Brazil’s Energy and Infrastructure Landscape
– A White Paper
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The coincidence over the past decade of political and economic reform in Brazil with the discovery of massive oil reserves in the so-called “pre-salt” formations offshore has created for EIG an extraordinary opportunity set of transactions to consider over the past several years. While we began investing in Brazil almost fifteen years ago, in the past two and a half years, EIG-managed funds have committed more than US$1.2 billion to investments in Brazil, all involved in one manner or another in the development of hydrocarbon and iron-ore resources. With this level of investment activity, and our expectation of further opportunities in the future, we thought it made sense to “connect the dots” for our investors and other partners in a more formal way. Our objective with this White Paper is to provide some context for our recent investments in Brazil and to underscore several of the major underlying trends supporting our commitments to this important emerging market.

What follows represents a collaboration among all of EIG’s partners, employees and advisors who touch our activities in Brazil: Kurt Talbot, our CIO, Ronnie Hawkins, our Head of International, Wallace Henderson, Derek Lemke-von Ammon, Kevin Corrigan, Andrew Ellenbogen, Marcel Abe, Simon Hayden, Kevin Lowder, and Brian Boland, as well as Luis Reiz of Lakeshore Advisors. In addition, Julia Sweig, the Nelson and David Rockefeller Senior Fellow and Director for Latin American Studies and the Global Brazil Initiative at the Council on Foreign Relations, and Daniel Kurtz-Phelan, a New American Fellow at the New America Foundation, served as advisors to us on the project.

We hope you find this White Paper informative.

Sincerely,

R. Blair Thomas, Chairman & CEO
I. Introduction: Brazil and EIG’s Investment Strategy

When massive pre-salt oil deposits were discovered miles beneath the sea-bed off the coast of southern Brazil in 2006, most analysts and markets in the country and abroad seemed to share President Lula’s assessment: “Brazil drew a winning lottery ticket.” By last year, however, they were more often echoing an older cliché about Brazil’s repeatedly squandered promise: “Brazil is the land of the future, and always will be.” The purpose of this white paper is to outline our perspective on the risks and opportunities inherent in the investment opportunities that have emerged in Brazil and to use that context to frame several of the investments that we have made, as well as the prospects we see ahead for our firm and the funds we manage.

With the ability to focus on long-term fundamentals, we believe we have been able to carefully craft strategic positions in Brazil’s energy sector and secure an important part in what, along with the shale revolution in North America, is one of the most transformative opportunities in global energy in decades.

“Brazil drew a winning lottery ticket.”

- President Lula da Silva

II. Brazil’s Transformation: Foundational Changes

Brazil represents an almost unique development on the global energy landscape: a new major producer with significant growth potential that also has a stable democratic government, sophisticated institutions, strong rule of law, and a diversified economy with relatively solid macroeconomic fundamentals and sound economic management. That is not to ignore the areas where reform is needed or the irritants to business and investment in the country, including burdensome regulation and recurrent concerns about transparency and corruption. But even taking those concerns into account, the overall political and economic picture is dramatically more favorable than in virtually any other emerging-market energy producer today, and presents a compelling risk-reward balance relative to other geographies, both developed and developing, in which we may consider investing.

Today’s scenario is the result of a process of political and economic reform that began in the 1980s, when a peaceful democratic transition ended more than two decades of military dictatorship. The first years of Brazil’s new democracy were marred by devastating hyperinflation (over 2,000 percent a year by the early 1990s) and nationwide economic distress. But an aggressive reform program implemented by Fernando Henrique Cardoso, an academic and democratic activist turned Finance Minister and then President, smothered inflation, tightened fiscal and monetary policy, privatized key industries, and bolstered institutions of democratic governance, thereby setting the stage for a political consensus that has facilitated two decades of consistent growth. Within the energy sector, the Cardoso government carried out a number of significant reforms that transformed the state owned energy company Petrobras into a full-fledged international oil company (even though not fully privatized) and allowed private-sector investment across the energy value chain.

Against the expectations of many observers, this pragmatic approach was sustained by Cardoso’s successors, particularly President Lula da Silva of the traditionally left-wing Worker’s Party (the “PT” per its Portuguese acronym). The consistency of this approach positioned Brazil to take advantage of rising global commodity demand, in particular from China, and an expanding internal market to reach a GDP growth rate of 7.5% by 2010. Meanwhile, contrary to the country’s previous reputation for inconsistent fiscal management, skillful policy in Brasilia helped the country weather a number of external shocks, such as Argentina’s 2001 debt default and the global financial crisis of 2008, better than most. Together, growth and stability reduced unemployment dramatically and brought as many as 50 million additional people into Brazil’s new middle class, which today constitutes half of the population of 200 million in a country long known for extreme inequality. It also fueled major growth in domestic demand, especially for energy.
Brazil’s economic success brought about a marked change in the country’s global and regional stature. It helped drive growth in Latin America and attracted unprecedented flows of foreign investment which, at US$65 billion in 2012, were smaller only than those of the United States and China.\(^1\) The BOVESPA stock index rose by 295% from 2001-2012.\(^2\) The country became a paragon of emerging-market dynamism and an increasingly ambitious global player, eager to claim its place as a regional leader, as a force in multilateral settings from the World Trade Organization to the UN Security Council, as a broker on issues from global climate change to peace and security issues, and as host of the 2014 World Cup and 2016 Olympics.

In the past three years, however, this optimism has given way to disappointment and skepticism – among investors, businesses, and ordinary citizens. The Brazilian government resisted making further economic reforms, on everything from tax and labor policy to regulatory regimes, which could have helped mitigate the effects of reduced commodity demand and the retreat of global capital. Investors began to complain about government meddling in the economy. After years of international celebration of various indicia of economic acceleration, the more recent images out of Brazil are dominated by the social unrest that paralyzed some of Brazil’s main cities in 2013. Protesters manifested dissatisfaction with a host of issues, including poor infrastructure, corruption, and the state of the health care and education systems.

The slowing of the global commodity boom and various structural bottlenecks brought Brazil’s GDP growth to just 0.9% in 2012 and 2.3% in 2013, with projections for 2014 and 2015 hovering around 2.0%.\(^3\) Restoring growth will require policies to address Brazil’s competitiveness, including investments in infrastructure and education, promoting labor force participation, deregulation and providing regulatory stability, and structural and tax reform. While significant policies to achieve such ends are unlikely to occur in the run-up to the October 2014 presidential election, the next administration, regardless of who triumphs, will be pressured to implement the required changes.

Key Brazilian corporations also experienced weakness. The energy giant Petrobras has seen its share price fall by 85%\(^4\) from its peak and has had its credit rating downgraded to low investment grade (BBB-/Baa1).\(^5\) A number of previously high-flying companies such as Eike Batista’s EBX group wound up in significant financial distress. The fortunes of these companies were broadly considered symbolic of Brazil’s broader fortunes, both on the way up and on the way down. Once famous as the B in the BRICS, Brazil is now talked about as one of the “fragile five” emerging economies.

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3. The World Bank (World Development Indicators) & Bloomberg Composite Index as of 4/14/2014.
While the pendulum has swung from unbridled optimism to a certain level of pessimism, it remains important to step back and focus squarely on the fundamentals of Brazil’s economy and energy sector and its continued attractiveness as a venue for long-term energy investment. Critically, Brazil’s fiscal vulnerability, historically a key issue, is quite low relative to historical Brazilian levels and as compared to other developing economies. The country holds international reserves of US$376 billion, versus foreign currency debt of US$310 billion (82% of foreign reserves), and short term foreign currency debt of only US$32 billion (9% of foreign reserves). Moreover, Brazil’s foreign currency denominated debt represents only 14% of its GDP, equal to Mexico’s and significantly lower than other developing economies such as Turkey (43%), Chile (44%) and Russia (31%).

Inflation in recent years has hovered at the high-end of the target range (4.5% +/- 2 points), but the Central Bank appears to be taking concerted action to contain it, notwithstanding the difficulty of raising interest rates in a slow-growth environment. Further reforms are warranted in this area, including a possible gradual reduction in the target range, and greater independence for the Central Bank via implementation of fixed terms of governors (rather than substitution by prerogative of the President).

Finally, while fiscal conditions have indeed deteriorated in the last few years, bringing the primary budget surplus below the current target of 2.3% of GDP (reduced from 3.1% in 2013), the surplus remains a consistent positive element of Brazil’s macroeconomic management of the last decade. The deterioration is at least in part due to higher financing costs resulting from the monetary tightening actions taken to combat inflation.
Overall, Brazil does face ongoing economic headwinds - particularly in a year in which any difficult but necessary policy actions will be stalled by the pending election and even the World Cup. But macroeconomic managers have remained prudent and the country retains substantial fiscal resilience. Thanks to these fundamentals, even bearish analysts do not foresee the kind of catastrophic political or economic risks that seemed endemic in Brazil just a few decades ago.

Further, while economic growth is at a low-ebb today, EIG’s investments in Brazil do not depend heavily on broader Brazilian economic growth, but rather are focused on the relatively more international market-facing pre-salt oil reserves, and on structural developments in Brazil’s energy industry that are likely to materialize notwithstanding short- and medium-term cycles in the Brazilian economy.

### III. The Pre-Salt Revolution

Brazil’s energy matrix has historically been one of the least carbon-intensive of any major economy. It was characterized by little domestic production and modest imports of oil and gas, a heavy reliance on hydro for electricity (over 90% of total generation throughout the 1990s), and a large ethanol industry that helped power the country’s mandatory flex-fuel automobile engines. Developments over the last twenty years, however, have set the stage for a shift to a more oil and gas oriented energy mix.

The 1990s reforms undertaken by the Cardoso regime, including partial privatization of Petrobras in 1997, brought about a new era of expanded oil production and, most importantly, investment in sophisticated exploration technology and expertise. In 2006, those investments yielded one of the world’s most promising new oil frontiers, with the discovery of the Tupi field (now known as Lula) off the coast of Rio de Janeiro, followed by additional deep-water discoveries in the Campos and Santos basins. These finds – known as “pre-salt” because they are held in rock below a layer of salt several kilometers thick under the ocean floor – helped catapult Brazil into the world’s top-ten holders of oil reserves and have been a central feature of the country’s positive momentum.

Two key aspects of pre-salt are particularly striking: the massive size of the reserves and the speed with which Petrobras intends to commercialize them. By some estimates, the offshore discoveries are the largest new find globally in several decades. Reasonable estimates of their size range from some 50 billion barrels of oil, which would put them on par with the North Sea reserves, to upwards of 100 billion barrels, which would put them firmly among the ten largest in the world. Even the low end of the range is more than sufficient to make Brazil a major new producer.
Brazil plans to bring the pre-salt reserves into production and commercialization with great speed. According to projections by the International Energy Agency, based on production from projects commenced in 2013 and beyond, by 2020 Brazil will account for more new barrels of oil than any other energy producer globally; by 2035, it will have tripled its current oil production, to six million barrels per day ("bpd"). The other regions and countries that are expected to post substantial production growth through 2020 fall into two categories. First, relatively stable areas where EIG is actively engaged today, but where availability of capital is greater - US, Canada and Northern Europe. Second, countries and regions that have a greater need for capital, but which present material political and security concerns and which would be difficult investment climates in their current state – Russia, Venezuela, West Africa, Iraq and Iran. Brazil combines many of the best elements of both groups into a compelling risk-reward proposition – rapid production growth and a substantial need for capital to fund this growth, coupled with stable governance and a relatively healthy economic backdrop.

Petrobras, in collaboration with international oil and gas partners, will be the key motor in the development of the pre-salt. Petrobras has, however, been used as a means to control local inflation. Specifically, the Brazilian government has put in place price controls on retail gasoline, which have forced Petrobras to sell gasoline domestically below its costs, impairing the company’s profitability and cash flow. This subsidy costs Petrobras an estimated $7 billion per year in cash flow. Price controls have begun to loosen, however, and many observers believe that after the 2014 Presidential election in Brazil there will be a gradual shift to market-based pricing for retail petroleum products.

Petrobras, in collaboration with international oil and gas partners, will be the key motor in the development of the pre-salt. Petrobras is widely regarded as a world-class company and a leader in deep-water operations, with cutting-edge expertise in highly complex deep-water discovery, exploration, and development. Even with its semi-public status, it has strong and independent leadership and management, some of the best technical experts in the world, and accountability to a mixed board and to Brazilian and global markets. It is the largest publicly traded company in Brazil, with a market capitalization of approximately US$93 billion, and net debt of US$94 billion.

EXHIBIT 2
Petrobras Key Statistics (US$)

<table>
<thead>
<tr>
<th>Company</th>
<th>Market Cap.</th>
<th>Total Debt</th>
<th>Net Debt</th>
<th>Enterprise Value</th>
<th>Ratings</th>
<th>2013 EBITDA</th>
<th>Total Debt / 2013 EBITDA</th>
<th>EV / 2013 EBITDA</th>
<th>Public Float (% of Total Shares)</th>
<th>2013 Production (Mboepd)</th>
<th>2013 Production (BBOE)</th>
<th>2013 Production (% Oil &amp; NGLs)</th>
<th>Total Reserves (Bboe)</th>
<th>RP Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrobras</td>
<td>US$93.1</td>
<td>US$114.0</td>
<td>US$94.2</td>
<td>US$187.3</td>
<td>Baa1 / BBB-</td>
<td>US$28.7</td>
<td>4.0x</td>
<td>6.5x</td>
<td>56%</td>
<td>2,540</td>
<td>0.93</td>
<td>80%</td>
<td>15.97</td>
<td>17.2x</td>
</tr>
</tbody>
</table>

While not completely free from government interference, Petrobras has not been a significant contributor to the federal budget, unlike state owned companies in Mexico and Venezuela, and thus is not faced with the same pressures to forego investment in order to deliver revenue to the government.9

Petrobras has been used as a means to control local inflation. Specifically, the Brazilian government has put in place price controls on retail gasoline, which have forced Petrobras to sell gasoline domestically below its costs, impairing the company’s profitability and cash flow. This subsidy costs Petrobras an estimated $7 billion per year in cash flow. Price controls have begun to loosen, however, and many observers believe that after the 2014 Presidential election in Brazil there will be a gradual shift to market-based pricing for retail petroleum products.

Even considering Petrobras’ strength in deep-water operations, the company faces a task of historic complexity in spearheading the development of the pre-salt and its other offshore fields. The location, geophysical characteristics, and size of the reserves are daunting in terms of not just technical but also sheer logistical difficulty. The Campos and Santos fields lie, respectively, 150 and 300 kilometers off Brazil’s

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East Coast in the open Atlantic. Wells are drilled off of floating drill-ships in water up to three kilometers in depth and through an additional one-to-two kilometers of salt before reaching the reservoirs.

To complicate matters, the Brazilian government has, in the interest of promoting domestic economic development, limited Petrobras’ ability to bring in partners to help shoulder the load. In 2010, the Brazilian government passed legislation contributing a substantial portion of the country’s pre-salt reserves to Petrobras and mandating that Petrobras be the sole operator in any development of the pre-salt fields, with a minimum working interest of 30%. Strict local-content requirements were also imposed on key components of the development and extraction value chain, including the fleet of drill-ships necessary to execute the exploration and development plan. However, Brazil lacks much of the industrial infrastructure required to manufacture these components, and this has led to price overruns and delays as providers have had to scramble to meet the local content requirements.

Notwithstanding the Brazilian government’s pursuit of industrial policy through controls on Petrobras’ ownership and involvement in pre-salt fields, local content rules and fuel price caps, large oil and gas companies such as Statoil, Chevron, Shell, BG and Sinopec have manifested their ongoing confidence in Brazil through continued large investments in the country’s oil and gas sector. Further, these companies actively operate in Brazil, and can therefore often meet many of the local content requirements, as government policy considers any company with local operations in Brazil to be Brazilian.

Brazil’s recent offshore auction underscores the interest of international oil and gas companies to continue investing in Brazil. Despite some initial skepticism from critics, the government went ahead with this first auction of pre-salt areas since the reserves were discovered. Some ten global companies bid on the right to join Petrobras in developing the Libra Field, which is estimated to hold 8-12 billion barrels of recoverable oil.10 The winners included Shell and Total, with each taking a 20% stake and the remaining ownership was taken by CNOOC and CNPC of China.11 This field is expected to require nearly $185 billion dollars of investment over the next 35 years.12

Even with the steady increase in pre-salt production so far, Petrobras’ ambitious growth plans will require continued capital expenditures over the next five years totaling US$220 billion, leaving Petrobras one to two years from positive free cash flow.16 The company will therefore continue to require considerable outside support: partners able to operate within the complicated regulatory framework established by the Brazilian government; a steady stream of raw materials, equipment, technical capabilities, and manpower; and continued access to capital to support its massive investment program.

10. Brazil’s National Agency for Petroleum, Natural Gas and Biofuels.
13. Petrobras 2030 Strategic Plan.
The scale of these demands and the strain on Petrobras’ finances have clouded the company’s near-term equity story and credit profile. Its share price has fallen by 85% from previous highs. New borrowing during 2013 resulted in net debt of US$94.2 billion, making it the world’s most indebted major oil company. In our analysis, however, these strains reflect the difficult up-front investment period required to harvest long-term gains. It is precisely these near- and medium-term demands that present significant opportunities for sophisticated investors who can take the long view and who can commit capital with an investment horizon that matches the time line of the underlying projects.

### IV. Pre-Salt and the Broader Brazilian Energy Context

As noted above, Brazil’s economy has historically been “fossil-fuel light,” with hydropower representing over 90% of electricity generation as recently as the late 1990s and ethanol representing a substantial percentage of transportation fuels consumed (reaching over 50% in April 2008). Natural gas played a minor role in both electricity generation and industry. In the last 20 years, however, Brazil has been shifting towards greater use of hydrocarbons, with meaningful increases in the use of natural gas in the power generation and industrial sectors, and petroleum products in the transportation sector.

In the electricity generation sector, the shift toward natural gas reflects a clear response to the problems created by over-reliance on a single energy source, particularly hydropower. Hydropower depends on unpredictable weather patterns and rainfall, and dry seasons can cause significant shortages and political tensions. In 2001, drought conditions drained reservoirs and forced the government to ration power, a necessary, but highly unpopular action that likely contributed to President Lula’s election victory versus Jose Serra, who represented the governing party. In response, the government announced programs and policies to promote development and construction of new gas-fired generating capacity.

Although dependence on hydropower has declined (now representing approximately 75% of generation), reservoirs are again reaching critical levels that could necessitate electricity rationing. In the next decade, Brazil’s power infrastructure will add further variability by the installation of over 13 gigawatts (equivalent to approximately 10% of total current capacity) of new wind generation capacity, which will, like hydropower, vary with the weather. An expanded fleet of natural gas-fired power plants is therefore necessary to offset less predictable wind and hydro generation, and thereby help prevent, or at least mitigate, periodic energy crunches. Brazil’s government foresees 2.8 gigawatts (approximately 2% of total current capacity) of new gas-fired generating capacity coming online by 2022. Setting aside demand growth - which the IEA forecasts at 80% between now and 2035, driven by overall economic growth and expanding middle class consumption - we believe that system stability will demand a far greater increase, and that Brazil’s power generation fleet will experience a structural shift toward gas-fired generation.

**EXHIBIT 14**

Petrobras 2014 - 2018 Total Capex and E&P Capex Breakdown (US$ in Billions)

<table>
<thead>
<tr>
<th>Category</th>
<th>2014 - 2018 Capex</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downstream</td>
<td>$79.7</td>
<td>17%</td>
</tr>
<tr>
<td>E&amp;P</td>
<td>$153.9</td>
<td>70%</td>
</tr>
<tr>
<td>Gas &amp; Energy</td>
<td>$10.1</td>
<td>5%</td>
</tr>
<tr>
<td>International</td>
<td>$9.7</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>$8.2</td>
<td>4%</td>
</tr>
<tr>
<td>Total 2014 - 2018 Capex: $220.6 billion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total 2014 - 2018 E&P Capex: $153.9 billion**

**Source:** Petrobras 2030 Strategic Plan.

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17. Brazil’s National Agency for Petroleum, Natural Gas and Biofuels.
18. EIG analysis based on data from Brazil’s Ministry of Mining and Energy.
20. Brazil’s Ministry of Mining and Energy.
**EIG/ BRAZIL’S ENERGY & INFRASTRUCTURE LANDSCAPE**

In industry, increased use of natural gas has come with increased availability of this fuel, particularly following construction of the Bolivia-to-Brazil natural gas pipeline (the “BTB Pipeline”) in the late 1990s. Natural gas represented a cleaner, often cheaper alternative to heavy oil products and diesel and its use increased in accordance with availability. As natural gas associated with pre-salt oil production (“associated gas”) begins to reach the Brazilian market, consumption by industry is likewise expected to continue to increase.

Today, Brazil’s average natural gas demand of approximately 96 million cubic meters per day (“MMcmd”) is met by three primary sources: 41 MMcmd of domestic production, up to 30 MMcmd of imports from Bolivia via the Bolivia-Brazil pipeline, and up to 27 MMcmd of liquefied natural gas (“LNG”) imports. By the later part of this decade, demand is expected to reach between 130 MMcmd and 185 MMcmd, driven by power-generation and industrial demand. Petrobras forecasts that this level of demand will be met by increased imports from Bolivia of up to 30 MMcmd, expanded LNG imports of up to 41 MMcmd and a more than doubling of domestic supply to approximately 86 MMcmd (for a total of up to approximately 157 MMcmd).

This doubling of domestic production is expected to come primarily from associated gas, natural gas that occurs naturally alongside petroleum and will be extracted alongside pre-salt oil. Meeting the expected increase in natural gas demand will therefore require that pre-salt production expand on time and as planned and that substantial investment be directed toward subsea pipeline infrastructure to transport associated gas to shore. Until pre-salt production does expand, or if there are delays in production or pipeline capacity, alternative sources of gas (e.g., Bolivia and LNG) will be critical.

Overall demand for natural gas, as well as the most rapid growth in natural gas demand, should center in the Southeast and South of Brazil, where industry is most concentrated. BTB remains the primary means for transporting gas, whether sourced from Bolivia or the pre-salt, to the South, and BTB operates at full capacity. Early plans by Brazil’s Ministry of Mining and Energy suggest that pipeline investments totaling between R$2.1 billion and R$7.7 billion will be needed to adequately service gas demand in the South and Southeast of the country. Petrobras has not included such investments in its capital plan, suggesting that the projects will need to be executed and financed by private-sector participants, and that BTB will remain a critical piece of Brazil’s energy infrastructure.

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**EXHIBIT 15**

Historical and Forecast Generation Capacity (GW)

![Generation Capacity Chart](chart15.png)

Source: Electrobras Capel.

**EXHIBIT 16**

Gas Consumption and Forecasted Gas Demand by Region (MMcmd)

![Gas Demand Chart](chart16.png)

Source: Abegás (Brazilian Gas Distribution Co. Association) and Energy Decennial Plan 2013-2022 (Ministry of Mines and Energy).

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22. Petrobras 2030 Strategic Plan.
23. Petrobras 2030 Strategic Plan.
In our view, the past decade has seen the emergence of two mega-trends in global energy: the “unconventional” oil and gas revolution in North America and the pre-salt discoveries in Brazil, both of which are reflected in the construction of the portfolios of our recent Energy Funds. In North America, we have committed over US$3.3 billion to several investments in most of the major unconventional plays, including the Marcellus, the Eagle Ford, the Barnett, the Haynesville, the Utica and the Bakken. The scale of the opportunity in Brazil is similarly massive. In terms of offshore resources, we have seen nothing of this scale since the development of the Gulf of Mexico and the North Sea. And in Brazil, Petrobras is aiming to do more, and more quickly, than happened in either the Gulf of Mexico or the North Sea. The scope of development and capital required will create numerous and diverse opportunities over the next several decades, starting with the need to fund development infrastructure – drill-ships, semi-submersibles, FPSOs, pipelines, support vessels, and more.

Outside of the oil arena, pre-salt will also have a profound impact by more than doubling Brazil’s natural gas production. This will reinforce and accelerate Brazil’s nascent structural transition toward gas-fired electricity generation and greater use of gas in industrial processes. Indeed, natural gas consumption has increased at an annual rate of over 8% per year for the last decade, and efforts to avoid periodic energy crises should dictate a continued shift toward natural gas. In the near- and medium-term, however, continued growth will be constrained by inadequate supply of natural gas and insufficient pipeline infrastructure. In the long-term, pre-salt gas will address the availability issue and will solidify the role of natural gas in the economy, but investment will be needed to transport and monetize such gas. These dynamics, both short- and long-term, are favorable to existing investments such as BTB, which transports over 30% of Brazil’s natural gas demand today, and they will create compelling new opportunities in areas such as pipeline infrastructure, power generation and LNG regasification.

Given EIG’s long term investment focus, the development of pre-salt reserves as well as the build-out of natural gas infrastructure represent highly attractive opportunities to deploy capital. Our approach to these opportunities is premised on the following:

- Petrobras’ enormous capital needs (forecast to average approximately US$44 billion a year for the next five years) will continue to strain its balance sheet, compelling it to build partnerships with providers of outside capital and to look to various kinds of attractive arrangements to secure the capital and expertise it needs.

- Despite anticipated delays and cost overruns, Brazil’s hydrocarbon resources are significant and real. Petrobras’ Proven Reserves stood at 16.6 billion barrels of oil equivalent at year-end 2013, approximately 95% of which is in Brazil. Also, the company’s Reserve Replacement Ratio has been above 100% for 22 consecutive years. Industry analysts forecast that Brazil’s average oil production in the decade starting in 2020 will average between 4.4 and 5.4 million bpd.

- While the risk profile and scale of capital required for upstream investment makes it a better fit for the “Super Major” energy companies and state-owned enterprises, EIG believes investments in midstream and energy-infrastructure will provide significant exposure to the economic upside of pre-salt development without requiring the same tolerance for scale and risk.

- The complexity, challenges and scale of pre-salt development require a long term focus. Projects will take longer and cost more than forecast by Petrobras and the government. Prudent forecasting and an appropriate return horizon will continue to be hallmarks of EIG’s investments in Brazil.

- Currency risk can be limited by focusing on opportunities that are dollarized, dollar-linked and / or inflation indexed. Fortunately, most costs and revenue associated with pre-salt development are closely linked to the US Dollar.

With these assumptions in mind, EIG has made three significant investments in Brazil, each targeted at a different part of the energy value chain:

- In order to have a stake in the development of the pre-salt fields, we became the first foreign investor in Sete Brasi, a public-private partnership with Petrobras that will build the ultra-deep water drill ships necessary to develop pre-salt oil and gas reserves.

- In order to have a stake in the development of the energy-related infrastructure that will support pre-salt production, we acquired a majority and control stake in LLX Logística, subsequently renamed Prumo Logística, which is developing the port of Açú. The port complex will serve...
as (i) a hub for both the export of pre-salt oil and iron-ore, (ii) the nexus for oil field services providers and equipment vendors supporting Brazil’s offshore development and (iii) a hub for natural gas and thermal power development.

- Finally, we have purchased significant minority stakes in the two companies that own and operate the BTB Pipeline, one of the most critical pieces of energy infrastructure in Latin America. Over the intermediate term, the BTB Pipeline will continue to support the growing natural gas demands of Brazilian industry and the country’s population. In the longer term, the BTB Pipeline should be central to the development of Brazil’s natural gas economy, transporting gas to Brazil’s industrial South from sources that will include Bolivian production, LNG terminals, onshore Brazilian production, and ultimately the substantial associated gas that will accompany pre-salt oil production.

VI. Sete Brasil

Petrobras projects that it will ultimately require 70-80 ultra-deep water drill ships to develop its pre-salt reserves. Initial exploration and development to date has been supported by a fleet of approximately a dozen vessels that were constructed in places like South Korea, Dubai and Singapore. However, in order to meet both the Brazilian government’s local content mandates as well as its own pre-salt production targets, Petrobras was given responsibility for developing and financing a revitalized domestic shipbuilding industry. This created a massive financing challenge for Petrobras – each ship’s production cost runs in the neighborhood of US$750 million – prompting the creation of Sete Brasil (“Sete”).

Sete is an off-balance sheet entity that will finance and construct a fleet of 28 ultra-deep water drill ships. The fleet will be built within the framework of Brazil’s mandatory local content requirements and when delivered, the drill ships will be chartered to Petrobras under long-term contracts. This arrangement permits Petrobras to avoid the significant upfront capital expenditures associated with constructing the vessels, thereby converting financing obligations into operating expenses that will more closely coincide with the actual revenues generated from pre-salt production.

Sete represents the largest project financing ever undertaken in Brazil. Sete’s investors include a number of large private-sector Brazilian investors, principally domestic pension funds. In 2011, two of our funds, Energy Fund XIV and Energy Fund XV, joined Sete’s equity investor group, committing a total of US$270 million to the company. EIG is the only foreign investor in Sete, and was able to secure the opportunity through our strong off-market origination capabilities and longstanding local relationships.

EXHIBIT 17

Petrobras Ultra-Deepwater Drill Ship

To date, Sete has contracted with Petrobras to build 28 drill ships, which are scheduled for delivery between 2015 and 2020. Over time there is the potential for twice that number as Petrobras continues to drill and develop wells. Each vessel will be operated by Petrobras under a 10-20 year charter, at day rates paid in dollars and indexed for inflation. Such strong, long-term charter agreements with investment grade counter-parties are rare in the energy industry. The day rates represent an operating expense for Petrobras. As a result, they will be made before Petrobras makes any interest or amortization payments on its senior debt. As such, Sete’s day rates are effectively senior to Petrobras’ senior debt. In addition, the Brazilian government established a special fund, the Fund to Guarantee Naval Construction, to protect Sete’s lenders in the event of a default, and to protect Sete’s equity holders against foreclosure. This implicit government safeguard against default reduces the equity risk in the investment, and should enhance Sete’s access to capital and lower its overall cost of financing.

For EIG, our investment in Sete is consistent with the major themes discussed above. The expected returns from Sete are underpinned by Brazil’s vast pre-salt reserves and the underlying oil production enabled by these drill ships, Petrobras’ demonstrated deep-water expertise, the set of protections and guarantees put in place by Petrobras and the Brazilian government, and by a set of long-term contracts with an investment-grade counterparty. It represents a unique entry point into the pre-salt value chain and exposes EIG to the considerable upside potential as additional pre-salt development comes on stream.
In 2013, we identified a second significant investment opportunity closely tied to the development of Brazil’s offshore oil-and-gas reserves. LLX Logística S.A. (now renamed Prumo Logística) was the holding company for an ambitious port development project at Açú in the state of Rio de Janeiro, some 300 kilometers north of the city of Rio de Janeiro. Açú is located near the Campos and Santos oil basins, the primary oil producing areas of Brazil. With Brazilian oil production forecast to double in the next 10 years, the country’s existing port infrastructure, located largely to the south, is thoroughly inadequate to deal with this scale of increase.

LLX was a publically traded company but was controlled by Eike Batista’s EBX conglomerate, spanning oil exploration, mining, and hotels. In the aftermath of the well-publicized collapse of Batista’s empire due to over-leverage and disappointing execution on a number of formidable projects, LLX essentially ran out of funding to continue construction and operations.

Informed by our appreciation of Brazil’s trajectory toward major oil producer status and our understanding of the associated infrastructure requirements, after careful analysis we came to view the port development at Açú as an extraordinary opportunity. The Port of Açú is one and a half times larger than the island of Manhattan, and once fully developed it is expected to be one of the world’s largest port complexes.

Açú is located in the Southeast region of the country, which is in proximity to approximately 75% of Brazilian GDP.

Relative to the offshore oil and gas sector, Açú occupies a unique geographic position just 150 kilometers from the Campos Basin where 85% of Brazil’s oil is produced and close to the Santos Basin where pre-salt development is concentrated. We believe Açú is therefore better positioned than virtually any other port in Brazil to serve as an urgently-needed hub for oil exportation by all of the upstream companies including Petrobras, which are forecast to exceed 2 million bpd by 2022. Açú’s location also makes it an ideal logistics and support base for exploration and production companies such as Petrobras, equipment vendors, oil field services companies and others integral to pre-salt and conventional oil development.

Açú is also ideally positioned to support iron-ore exportation, as it is situated approximately 500 kilometers from the iron-ore rich “iron quadrangle” in Minas Gerais state. There, Anglo American is developing one of the world’s largest new iron-ore mines, which will send iron-ore via slurry pipe to Açú for export. At Açú, Anglo’s iron-ore will be handled and loaded onto vessels by a 50-50 joint venture between Prumo and Anglo American that will provide this service under a twenty-five year, ship-or-pay contract covering up to 26.6 million tons of iron-ore per year.

### VII. Prumo Logística

**EXHIBIT 18**

Map of Açú Superport

Source: Prumo Logística 2013.
In addition to its strategic value as an export center and logistics hub, Açu has tremendous potential to be the cradle of a vast new oil, gas and petrochemicals complex, housing the processing facilities, manufacturing enterprises, service businesses and technology companies that will naturally emerge alongside pre-salt development. Cities and regions near other offshore fields have evolved in much the same way. For example, Port Fourchon, Louisiana, established in 1960, is today one of the most important oil and gas hubs in the United States, handling approximately 10% of the United States’ domestic oil production, servicing over 90% of the Gulf of Mexico’s deepwater oil production, and playing home to over 250 companies associated with the oil and gas industry. Similarly, after the discovery of oil in the North Sea in the 1960s, Aberdeen, Scotland boomed, becoming the “Oil Capital of Europe” with 100,000 oil-related jobs by some estimates and a web of industry leading offshore technology, service and manufacturing companies. We believe that for Açu, a first phase of such adjacent growth could include construction of an LNG regasification terminal which would receive and process LNG and then deliver gaseous methane directly into a pipeline grid and/or to gas-fired power plants in the Açu area. Construction of an LNG terminal would leverage Açu’s strategic location and available infrastructure to help solve the near- and medium-term challenges facing Brazil’s natural gas and power generation sectors, described in Section IV above.

LLX was in significant financial distress when EIG decided to invest. OSX, the largest tenant at Açu, was unable to meet its financial obligations to LLX and likely headed into bankruptcy. There was a large hole in the company’s funding plan to complete the initial development phase of the port, and bank financing arrangements needed to be restructured and extended. Other prospective tenants and joint venture partners were unwilling to commit in such uncertain circumstances. Still, from our perspective, the underlying asset, the port of Açu, had retained its fundamental value despite financial and operational mismanagement. By late 2013, the project was already seven years into development and approximately a year from beginning to realize meaningful commercial revenue. Our commitment of US$588 million (R$1.3 billion) and successful efforts to restructure and extend the company’s bank financing will, we believe, enable the company to finish the first phase of construction of the port and commence material operations. In connection with our investment, we have taken control of the company’s board of directors, hired new management, severed any material ties with Batista’s other companies, and renamed the company Prumo Logística S.A.

Crucially, EIG’s control of the company has helped solidify political support for the project in the rest of Brazil, with key local and national actors – politicians, financial institutions (including BNDES, Brazil’s development bank), and labor – viewing it as a central piece of the country’s efforts to leverage the pre-salt reserves for industrial and economic development. Most importantly, the company’s financial and operational rejuvenation has attracted clients and commercial partners from across industry. In April 2014, Prumo signed a lease agreement with Edison Chouest Offshore, a US-based owner/operator of vessels, ports, and shipyards servicing the oil and gas industry. The agreement covers over 250,000 square-meters for 15 years and involves an investment by Edison Chouest of over US$425 million, and thus represents a milestone in Prumo’s resurgence as a key part of Brazil’s pre-salt infrastructure.

VIII. BTB Pipeline

EXHIBIT 19

Map of BTB Pipeline


Today, the single most important operating energy asset in Brazil is, in EIG’s estimation, the BTB Pipeline, which runs over 3,000 kilometers from Bolivia to near Sao Paulo and then southward to Porto Alegre. As discussed above, Brazil needs to shift from excessive dependence on less predictable hydroelectric generation, to more predictable and dispatchable natural gas power generation. Further, the country’s industry currently runs on expensive and dirty fossil fuels, and would benefit from shifting toward natural gas. Both the power sector and industry are, however, constrained in their ability to shift to natural gas, for lack of supply and insufficient transport infrastructure. In the context of these bottlenecks,

The BTB Pipeline is an indispensable piece of Brazil’s energy infrastructure. The BTB Pipeline currently delivers to Brazil about 30% of the natural gas consumed there each day. With drought conditions depleting hydro reservoirs, gas-fired power generating facilities are running at full capacity and electricity rationing is contemplated. Such conditions emphasize the importance of the BTB Pipeline and the gas it delivers to Brazil. Until new sources of supply are developed and the infrastructure to bring such supply to market is built (as discussed in Section IV above), the BTB Pipeline will remain Brazil’s most important single energy infrastructure asset. In the longer term, once new supply comes online, the BTB Pipeline will be a critical component of the infrastructure network to bring such supply to market.

In a series of transactions in 2012 and 2013, funds managed by EIG, together with co-investment from our limited partners, acquired ownership stakes of 27% and 38%, respectively, in the Brazilian and Bolivian companies that operate the BTB Pipeline - Transportadora Brasileira Gasoduto Bolívia-Brasil S.A. (“TBG”) and Gas Transboliviano S.A. (“GTB”). Petrobras is a significant partner at various levels of the BTB Pipeline - upstream, Petrobras operates the majority of the gas fields that supply the BTB pipeline; in the midstream, Petrobras is an equity investor in both TBG (51%) and GTB (11%); and downstream, Petrobras is purchaser of both the capacity on the BTB Pipeline and the natural gas that flows through the pipeline.

The BTB Pipeline was built in the late 1990s, and was the result of a massive collaborative project involving the governments of Bolivia and Brazil, their respective national oil companies, a number of private energy companies, and multilateral development banks. Since it was built, the pipeline has been operating at world-class levels, with high reliability and availability. As noted above, the BTB Pipeline earns revenues primarily through contracts with Petrobras for pipeline capacity. The contracts are long-term (expiring in stages in 2019, 2021 and 2039), fixed-price and ship-or-pay. As a result, the BTB Pipeline’s revenues are not subject to fluctuations in commodity prices or commodity demand. Further, the contracts are dollarized or dollar-linked, thereby substantially limiting foreign exchange exposure.

The importance of the Bolivia-Brazil gas trade has assured a strong measure of pragmatism in Bolivia’s management of the pipeline, underpinned by a competent technical management team on both sides. Revenues associated with natural gas shipped through the pipeline constitute about one-quarter of Bolivia’s export earnings. Even with occasional concerns about resource nationalism in Bolivia and friction in the Brazilian-Bolivian relationship, there has been no significant threat of disruption of gas flows.

Our BTB Pipeline investment thesis focuses on two phases in the pipeline’s life-cycle. Through 2019, the year in which the largest transportation contract expires, the BTB Pipeline will enjoy stable and predictable cash flows as a result of the contract’s fixed-price, ship-or-pay features.

The post-2019 phase depends more heavily on market dynamics, particularly the state of Brazil’s natural gas supply /...
demand dynamic at such time, and its associated infrastructure. Overall, we believe that Bolivian gas transported via the BTB Pipeline will play a central long-term role given Brazil’s desire to achieve energy security and stability through a diverse array of supply options, as well as Brazil’s shift from unpredictable hydropower to dispatchable natural gas power generation. Additionally, although Brazil’s pre-salt and other domestic oil and gas developments may have begun to produce greater amounts of natural gas by 2019, getting this gas to the market will remain a challenge. A completely new web of transport and processing infrastructure will be needed to carry gas from wells onshore and offshore to demand centers, particularly in the South and Southeast of Brazil. This will include complex and expensive subsea pipelines, some of which are already delayed after Petrobras deemed the prices proposed by potential vendors as prohibitively expensive. These challenges will limit the ability of domestic Brazilian gas to replace gas imported from Bolivia. Therefore, we expect that Petrobras will need to continue importing Bolivian gas for decades to come, making re-contracting of post-2019 transportation volumes through the BTB Pipeline highly likely. Indeed, Petrobras forecasts that Bolivian gas transported through the BTB Pipeline will represent a key piece of Brazil’s gas supply matrix through at least 2030.34

In the longer term, even as domestic gas begins to play a larger role, we expect the BTB Pipeline to retain its importance. The pipeline traverses and serves the country’s most important demand centers, including the states of Sao Paulo, Paraná, Santa Catarina and Rio Grande do Sul, which together represent nearly 50% of Brazilian GDP.35 It is the only major pipeline of any relevance for serving these markets, with imported LNG the only alternative, typically at 1.5 to 2.0 times the cost of Bolivian gas.36 The need for transportation capacity to the south of Brazil is so great that the Brazilian Ministry of Mines and Energy has published a draft plan projecting costs between R$2.1 and R$7.7 billion for expanding pipelines in the south.37 That new capacity of such dimension is foreseen at this stage, underscores the value of an existing and operating asset such as the BTB Pipeline. Thus, even when domestic Brazilian gas is ready for commercialization, the BTB Pipeline will likely remain a key part of the transport infrastructure that carries such gas to these critical markets.

IX. Signal and Noise in Brazilian Energy

These initial investments in Brazil’s transformative energy trajectory give EIG a significant stake in some of the most important developments in global energy markets today. They expose us to the energy value chain at several strategic points – exploration and drilling, transshipment and distribution, and power generation. And while they stand to benefit considerably from success in pre-salt development, they are structured to yield substantial returns even if more pessimistic scenarios for Brazilian economic growth materialize over the short- or medium-term.

This long-term perspective is crucial to our strategy in Brazil. The pessimistic outlook on Petrobras in the equity markets may, in our assessment, persist, because the company will need to continue making enormous capital expenditures while pre-salt revenues take time to catch up and while it remains constrained by slowly changing fuel pricing rules in its domestic market. But while that dynamic poses challenges for equity investors in the short term, it gives capital providers like EIG an opening to make particularly strategic long-term investments. It signals an opportunity to provide higher return capital at a time when Petrobras is especially careful to maintain its investment-grade rating. It also makes arrangements like Sete particularly attractive to Petrobras, allowing it to ramp up exploration and development while transforming significant up-front capital costs into future operating expenses that will arise contemporaneously with pre-salt revenues. Petrobras is funding investments of unprecedented scale that will yield significant returns over the coming decades. While a short-term perspective might lead one to worry about whether the gains come over a 2-3 year horizon, our longer-term time horizon allows for a high degree of uncertainty about pace.

If our investments in Brazil are not a bet on the short term, neither do they represent a bet on high economic growth. Our thesis is connected primarily to the global energy economy.

34. Petrobras 2030 Strategic Plan.
35. EIG analysis based on data from UOL Economics as of 11/22/2013.
36. EIG analysis based on data from TBG and GTB.
and to the natural and necessary structural evolution of Brazil’s energy sector, not consumer confidence or domestic markets in Brazil. While strong growth in Brazil would be beneficial, since it would take pricing pressure off of Petrobras, increase traffic of goods through ports such as Açú and increase demand for Bolivian natural gas, our projections do not hinge on high growth returning in the near term.

While the Brazilian government has saddled Petrobras with multiple mandates – funding social programs from pre-salt (though Brazil does not budget based on oil prices, like many other major state-owned producers), and fostering the country’s industrial development via domestic content rules, – that tendency is balanced by a consistent underlying pragmatism. Ultimately, the foremost concern of Brazilian politicians and voters is that the pre-salt resources are developed and extracted successfully. That consensus has ensured a consistent willingness to adjust to technical and market realities, even if it is not always at the pace that investors or even Petrobras’ leadership might like. The Petrobras board projected in the most recent strategic plan that domestic fuel prices will be allowed to converge with international prices. While the adjustment may turn out to be slower than desired, and is unlikely to begin until sometime after this year’s presidential elections, there is nonetheless a clear recognition that a policy change is required, which will eventually have significant positive implications for the company’s cash flow.

These elements of pragmatism should also serve as a reminder of the broader context of Brazil’s political and economic development. For all of the country’s problems, democratic institutions remain stable, the rule of law secure, macroeconomic management and monetary policy responsible. (Even after the recent slow-down, Brazil can boast a better sovereign spread than many European countries.) Labor and environmental considerations have been a longstanding part of investing and doing business in Brazil, and while they must be factored into planning and projections, there is limited risk of major disruptions.

Also significant is the fact that Brazil does not have the kind of resource nationalism found in other Latin American energy suppliers, which reject most or all foreign participation in the energy sector. While the government does want to ensure dominant domestic participation in all parts of the pre-salt value chain – hence the sole-operator and local-content requirements – it welcomes foreign investment and partners, as long as the core activity remains within Brazil. Even the recent protests, a source of worry to some about the country’s short-term prospects, had positive implications. Fundamentally, protestors were demanding from their government the kind of accountability and competence that would benefit our investments as well as economic growth more broadly.

X. Investing in the Long-Term Potential of Brazil

Underlying all of this sector- and project-specific analysis is a key observation about the powerful intersection of Brazil’s core national strategy and EIG’s basic approach to investment. Our investments in energy benefit from the priorities of the country’s own national strategy, while the country’s strategy hinges on such investments. There is no more important factor in Brazil’s economic development, from a policy and a physical standpoint, than developing the pre-salt reserves. Every other priority is subordinate to that end.

EIG’s patient approach allows us to invest in the types of critical infrastructure that provide attractive opportunities for long-term success, while Brazil’s acute need for the kind of long-term capital we provide allows us to seek out the most strategic opportunities with strong investor protections. That synergy has given us a highly desirable stake in the Brazil story, one that we intend maintain as a central part of the EIG strategy going forward.

38. Petrobras 2030 Strategic Plan.
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