovered by Petrobras in 1990, the fields have estimated recoverable reserves of approximately 188 million barrels of oil and 62 billion cubic feet (Bcf) of gas. Shell assumed operatorship of the Bijupirá-Salema Project following the acquisition of Enterprise Oil in May 2002.

The next foreign oil company in line to produce oil in Brazil is ChevronTexaco. The company, in partnership with Petrobras, is currently developing the Frade field, with estimated recoverable oil reserves between 200 and 300 million barrels. In phase one, oil production is expected to peak at 90,000 bbl/d by 2010. The company could eventually expand operations, but this decision, according to ChevronTexaco, will depend on technical considerations and on Brazil's fiscal policies regarding oil exploration and production activities.

Geology

Petrobras is the only company to have made commercially viable oil discoveries in Brazil. Private oil companies have yet to find an oil field in Brazil that is large enough to be commercialized. Private companies have encountered oil, but volumes have been small and located in deep waters. Furthermore, many of the discoveries contained extremely viscous oil. All of these factors make oil production activities in Brazil an expensive undertaking, requiring large fields in order to be commercially viable. These recent geological disappointments have prompted some oil companies to rethink their investments in Brazil, as well as to scale back their exploration activities.

Fiscal Issues

Other reasons that oil companies have been hesitant to invest in Brazil has been fiscal uncertainties on the federal and state levels. On a federal level, companies were concerned that the da Silva administration would not extend the so-called Repetro - a federal tax exemption on imports of equipment for oil exploration and production activities. The tax exemption was scheduled to expire in 2007; however, in July 2004, the ANP extended Repetro to 2020, a move applauded by oil companies.

Two taxes enacted by the State of Rio de Janeiro in 2003, where an estimated 80% of Brazil's oil production is located, have also soured the investment climate for international oil companies. The first tax imposes an 18% tax on imported oil production equipment and essentially undoes the benefits of Repetro. In addition to the import tax, Rio's state government passed an 18% tax on oil production at the wellhead, but then suspended its implementation in the face of strong opposition from oil companies (Shell and ChevronTexaco) operating in the state. There have already been some repercussions from the proposed taxes. In October 2003, Petrobras indicated that it would consider focusing investments in other Brazilian states, such as in the states of Espírito Santo, Sao Paulo, Sergipe and Alagoas. Shell and ChevronTexaco have reportedly stated that they would curtail their investments in the region if the tax issue is not resolved.

Licensing Rounds

ANP hopes to attract more oil companies to the sixth round, slated for August 17-18, 2004. In all, ANP has offered up 913 blocks, of which 294 are onshore and 619 are offshore. The 294 onshore blocks are considered mature, located in three basins: Recôncavo (97); Espírito Santo (56); and Potiquar (141). The 619 offshore basins are a mixture of new frontier (551) and high potential blocks (68). Some of the offshore acreage is located in the prolific Campos, Santos and Espírito Santo (both shallow and deep water). In addition to these blocks, ANP has indicated that 7% of the acreage on auction will be the so-called "blue" areas, which were returned to the federal government by Petrobras (the company had failed to develop these areas within the allotted timeframe of the concession). These areas are considered to have the highest potential for commercial discoveries; however, it is expected that Petrobras will bid aggressively to reclaim those areas it had to relinquish. The Brazilian government hopes that the increased presence of international companies will help the country boost its oil output and meet its goal of being self-sufficient by 2006.

Since opening up its oil industry, Brazil has held five bidding rounds, with the last one taking place

on August 19-20, 2003. The fifth round, however, did not attract the interest from oil companies as the ANP envisaged. The main bidder in the round was Petrobras, with no oil majors participating. Analysts have suggested that the fifth round was less attractive for larger companies than previous rounds because of uncertainties about taxes, lack of recent commercial discoveries, and the geological challenge of oil recovery in deep waters.

The Road to Self-sufficiency

Petrobras is leading the Brazilian government's plan to become self-sufficient in oil production by 2006 and a net exporter thereafter, with oil production reaching 2.3 MMBD in 2010. Petrobras, the country's largest oil and natural gas producer, has made positive steps towards reaching this goal. In 2003, Petrobras increased its total oil production (excluding international operations) to 1.54 MMBD, a 2.6% increase year-on-year and a 21% increase since 2000. Nonetheless, Petrobras was below its oil production target for 2003 of 1.59 MMBD, outlined in the company's 2003-2007 Strategic Plan issued in March 2003. Oil production for the first half of 2004 was also down, to1.47 MMBD. In June 2004, the Floating, Production, Storage and Offloading (FPSO) Marlim Sul unit began operations and could help Petrobras' oil output rebound. In March 2004, Petrobras demonstrated its commit to achieving oil self-sufficiency by issuing a revised strategic plan for 2004-2010, in which the company pledges to spend $7.7 billion per year, allocating most of the funding to boost domestic oil output, as well as to increase international production.

Platform Delays

Delays in bidding and in construction of offshore oil production platforms have been the main reasons behind Petrobras to meeting its oil production target for 2003. In late 2002, the federal government adopted new regulations requiring oil companies in Brazil to devote a percentage of their investments to purchase goods and services provided by domestic firms (known as local content requirements). In regards to platform construction, companies were now required to build or to assemble a large part of their platforms in Brazil, with a large percentage of the parts manufactured domestically. Petrobras consequently had to delay its tender for P-51 (Marlim Sul field) and P-52 (Roncador field), planned for February 2003, in order to incorporate these new requriements in its bidding process. Since then, Petrobras has awarded contracts for P-52 and P-51 units in December 2003 and June 2004, respectively. The intention of the local content requirement is to create more jobs and develop local expertise, as most oil platforms and rigs in Brazil were previously built abroad.

Construction delays were responsible for pushing back the start-up dates of Petrobras' P-43 (Barracuda) and P-48 (Caratinga), originally scheduled for the end of 2003, until fall 2004. The construction of P-50 Floating, Producing, Storing and Offloading (FPSO) unit for Albacora Leste field is also reportedly behind schedule, pushing back the original start-up date of 2004 to late 2005 (see below a summary of platforms).

New Oil Production in Brazil

Unit	Field	Capacity†	Start-up	Operator
Marlim Sul FPSO*	Marlim Sul	100,000	June 2004	Petrobras
P-43*	Barracuda	150,000	September 2004	Petrobras
P-48*	Caratinga	150,000	November 2004	Petrobras
P-50*	Albacora Leste	180,000	late 2005	Petrobras
P-34	Jubarte	60,000	late 2005	Petrobras
FPSO	Frade	150,000	late 2006	ChevronTexaco

P-51*	Marlim Sul	180,000	2008 (uncertain)	Petrobras
P-52*	Roncador	180,000	2007	Petrobras
P-53*	Marlim Leste	180,000	2007-2008 (uncertain)	Petrobras
P-54*	Roncador	180,000	2008	Petrobras

Note: Production capacity denotes maximum production capacity of each unit but not necessarily the actual amount could be considerable lower. For example, the Frade field FPSO is expected to have a 150,000 bbl/d capacity but is only expected to produce 90,000 bbl/d by 2010. ChevronTexaco is including the extra capacity for potentially increased production.
* Indicates a start-up delay
† Indicates barrels per day (bbl/d)

Downstream

Refining

As of January 2004, Brazil had an estimated crude oil refinery capacity of about 2 MMBD, of which about 98% is controlled by Petrobras. There are currently 13 refineries in Brazil. Petrobras wholly owns 10 of Brazil's refineries as well as has a 70% stake in the Alberto Pasqualini (known as Refap), with Spain's Repsol-YPF controlling the remaining 30%. The remaining two refineries in Brazil – Ipiranga and Manguinhos – are privately owned. The Manguinhos refinery is controlled by Grupo Peixoto de Castro (69.3%) and Repsol-YPF (30.7%). Petrobras' total refining crude capacity, including stakes in refineries in Argentina and Bolivia, is 2.1 MMBD.

Petrobras plans to invest $11.2 billion through 2010 to build a new refinery with a capacity of 200,000 bbl/d and to upgrade and expand many of its existing refineries. The company hopes to begin constructing the new refinery in 2007, with completion in 2010. The main goal of Petrobras' current investment plans is to increase Brazil's ability to refine heavy crude oil, which makes up a large portion of the country's crude oil production. It remains unclear where the refinery will be built.

NATURAL GAS

Brazil's natural gas reserves stood at 8.5 trillion cubic feet (Tcf), as of January 2004. The Campos and Santos basins hold the largest Brazilian natural gas fields. Other natural gas basins include Foz do Amazonas, Ceara e Patiguar, Pernambuco e Paraíba, Sergipe/Alagoos, Espírito and Amazonas (onshore). Recent discoveries in Blocks BS-400 and BS-500 in the Santos Basin will likely increase Brazil's natural gas reserves considerably in coming years. In September 2003, Petrobras reported that these discoveries could hold up to 14.8 Tcf of natural gas, up from a previous estimate of 2.46 Tcf. It will likely take several years, however, for these fields to be thoroughly evaluated and commercialized.

Overall, natural gas plays a small role in Brazil's energy mix. In 2002, gas accounted for only 5.7% of Brazil's total primary energy consumption. In contrast, natural gas in Argentina accounted for approximately 45% of the country's total primary energy consumption in 2002. Natural gas consumption in Brazil, however, has been steadily increasing, and in 1999, the country began importing natural gas from Bolivia. Since then, Brazilian natural gas consumption has grown at a much faster rate than production. In 2002, Brazil consumed 472 Bcf, an increase of 19.4% year-on-year, while producing only 287 Bcf. Nonetheless, Brazil's demand for natural gas is still not high enough to consume the contracted volumes the country imports from Bolivia (more information below).

Petrobras is the largest producer of natural gas in

Brazil, as well as the largest
supplier to local distributors. Under Brazilian law, each state has the monopoly right to distribute natural gas in its jurisdiction. In recent years, the states have sold stakes in their distribution companies. Petrobras reportedly has minority stakes in 17 natural gas distribution companies in Brazil. The largest distributor is CEG in Rio de Janeiro, controlled by Spain's Gas Natural.

Promotion of Natural Gas

Since the early 1990s, the Brazilian government has been trying to promote the use of natural gas in order to diversify it energy mix, in particularl to reduce its dependence on hydropower and on imported oil. The most significant development in reaching that goal was the construction of the nearly 2,000-mile Bolivia-to-Brazil pipeline, known as Gasbol. Construction of Gasbol began in July 1997 and was completed in 1999. Gasbol was the result of a 1996 gas supply agreement (GSA) for the purchase of natural gas between the Bolivian state oil company, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB), and Petrobras. The GSA requires Petrobras to purchase from YPFB, on a take-or-pay basis, specified volumes of natural gas transported through Gasbol over a 20-year term. At the original signing of the contract, the supply volume was tied to Brazil building 16 natural-gas-fired power plants.

In following years, neither the projected demand for natural gas nor the completion of the many of power plants have materialized. One of the reasons was an economic recession in 1999, which devaluated the Brazilian *real*, making dollar-denominated natural gas imports from Bolivia more expensive. While power producers in Brazil paid for their natural gas in dollars, they were required to sell their power to distributors in *reals*. Currency exchange losses only compounded the fiscal stress placed on power producers, many of which faced difficulty in servicing other dollar-denominated liabilities.

The energy crisis in 2000-2001, brought on by prolonged droughts, provided the Brazilian government an opportunity to diversify its power supply and to lessen its dependence on hydropower. In February 2000, the Cardoso administration launched a $5 billion program (the Emergency Thermal Power Project -PPT) that called for the construction of 49 new gas-fired power plants, increasing Brazil's installed capacity by 17 gigawatts (GW) by 2003. When the rains returned however, the already-amortized hydropower plants again supplied cheap electricity, putting the construction of new natural gas-fired plants on hold indefinitely, as companies reconsidered their investments in Brazil. A final blow to the PPT program came in late 2002, when newly-elected President da Silva indicated that his adminstration supported the expansion of hydropower projects, in spite of the recent power crisis.

With natural gas demand low, Brazil was unable to absorb contracted volumes from Bolivia, but was still required to pay for the full volume it had agreed to buy from its neighbor. Brazil consequently sought to revise its take-or-pay contract with Bolivia. During 2003, government delegations from both countries met repeatedly in attempt to renegotiate the GSA contract. Brazil wanted to import less and pay a lower price for natural gas from Bolivia. Bolivia indicated that it would not change the contract unless Brazil would guarantee that exports would increase in the future. When former Bolivian President Sanchez de Lozada was forced to flee the country in October 2003, President da Silva indefinitely abandoned contract talks to show support for newly-appointed Bolivian President Carlos Mesa.

Turning the Corner

It remains unclear how Brazil's natural gas sector will develop in coming years. However, recent actions undertaken by the da Silva administration and Petrobras appear to have revitalized the importance of natural gas in Brazil's energy mix. In December 2003, the da Silva administration

reversed its policy towards natural gas when the MME announced its intentions to develop a plan to boost natural gas consumption. Petrobras has also been keen on increasing the use of natural gas in Brazil, particularly since its investments have been severely impacted by the drop in demand for natural gas. In December 2003, for example, Petrobras offered local distributors in the states of São Paulo, Minas Gerais, Paraná, Santa Catarina, Rio Grande do Sul, and Mato Grosso do Sul, which it supplies, discounts if they sold more natural gas than they were originally contracted for. The company hopes that the program will stimulate demand for natural gas and ultimately reduce the financial exposure from their take-or-pay commitments it has with Bolivia.

Other recent Brazilian gas developments include the revitalization of once-dormant natural gas infrastructure projects. In the case of Petrobras, the company has been proceeding on a number of domestic pipeline expansion projects. The first project, known as the Networks Project, involves the expansion of natural gas distribution networks in southeastern and northeastern regions of Brazil, with completion expected in mid-2005. A second phase of this project involves constructing a 750-mile pipeline (Gasene), interconnecting the southeastern and northeastern regional distribution units. A similar project, dubbed Gas Unificacao or Gasun, will link the southwest of Brazil with the northeast. The 1,412-mile pipeline will begin in the state of Mato Grusso dul Sul, which borders both Bolivia and Paraguay. From there, the pipeline will traverse in a northeastern direction the following states: Goiás; Tocantins; and Maranhao (terminus). These pipeline projects fulfill an objective the Brazilian government announced in June 2003 to expand the country's natural gas pipeline network.

Another important infrastructure project, located in Coari (state of Amazonas), began in June 2004. The project involves the construction of a natural gas processing plant to boost gas production in Coari from the current 211 Mmcf/d to 353 Mmcf/d. From Coari, Petrobras is building two pipelines: a 342-mile line to Manaus, the capital of Amazonas State; and a 261-mile to Porto Velho, the capital of Rondônia State. The pipelines are expected to eliminate the two cities' need for fuel oil to generate electricity.

Despite these positive signs, Brazil's natural gas market still faces some major hurdles, the largest of which is domestic demand. Petrobras is still importing only about half of the volumes prescribed in its take-or-pay contract with Bolivia. Without demand, it will likely be difficult to attract foreign investment to develop newly found natural gas reserves. Petrobras' dominance of Brazil's natural gas sector might also discourage foreign investment, which is needed to help develop the country's natural gas infrastructure.

Pipelines

Brazil has two existing international pipeline connections. The first pipeline was the Bolivia-to-Brazil pipeline (Gasbol), tapping Bolivia's Rio Grande sources. Gasbol covers almost 2,000 miles, with a terminus in Porto Alegre. Brazil's second operational international natural gas pipeline links Paraná, Argentina, to Uruguaiana, Brazil. The pipeline, Transportadora de Gas del Mercosur**,** is 270 miles long. The pipeline supplies natural gas to a $350 million, 600-MW power plant in Uruguaiana. In January 2004, the Brazilian and Argentine governments agreed to proceed with a 384-mile pipeline extension, the Transportadora Sulbrasileira de Gas (TSB)**,** which would connect Uruguaiana to Porte Alegre. The project will likely revitalize a project to build two new natural gas-fired power plants in Porto Alegre.

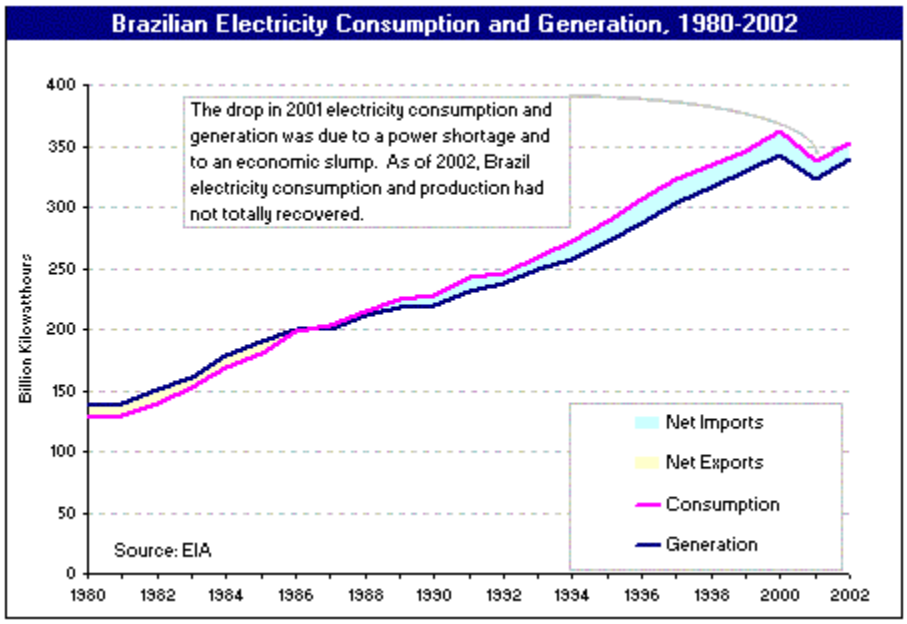
COAL

Brazil has considerable recoverable coal reserves of approximately 13.1 billion short tons, the second largest in the Western Hemisphere behind the United States. Coal, however, plays only a small role in Brazil's energy mix, accounting for just 5.2% of the country's total primary energy

consumption in 2002. Much of Brazil's coal is characterized by high ash and sulfur contents, as well as low caloric values. In 2002, Brazil's coal production was approximately 4.6 million short tons (Mmst), while consumption was an estimated 22.1 Mmst, with net imports of 17.5 Mmst. Most of domestic production is used for power generation, while imports are used for the country's steel making industry.

Brazil is attempting to reverse its status as a net importer of coal. According to reports, Brazil's national development bank, Banco Nacional de Desenvolvimento Economico e Social (BNDES), is developing a plan to expand the country's coal industry. BNDES hopes that the proposed program will make Brazil self-sufficient in coal by 2010 and eventually a net exporter of coal.

ELECTRICITY



Brazil is the third largest producer and consumer of electricity in the Western Hemisphere, behind the United States and Canada. As of December 2002, Brazil had an installed generation capacity of 76.2 GW, a 3.6% increase year-on-year. Hydroelectricity accounted for 83% of Brazil's installed capacity in 2002, with an absolute year-on-year increase of 1.48 GW. Thermal (oil, natural gas and coal) accounted for 10% of Brazil's installed capacity in 2002, followed by renewables with 4% and nuclear with 3%. Thermal installed capacity also saw a large year-on-year increase of 12%, mainly from new natural gas-fired power plants coming online.

In 2002, Brazil generated 339.1 billion kilowatthours (Bkwh) of power, of which 282.1 Bkwh, or 83%, was generated from hydro, up 6.4% from the previous year (drought year). Together with Paraguay, Brazil maintains the world's largest operational hydroelectric complex, the Itaipu facility on the Paraná River, with a capacity of 12.6 GW. Many of Brazil's hydropower generating facilities are located far away from the main demand centers, resulting in high tranmission and distribution losses - around 15%-16% of total domestic demand supplied. Brazil's power consumption also increased over the previous year, to 351.9 Bkwh. Over the last decade, Brazil's electricity consumption has grown at an annual rate of 3.2%, with demand only dropping in 2001 during the energy crisis. Brazil's domestic power supply is augmented by imports from neighboring Argentina.

Electricity Shortage

In 2001, Brazil faced a critical electricity shortage, due to insufficient rainfall and to years of limited investment in the country's power sector. During the 1990s, power demand, on account of a growing economy and a rising standard of living, had been consistently outstripping increments in generation capacity. In 2000, electricity consumption was about 58% higher than it was in 1990, while installed generation capacity grew about 32% during the same period. Analysts had long predicted that this demand growth, if not supported by capacity growth, had the potential to lead to shortages. In June 2001, the government implemented an energy-rationing program, which

prevented rolling blackouts by requiring customers in the Northeast, Southeast and Midwest regions to reduce consumption by varied percentages, depending on customer. The rationing program was terminated on March 1, 2002.

Power Reforms

In July 2003, Brazilian Energy Minister Dilma Rousseff revealed a new model for the country's electricity sector, with goals of ensuring reliable supply, stabilizing prices for consumers, and attracting long-term investment to the sector. This new model came into effect in March 2004. The first major component of the new electricity model was the creation of two energy trading markets: a regulated pool which buys power from generators and shares the costs between distributors under set prices; and a free-market environment where distributors and generators can negotiate their own contracts. The model restored power to the MME to plan and tender power generation concessions, a role that the country's independent energy regulatory agency ANEEL (Agência Nacional de Energia Elétrica) previously had been responsible for. Three new bodies were created: the Company for Energy Research (Empresa de Pesquisa Energetica -EPE), responsible for long term research and planning of the power sector; the Chamber of Electric Energy Commercialization (Camara de Comercializacao de Energia Eletrica - CCEE), a body that will oversee trading in the pool, replacing the current electric wholesaler Mercado Atacadista de Energia Elétrica; and the Electric Sector Monitoring Committee (Comite de Monitoramento de Setor Electico -CMSE), responsible for overseeing the security of supply in Brazil. These three bodies are expected to afford the government additional influence on the country's electricity sector. Finally, electricity pricing will be determined by pooling cheaper hydroelectricity with more expensive thermoelectric plants (natural gas). By pooling the various sources, the government hopes to reduce electricity tariffs and to ensure power is purchased from the newly constructed thermal plants. All of Brazil's 64 distributors will now buy power at a single price generated from the new pricing formula.

Iinitial reaction to the new energy model has been mixed. Many foreign and private companies see the new regulations as the government consolidating its hold on Brazil's electricity sector, which is currently, at least in generation, dominated by state-owned entities. In recent years, Brazil's electricity sector has not been the most lucrative market for private investors, particularly distributors, many of which defaulted on loans in 2001-2002 and required a massive bailout from BNDES to stay afloat. With an estimated investment of $82 billion through 2020 just to keep supply and demand in balance, Brazil will have to rely on the private sector.

Sector Organization

In 1995, the Cardoso administration began restructuring Brazil's electricity sector. A regulatory agency, known as ANEEL was established in 1996, and a national transmission operator (Operado Nacional do Sistema Elétrica) followed in 1998. In September 2000, a wholesale market was created (Mercado Atacadista de Energia Elétrica), which was put under the jurisdiction of ANEEL in 2002. Brazil also had planned to privatize three subsidiaries of state-owned utility Eletrobrás - Centrais Elétricas do Norte do Brasil (Eletronorte), Furnas Centrais Elétricas (Furnas) and the Companhia Hidro Elétrica do São Francisco (Chesf) - but the da Silva administration put a halt to this after assuming power in 2002. Eletrobrás, along with its subsidiaries, therefore retained their control over nearly half of the country's installed capacity and most of the large transmission lines. The largest private power company in Brazil is Tractebel Energia, a subisidiary of France's Suez, with an installed generation capacity of 6.7 GW. Although generation remains mostly under government control and transmission is not slated for privatization in the near term, distribution is mostly in private hands.

Nuclear Power

Brazil has two operational nuclear plants -- the 0.66-GW Angra-1 and the 1.35-GW Angra-2.

Angra-3 remains partly completed, with the plant foundation already constructed and $700 million worth of parts waiting in storage. The 1.35 GW plant was originally scheduled to become operational in 1988, but a lack of political support and funding have repeatedly postponed completion of the project. France's Framatome, a joint venture between French nuclear energy company Areva and German engineering group Siemens, has reportedly shown interest in the plant, but it still remains unclear whether Angra-3 will ever be completed. Eletronuclear, a subsidiary of Eletrobrás, operates Brazil's two nuclear power plants.

ENVIRONMENT

Brazil is a major player in discussions regarding the environment. Brazil's Amazon rainforest comprises 30% of the world's remaining tropical forests, and in addition to providing shelter to at least one tenth of the world's plant and animal species, the rainforest acts as a mechanism for absorbing carbon dioxide from the atmosphere.

Brazil is the largest energy consumer in South America (consuming 8.6 quadrillion Btu of commercial energy in 2002), and the third largest in the Western Hemisphere, behind the United States and Canada. While total energy consumption statistics place the country as prominent in the region, Brazil's per capita energy consumption is comparable to the average per capita energy consumption for all of Central and South America. Brazil also is the largest emitter of carbon dioxide in the region, releasing 346 million metric tons of carbon dioxide into the atmosphere in 2002. Although Brazil's carbon emissions are fairly significant in the region, carbon intensity, the amount of carbon emitted per dollar of GDP, is comparatively low.

COUNTRY OVERVIEW

President: Luiz Inacio Lula da Silva (elected 10/27/02)
Independence: September 7, 1822 (from Portugal)
Population (2003E): 176.9 million
Location/Size: Eastern South America/3.3 million square miles, slightly smaller than the United States
Major Cities: Sao Paulo, Rio de Janeiro, Belo Horizonte, Brasilia (capital)
Languages: Portuguese (official), Spanish, English, French
Ethnic Groups: white (55% - includes Portuguese, German, Italian, Spanish and Polish), mixed (38%), black (6%), other (1% - includes Japanese, Arab, and Amerindian)
Religions: Roman Catholic (80%)

ECONOMIC OVERVIEW

Currency: 1 Real (R) = 100 centavos
Exchange Rate (8/16/04): US$1 = R 3.02
Gross Domestic Product (GDP, 2003E): $492.9 billion
Real GDP Growth Rate (2003E): -0.2% **(2004F):** 3.3%
Inflation Rate (consumer prices, 2003E): 14.7% **(2004F):** 6.8%
Merchandise Exports (2003E): $73.1 billion
Merchandise Imports (2003E): $48.3 billion
Net Merchandise Trade Surplus (2002E): $24.8 billion
Main Destinations of Exports (2003E): United States (23.1%), China (6.2%), the Netherlands (5.8%), Germany (4.3%)
Main Origins of Imports (2003E): United States (2021%), Argentina (9.7%), Germany (8.7%), Japan (5.2%)
Unemployment Rate (2003E): 12.3%
Total External Debt (2003E): $233.4 billion
Foreign Exchange Reserves (2002E): $39.3 billion

ENERGY OVERVIEW

Minister of Energy and Mines: Dilma Rousseff
Proven Oil Reserves (1/1/04E): 8.5 billion barrels
Oil Production (2003E): 1.88 million barrels per day (bbl/d), of which 1.55 million bbl/d was crude.
Oil Consumption (2003E): 2.12 million bbl/d
Net Oil Imports (2003E): 0.24 million bbl/d
Crude Oil Refining Capacity (1/1/04E): 2.0 million bbl/d (source: Petrobras and *Oil and Gas Journal*)
Natural Gas Reserves (1/1/04E): 8.5 trillion cubic feet (Tcf)
Natural Gas Production (2002E): 287 billion cubic feet (Bcf)
Natural Gas Consumption (2002E): 472 Bcf
Net Natural Gas Imports (2002E): 185 Bcf
Coal Reserves (2001): 13.1 billion short tons
Coal Production (2002E): 4.6 million short tons (Mmst)
Coal Consumption (2002E): 22.1 Mmst
Net Coal Imports (2002E): 17.5 Mmst
Electric Generation Capacity (2002E): 76.2 gigawatts (83% hydroelectric, thermal 10%, renewables 4% and nuclear 3%)
Net Electricity Generation (2002E): 339.1 billion kilowatthours (Bkwh)
Net Electricity Consumption (2002E): 351.9 Bkwh

ENVIRONMENTAL OVERVIEW

Minister of Environment: Marina Silva
Total Energy Consumption (2002E): 8.6 quadrillion Btu*
Energy-Related Carbon Dioxide Emissions (2002E): 346 million metric tons
Per Capita Energy Consumption (2002E): 48.7 million Btu (vs. U.S. value of 339.1 million Btu)
Per Capita Carbon Dioxide Emissions (2002E): 2.0 metric tons (vs U.S. value of 19.9 metric tons)
Energy Intensity (2002E): 7,378 Btu/ $1995 (vs U.S. value of 10,623 Btu/ $1995)**
Carbon Dioxide Intensity (2002E): 0.30 metric tons/thousand $1995 (vs U.S. value of 0.63 metric tons/thousand $1995)**
Fuel Share of Energy Consumption (2002E): Oil (51%), Hydro (33.2%), Natural Gas (5.7%), Coal (5.2%), Other Renewables (1.7%), Nuclear (1.7%)
Fuel Share of Carbon Dioxide Emissions (2002E): Oil (79.6%), Coal (11.8%), Natural Gas (8.6%)
Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified June 4th, 1992). Signatory to the Kyoto Protocol (April 29th, 1998 and ratified on August 23, 2002).
Major Environmental Issues: Deforestation in Amazon Basin destroys the habitat and endangers the existence of a multitude of plant and animal species indigenous to the area; air and water pollution in Rio de Janeiro, Sao Paulo, and several other large cities; land degradation and water pollution caused by improper mining activities
Major International Environmental Agreements: A party to the Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Law of the Sea, Marine Dumping, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling.

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower,

solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.
** GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

ENERGY INDUSTRY OVERVIEW
Organization: *Petroleo Brasileiro (Petrobras)* - government-owned (majority shareholder) oil and natural gas company; *Centrais Eletricas Brasileira (Eletrobrás)* - federal holding company for planning and coordination of generation, transmission and distribution of electrical power
Major Petroleum Terminals: Sao Sebastiao, Paranagua, Salvador, Tramandai, Sao Francisco do Sul, Aracaju, Maceio, Recidfe, Natal, Fortaleza, and Belem
Major Ports: Santos, Rio de Janeiro, Praia Mole, Vitoria, Rio Grande
Major Oil and Gas Fields: Campos Basin (includes Marlim, Albacora, and Barracuda fields), Santos Basin
Major Refineries (January 2004 capacity, all belonging to Petrobras): Paulínia - São Paulo (371,000 bbl/d), Mataripe-Bahia (306,000 bbl/d), Duque de Caxias - Rio de Janeiro (242,000 bbl/d), Sao Jose dos Campos - São Paulo (251,000 bbl/d), Canoas, Rio Grande do Sul (189,000), Araucaria - Paraná (196,000 bbl/d), Cubatão-São Paulo (170,000 bbl/d), Betim-Minas Gerais (151,000 bbl/d) - data taken from Petrobras' SEC Form 20-F

Sources for this report include: Agência Nacional do Petróleo; Argus Latin American Energy and Latin American Power Watch; Business News Americas; ChevronTexaco; CIA World Factbook; Global Insight; Dow Jones; Economist Intelligence Unit ViewsWire; Eletrobrás ; Energy Day; Financial Times; Infopetro Bulletin; International Energy Agency; International Petroleum Finance; James Baker Institute-Energy Forum; Latin America Monitor; Lloyd's List; New York Times; Oil Daily; Oil and Gas Journal; Olade; Petroleum Economist; Petrobras; Platts; Reuters; The Economist Intelligence Unit; U.S. Department of State; U.S. Energy Information Administration; U.S. Security and Exchanges Commission; Valor Economico; Wood MacKenzie Ltd.; World Gas Intelligence; World Markets Online.

LINKS

For more EIA information on Brazil, please see:
EIA - Historical Energy Data on Brazil

Links to other U.S. government sites:
CIA World Factbook - Brazil
U.S. State Department's Consular Information Sheet - Brazil
U.S. State Department's Background Notes on Brazil
U.S. Department of Energy's Office of Fossil Energy's Overview of Brazil
U.S Embassy in Brazil

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Association and Institutes
Associação Brasileira das Empresas Distribuidoras de Gás Canalizado (Assocation for Gas Distributors)
Associação Brasileira das Empresas Geradoras de Energia Elétrica (Association for Power

Producers)
Associação Brasileira de Geradoras Termelétricas (Association for Thermal Power Producers)
Brazilian Petroleum Institute
National Organization of the Petroleum Industry
The Baker Institute Energy Forum (various papers on Brazil's energy sector)
The Brazilian Association of Electric Energy Independent Producers

Government
Agência Nacional de Energia Elétrica
Agência Nacional do Petróleo (ANP) (National Petroleum Agency)
Ministério de Minas e Energia (MME) (Ministry of Mines and Energy)

Oil and Natural Gas
Aker Kvaerner ASA
GásEnergia
Petrobras
Transpetro

Refineries
Ipiranga SA
Manguinhos SA

Distributors-natural gas
ALGAS (Alagoas state)
BR Distribuidora
CEG (Rio de Janeiro state)
CEGAS (Ceará state)
COMGAS (São Paulo state)
COMPAGAS (Paraná state)
COPERGAS (Pernambuco state)
SERGAS (Sergipe state)
GASMIG (Minas Gerais state)
PBGAS (Paraíba state)
SCGAS (Santa Catarina)
Potigas

Pipelines
Transportadora Brasileira Gasoduto Bolivia-Brasil

Electricity
Centrais Elétricas do Norte do Brasil (Eletronorte)
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