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# **INFRASTRUCTURE AND LOGISTICS IN BRAZIL**

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## INFRASTRUCTURE AND LOGISTICS IN BRAZIL<sup>\*</sup>

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This broad evaluation of the infrastructure of energy and transportation in modern-day Brazil can begin with the identification of the main features of the structural configuration of Brazilian industries and to compare them to the features of other relevant economies.

The Brazilian energy matrix possesses a peculiar structural configuration when compared to other energy matrices in the world. In 2006, Brazil produced approximately 226 million tons of oil equivalent (TOE). The Brazilian economy uses 2% of the total energy consumed in the world. The Brazilian energy matrix's most important feature is the extremely relative importance of its renewable energy sources compared to its non-renewable energy sources. It is reported that 44.9% of Brazil's consumed energy is renewable TOE, while only 10.6% of the world's consumed energy comes from this source. The main Brazilian source of renewable energy is hydroelectricity, which is closely followed by sugar cane and wood fuel. It is important to point out the high fraction of wood fuel on the Brazilian energy matrix.

The high fraction of wood fuel on the Brazilian energy matrix can be partly explained by the vegetal charcoal used in both ferrous metallurgy and non-ferrous metallurgy. In the absence of compensatory reforestation, the renewability of this fuel cannot be guaranteed. As for the country's non-renewable sources, which make up 55.1% of total TOE, petroleum dominates at 37.9%. This amount is slightly above average petroleum use in other countries.

The use of natural gas is noticeably reduced in Brazil at 9.6%, as is the use of coal (6%). In the world, natural gas makes up almost 20% of non-renewable energy use, and coal makes up approximately 40%. Uranium represents 2% of Brazilian energy use, which is lower than the world average of 6.5%. The generation of electric power by hydraulic, non-thermal sources certainly affects the environment. However, its sustainability can be preserved, meaning it can be a source of energy for the future. Thermoelectric power may come to play a greater role in non-renewable energy consumption in Brazil, though it should be evaluated by those who are "concerned" about the environment and who are against the use of hydroelectric plants.

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As its makeup shows, the Brazilian energy matrix is both progressive and convenient. It guarantees self-sufficiency while protecting the environment, and it reinforces the potential for sovereignty that the Brazilian economy has in its future development, as long as any energy expansion is planned in a way that will stimulate economic growth.

A troubling factor in Brazil's energy matrix resides in its per capita consumption. Annually, each Brazilian uses 1.21 TOE, while the world average is 1.69 TOE. The average is 4.67 TOE in the countries that make up the Organization for Economic Cooperation and Development (OECD). In Brazil, the tropical conditions that are widely enjoyed by a large majority of the population help contribute to the country's average index numbers, but there is undoubtedly less energy consumption in the country. Even now, 5% of Brazilian homes are still not equipped with electricity.

The national program *Luz Para Todos*<sup>1</sup> announced that this number of houses that were connected to the national power grid was reached in 2007. There are many homes in more isolated places that are difficult to access. In these cases, the national Ribeirinha Project plans to bring energy to these communities using a variety of different technologies. However, the standard of living in the poorest segments of Brazilian society is partly defined by a sparse use of energy, and any improvement in the integration of these segments will generate an increase in energy demand. The country's long-term challenge in the evolution of its energy matrix is a way to increase and improve the distribution of energy, while still maintaining renewable energy as a significant portion of the energy matrix.

The cargo transportation matrix in Brazil is peculiar and largely inefficient. In 2004, 863 billion net ton kilometers (NTK) were used. The vast majority of this use occurred on highways, which used 512 billion NTK, followed by railways, which used 206 billion NTK, and then by waterways, which used 105 billion NTK. Human transport occurs almost exclusively on highways. In 1999, it accounted for 92% of passenger-kilometers.

It is useful to compare Brazilian standards and the country's use of railways to the six largest world territories. As shown in Table 1, Brazil has the lowest percentage of railway use (24%). In contrast, Brazil is almost the leader in highway use: almost 60% of Brazilian cargo is transported on highways. For a country that has three large river basins, an extensive coastline, and a significant nautical distance from the main centers of the world economy, the contribution of waterway transportation is modest at best.

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<sup>1</sup>The Brazilian National Program for Universal Access to and Use of Electric Power.

**Table 1**  
 Transportation Matrix Breakdown by Transportation Modal<sup>1</sup> - 2003

Country	Railway (%)	Highway (%)	Waterway (%)	Land Area (1,000m <sup>2</sup> )
Russia	81	8	11	17
Canada	46	43	11	9.2
Australia	43	53	4	7.6
USA	43	32	25	9.2
China	37	50	13	9.6
Brazil	24	52	14	8.5

**Source:** The Brazilian National Agency of Land Transport (ANTT), Trevisan analysis (*Análise Trevisan*), 2003.

(1) Neither air transportation nor pipeline transportation were considered.

NB: Areas covered by water were not considered.

All of the information available shows that, with an increase in productive forces and in phenomena such as urbanization, the development of metropolises, and the displacement of the agricultural frontier, there has been a tendency toward an increase in the average distance traveled per ton of goods. Over the last few decades, the volume of net ton kilometers has continually increased against GDP in Brazil. For example, between 1971 and 1991, the NTK index grew from 100 to 488, while GDP reached a value of 288. Simultaneously, there was an increase in the average distance traveled per ton of goods. It is estimated that, between 1970 and 2004, the average distanced traveled per ton of goods increased from 267km to 612km. The lack of structure in the Brazilian transportation matrix is clear when one considers the average cost of each type of transportation. Table 2 shows this comparison.

**Table 2**  
 Comparative Costs Between Types of Cargo Transportation

Mode of Transportation	US\$ cents / net ton kilometer
Air	14
Highway	4.0-5.0
Railway	0.3-1.0
Pipeline	01-0.3
Ferry and other tug vessels	0.12-0.18
Cargo ship and container ship	.06-0.24
Bulk carrier	0.02-0.04

**Source:** The Coppead Graduate School of Business at the Federal University of Rio de Janeiro (COPPEAD/UFRJ).

Highway transportation is five times more expensive than railway transportation. The cost of waterway transportation is significantly lower than that of railway transportation. Pipeline transportation, which contributes to 15% of cargo transportation in the US, reaches less than 5% in Brazil. Pipeline transportation is comparable to waterway transportation in terms of cost.

Any satisfaction resulting from the review of the structure of Brazil's energy matrix is canceled out by this review of the country's cargo transportation matrix. Brazil's cargo transportation matrix is excessively dependent on the most expensive method of cargo transportation. There have been predictions of a worldwide increase in the price of petroleum and its derivatives. This price increase will prove to be the bane of the Brazilian transportation matrix. The situation in Brazil is worsened by the growing use of intra-city highway transportation for both cargo and people. This increase reflects the fact that Brazilian citizens greatly prefer to use cars for individual transportation. In the case of Brazilian inter-city transportation, the use of trains and subways is infrequent.

The logistics that encompass the planning, transportation, storage, and cost control operations, as well as the distribution of both technology and the information available on supplies, are largely inefficient in Brazil. In the logistics of the country, there is a flawed combination of the following features: a lack of storage areas for grains in grain-producing regions; problems on the highways surrounding the ports of Santos and Parangua due to the use of city surface streets to transport products from the ports to the highways; a lack of maintenance of the country's highways (the federal highways alone require an investment of R\$5 billion per year); the use of an outdated truck fleet (semi-trucks on Brazilian highways are an average of 14 years old); an absence of streamlined processes for intermodal transportation, and the chronic underinvestment in the nation's ports – for example, the Port of Itaguaí, in Rio de Janeiro, is under-utilized because of delays in constructing even one narrow, winding road from the port to the highways. A comparison of the logistics in Brazil and in the US illustrates Brazil's inferior practices and can be seen in Table 3.

**Table 3**  
 Cost of Logistics in 2004 (in % of GDP)

	Brazil	USA
Transportation	7.5	5
Stock	3.9	2.1
Storage	0.7	0.7
Administration	0.5	0.3
TOTAL	12.6	8.1
Total Cost in 1996	17	10.2

**Source:** The COPPEAD/UFRJ Center of Studies in Logistics.

From a structural point of view, the Brazilian transportation matrix decreases the macro-productivity of the national economy. There are recognized weaknesses to the country's intermodal transportation system, and these weaknesses reinforce the country's tendency to depend on the highway system for its flexibility and agility. It is worrisome to see the displacement of the agricultural frontier, as well as the use of trucks to move products to cities and ports, when these trucks depend on petroleum. In the long term, the continuation of this behavior will lead to a general reduction in macroeconomic productivity. It will have troublesome effects on Brazilian society that will impact the population's purchasing power.

The excessive increase in highway use for transporting both people and cargo through urban areas has dramatically reduced the quality of life for residents in many cities. These problems have occurred because of increased commute times, which, according to most recent estimates, are often longer than two hours in the metropolitan regions of Sao Paulo and Rio de Janeiro. The high density of houses in unfavorable parts of the urban fabric (parts which become *favelas*, or shanty towns, creating a process known in Brazil as "*favelização*") is largely the result of a very low standard of both public and private transportation in cities, in terms of both cost for residents and commute times. The low-income populations in Brazilian metropolises tend to choose lower quality housing, though this housing tends to be in areas close to where they work, whether the work is salaried or whether they are unofficially self-employed through the sale of their own products or services. The lowest-quality housing is found on and at the bases of steep mountainsides or in areas with swamps or marshland, with a lack of infrastructure and oftentimes without any kind of engineering solution available that would improve the current housing used by the residents in these areas.

These lands are left by the wayside during the expansions of housing developments for higher income residents. It is rational for citizens that are so insecurely linked to the urban economy to try to reduce their costs and commute time, even if these reductions are to the detriment of the quality of the household itself. A reduction in the cost and time required for commuting would increase these citizens' housing options, would reduce the price of land, and would make better low-income housing possible.

It is important to consider the past as a way to prove how Brazil's current energy and transportation matrices reflect the previous development of productive forces, and also how the matrices represent centuries of human impact on the environment. This infrastructure and the formation of urban networks are changes made through national efforts in order to structure a new definition of nature to serve the country's future projects.

Though it is with some exaggeration, it is possible to trace underlying features of the current structural matrices all the way back to colonial times, and even to the time before Portuguese explorer Pedro Alvares Cabral first came to Brazil. The way in which land is occupied in

Brazil, from the distribution of urban centers along the coast to the slow movement and development of cities inland, dates back previous centuries, when the country was first colonized. The main recent macro-intervention was the construction of Brasilia, the nation's capital, and its interconnected transportation network that links it to all regions of the country, including the Central-West region (which makes up much of the western border of the country) and the southern Amazon region. The design of the Brazilian railway system (which was based on the transportation of exportable cargo from the countryside to the ports) and the simultaneously developed standard of concentrated farming areas, can both be traced back to the nineteenth century.

During this time, the organization of the transportation matrix made coastal navigation the most common way to transport goods to the railway system. There were no worries about standardizing track gauges, which are still inconsistent today. This lack of standardization makes inter-railway transportation difficult. The use of vegetal charcoal was a model of transportation and energy infrastructure that was founded during the imperial regime in Brazil.

At the forefront of the First Industrial Revolution, the economies of Europe and the United States developed their railway systems, which resulted in the integration of their respective national territories. Their railroad tracks, which were used nationally for both cargo and passengers, were united with historical railroads and former carriageways in the cities. Europe also unified and interlinked its railways with its waterway networks, and over time, integrated rivers and man-made canals into its transportation networks.

In the United States, the railways linked the Pacific and Atlantic, and led to a model of an industrial and agricultural expansion that favors the domestic market. When the Second Industrial Revolution took root, with the combustion engine, petroleum and its derivatives, as well as with the spread of electricity, America's former transportation matrix was only enhanced by the development of the highway system. The European highway system replaced neither the railway system nor waterway transportation: modifications to the use of energy in both the railway system and the waterway system conformed to those of the highway system in order to increase productivity across the board. The interactive and synergistic changes to the transportation and energy matrices made the development of productive forces in the first world possible.

The economic history of Brazil is markedly different. Even today, Brazil's territory is not completely interconnected by the country's railway system. The system plays an important role in exporting minerals and grains from several regions of the country, but its use in general cargo and passenger transportation is extremely limited. South America currently lacks a railway system that connects the Pacific and the Atlantic Oceans. Despite the extent of both the coastline and river systems in Brazil, there has been a relative decline in the use of waterway transportation. Its involvement in transporting general cargo has been reduced.

The highway system, rather than railroads, is what best connects all regions of the country. It is peculiar that the country's main interstate highway runs along the coast, from the northern tip to the southern tip of Brazil. This tendency to favor the highway system was reinforced with the development of the nation's capital in the middle of the country. Though this development fostered a significant increase in the amount of land being used for new agricultural regions, there was another wave of highway expansion. Only large amounts of agricultural productivity from the farm industry itself would make it possible to export grains along more than two thousand kilometers of highway. Projects such as the Trans-Amazonian Highway and the construction of Highway BR-210 in the northern region of the country prove the "boundless preference" for highways over railways.

An evaluation of Brazil's history shows that it has never questioned the option of using the highway system. The inadequacy of the previous transportation network is clear by Brazil's choice to develop productive forces that focused on the internal market as the main frontier of expansion. There was a network of roads developed for animals, which provided the integrated system required for an export-led economy. A new model of development, however, would require the interlinking of several regions of the country through the use of transportation in a way that would offer reasonable shipping prices and that would open up the national market to infant national industries.

In Brazil's history, existing industrial units, along with exporting complexes, were residential in style, and were confined to sub-regional markets. The issue was so urgent that, at the end of the 1920s, former president Washington Luis affirmed that "to govern is to build highways." At that time, a prolonged debate on the best type of transportation for the future took place. Improving the old carriageways and modifying them for the automobile was the campaign plan when the government decided to focus on the highway system. Traffic density would progressively pressure and justify the attempt to perfect the paths of transport in the evolution toward highways. The railways, however, operate with minimum efficient scales that are far greater than those of the highway system, and investment in them has a greater maturation time. Constructing a main north-south railroad across the country would be a demanding project that would require a consistent bulk of financial resources and which would require a long maturation time.

The technological horizon seen from the Second Industrial Revolution revealed changes that favored the highway system. After World War II, the discussion in Brazil ended with the development of the National Highway Plan and the creation of a tax-supported fund to support the highway system. The railway system at that time, which had been worn down and which had remained unrestored during the years of the Depression and World War II, was acquired by foreign concessionary companies. Brazil's frustration with the lack of immediate North American



post-war support reinforced the highway option. Without foreign financing for the restoration of the railway system, the highway system was the only practical solution for transportation lines at that time. Once the automobile industry took root, it lobbied in favor of the highway system and essentially condemned the railroads to a history of neglect.

A guide to understanding Brazil's energy matrix is an understanding of the historical evolution of the generation and use of electricity in the country. At the end of the Imperial period and during the time of the Old Republic, energy was considered state of the art in terms of urban modernity. The first attempts at using electricity occurred in urban areas, both as lighting for public areas and as a source of energy for electric train tracks. The latter use of electricity got its start in 1879 with the inauguration of the permanent internal electric lighting service at the Central Station of the Dom Pedro II Railway (now known as the Central do Brazil Railway) in Rio de Janeiro. Public lighting using electricity was first installed in the city of Campos de Goytacazes, which during that time was the country's main sugar-producing region.

Soon after their development in Detroit, electric tracks were brought to Rio de Janeiro to replace cargo animals. Pereira Passos, a great modernizer of colonial Rio de Janeiro, was inspired by Paris, "the City of Light." He gave Rio de Janeiro the name "Paris of the Tropics," because the city came to have more public lighting than Paris itself. The modernization of consumption made Brazil a country where new ideas in the electricity sector were welcomed. The expansion of the Brazilian textile industry was evident: it was able to occur once self-generating indoor lighting was available. Consequently, the country's first hydroelectric power plant was built in the city of Juiz de Fora, in the state of Minas Gerais, by the Mascarenhas Textile Factory. This location was significant, because it modernized the region around Juiz de Fora. The energy available quickly spread its distribution area to the surrounding high-income urban areas, in which public and household lighting were considered essential for a high standard of living among the dominant social groups.

Energy for production largely continued to be dependent on firewood and vegetal charcoal. If one considers the use of the blast furnace at the Monlevade Plant, a pivotal moment in Brazil's industrial history (1922), then it was with vegetal charcoal that the first modern steel mill was operated. It was with the development of the Volta Redonda Steel Plant in 1946 and through the use of coal that Brazil fully embraced the First Industrial Revolution.

The spread of electricity in Brazil depended almost completely on the use of hydroelectricity. In the city of Sao Paulo, the rerouting of the Pinheiros River toward the lowlands surrounding the city of Cubatao provided an ample supply of energy, which led to the development of factories during the height of the coffee boom. This energy supply gave the city the conditions necessary for it to become the country's industrial hub.

Following the examples given in Imperial Brazil, which offered concessions to private companies that were willing to develop the infrastructure necessary for the railway system and the ports, the Old Republic also used the concession system to spread electricity and other public utility services in urban areas. In 1889, the Light Group received concessions for Rio de Janeiro and Sao Paulo. By the 1930s, the group controlled 40% of the power sources installed in Brazil. The type of contract they had allowed them to charge fees for marginal thermoelectric costs. These profits made it possible for them to wholly take advantage of their Ricardian profits from hydraulics.

The Amforp Group<sup>2</sup> established itself in the Sao Paulo countryside (which was the main frontier of Brazil's agricultural expansion), as well as in other state capitals around the country. The concessions received from the two groups gave them each a monopoly, and these concessions had tariffs that, in turn, depended on international prices. This liberal attitude on the part of the government made foreign presence easier in these sectors, and it was within these sectors that non-Brazilian concessions took over local utilities and expanded the scopes of their operations. It wasn't until 1933 that the government came to adopt tariff laws based on average cost, in addition to the return on the capital that the companies invested. The magnitude of this amount of capital led to a dispute between the State and the two groups, one that was dragged out until 1970.

The infrastructures of the ports and railway systems that were developed to sustain the coffee-driven economy in the state of Sao Paulo, however, were largely developed by private national groups. On top of their asset gains (land for agriculture whose value had been exaggerated), these groups received various types of operational subsidies. Two of the three railways in the state of Sao Paulo came from private capital provided by banks and farmers, and the third railway was founded by local, state-owned company. Concessions for the Santos-Jundiaí railway<sup>3</sup> were provided by foreign capital, though a group called Docas de Santos formed a Brazilian company that mobilized capital for emissions on the Rio de Janeiro Stock Exchange. In the other regions of the country, there was a clear foreign dominance in different areas of infrastructure.

A gold clause resulted in profitability through the use of a tax subsidies for foreign investors during the imperial regime. This clause was transformed into contractual rules that benefited the two groups holding monopolies in the electricity sector. There was an increase in attrition of tariff levels, and a political antipathy developed toward the concessionary companies. Until the end of the 1920s, however, there were no supply restrictions on electricity (from a

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<sup>2</sup> American and Foreign Power Company (editor's note).

<sup>3</sup> The Santos-Jundiaí railway runs between the cities of Santos (where the Port of Santos is located) and the city of Jundiaí, located inland in the state of Sao Paulo.

market perspective). During its inception, access to available electricity established itself as a popular product in urban areas. From the Great Depression until the end of World War II, the lack of an electricity supply became a hindrance to industrial and urban development in Brazil. During the *Estado Novo* period, which itself was during the Vargas Era of government in Brazil, these liberal attitudes were slowly abandoned. This period of government marked changes in hydroelectricity through a new institutional arrangement, from the development of the National Water Code to effective government control of tariffs in the sector.

Brazil adopted a developmentalist model, prompted by the events of 1929 and the subsequent Depression. The country stuck to its convictions after suffering from the lack of supplies abroad during the Second World War. The decision to use this model was reinforced by the prediction of a possible Third World War during the time of the Cold War. Two common perceptions started and spread in the political sphere of Brazil during this time. One perception was the enormous vulnerability of a country with no integrated industrial system facing the difficulties and obstacles of a lack of supply caused by world wars. The other prevailing opinion was one of a relatively antiquated economy dependent on coffee and other primary resources, with sales and prices that depended on the whims of the world economy.

A deeper understanding of this project revealed kinks in the infrastructure. It was also evident that modernization would follow in the footsteps of urbanization and the spread of electricity. A country that was not willing to produce vehicles with internal combustion engines would be vulnerable in world markets. The issue of national supply came to be perceived as something directly dependent on industrialization. Liberal beliefs in the efficacy of production for and by the market had been rocked by the Great Depression. As the developer and director of national projects, the Brazilian government needed to work toward creating a public sector that would be capable of producing anything that the private sector revealed itself to be incompetent at producing. This objective transferred the projects, programs and problems of energy and transportation infrastructure to the center of the developmentalist arena.

Through industrialization and urbanization, the national development project considered offering energy – particularly electricity – ahead of market signals. Electricity was seen as essential for the creation of industry and for an increase in personal consumption. The idea that Brazilian development had flaws in its energy and transport infrastructure was clearer than ever, and the government began to devote itself to the idea of increasing public investment in infrastructure. At the end of World War II, the federal government created the Sao Francisco River Hydroelectricity Company (CHESF) and set up the Paulo Afonso Hydroelectric Complex as a way to supply the urban networks of northeastern Brazil with an adequate supply of hydroelectric energy. By using the Sao Francisco River in this way, Brazil would be reproducing what the Roosevelt administration had done with the Tennessee Valley Authority during the New Deal: public

investment operated by the Army Corps of Engineers and in a region that was developmentally behind the other regions of the country.

Progressive sectors of the government of the decade had heard of a famous phrase of Lenin's that attributed Russia's development to "a combination of electricity and Soviet power." In order to continue with the CHESF, the state governments of Minas Gerais and Sao Paulo organized state companies to generate and distribute hydroelectricity. Financing for this sector was guaranteed by the combination of new tariff laws. Brazil's National Electrification Fund was established, supplied by tax revenues that were linked to the growth of the sector. The Brazilian Development Bank (BNDE) made it possible for the country to have access to foreign investment for the importation of electrical equipment.

Between 1952 and 1962, the public sector's involvement in the generation of energy grew. It went from providing 6.83% of electricity generated to providing 31.28%. In 1963, the inauguration of the Furnas Dam marked the effective implantation of an integrated electricity system in Brazil by connecting the supplies from the states of Minas Gerais, Sao Paulo, and Rio de Janeiro. In the 1960s, the foreign companies in the sector (Amforp and Light) were nationalized. The Brazilian government created Eletrobrás as a holding for various national concessions. In the beginning of the 1970s, a 10%-12% return on invested capital was guaranteed, to be factored into tariffs. In 1974, electricity tariff equalization was instituted across the country, and intra-regional transfers took place. GDP grew 10% per year, and planning in the sector was improved in an attempt to prevent any obstacles to growth.

Through the *Plano de Metas*<sup>4</sup>, Brazilian President Juscelino Kubitschek sought to develop the heavy electrical equipment industry. The engineering of large hydraulic works became more technologically advanced, and this improvement led to the creation of a new network of national contractors in the sector. Brazil came to depend on the sector that involved the production of goods and services, particularly those that were specialized in increasing productive capacity in the energy sector. Given the hydraulic potential of the country, perfecting the planning standards in the energy sector, as well as the operation of an integrated hydraulic macro-system, was the driving force behind improvements to the energy sector.

Before the war, Brazil had become even more convinced that the delay in development of productive forces was an age-old problem. It was the dream of urban industrialization and modernization that boosted Brazil's infrastructure. On the path to industrialization, Brazil was more than half a century behind the rest of the post-Second Industrial Revolution world. It was logical for the country to concentrate on the production of petroleum and its derivatives, as well

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<sup>4</sup> Brazilian President Juscelino Kubitschek developed an industrialization and modernization program called "The Objectives Plan" (Portuguese: o Plano de Metas).

as on the development of mechanical and electrical factories, as a way for the Brazil people to make their way toward modernity.

In search of structural empowerment, Brazil's national developmentalist efforts focused on relevant economic sectors and the petroleum industry, on building automobiles, and on increasing domestic production of electronics. The subsequent creation of the metal-mechanical complex and the electronics production connections within urban regions were seen as the seeds of the country's growing industrial system. Later, these national projects were combined with the creation of factories to produce machines and equipment. The demand for public investment in infrastructure created a market for more integrated industrialization. The heavy electrical equipment industry was created, and the petroleum complex led to the creation of more than five thousand companies. The radical transformation of Brazilian production was successful, and the country evolved from essentially one giant coffee plantation in the 1930s to become the eighth largest industrial economy in the world by 1980.

However, as a stain from Brazil's history of slavery, there has been no radical improvement in the country's distribution of wealth, despite the high levels of development having incorporated growing fractions of the population into the modern national market. There was a large population shift from rural areas to the cities during the second half of the twentieth century. It not only hindered the job market, but on the outskirts of the cities, a great social imbalance persisted between urbanized citizens and citizens who had been used to rural life. Brazilian urbanization did not lead to the country's dream of integrating social justice. In urban areas, Brazilian society has maintained an enormous population that left the countryside but has not adapted to the urban-industrial working class, despite job growth in sectors with more economic activity that outweighed demographic growth. This growth, however, has set the stage for the possible incorporation of rural migrant workers and their children. It is an indisputable fact that, despite expanding social differences, there has been a significant improvement in the standards of living of Brazil's citizens.

At the beginning of the 1950s, Brazil's petroleum issue began to be equated with the the development of a state oil monopoly and the foundation of Petrobras. Walter Link is a geologist and the author of a famous report on Brazil's potential in the fuel industry. In 1954, he affirmed that Brazil's chances of finding petroleum in the country were limited, except for that which existed on the continental shelf. At the time, his conclusion was considered extremely pessimistic, because there were no means to fund offshore drilling, and the low price of fossil fuels did not encourage any investment in them. The conclusion seemed like a malicious prophecy in support of those who condemned Petrobras, those who considered it a "reckless venture" and who thought the development of the petroleum industry to be a task that was above Brazil's competency levels.

The “The Petroleum is Ours” campaign ended any debate because it revealed public support for the national development project. Since then, Petrobras, the largest company in Brazil, has progressed. It has taken advantage of the reserves of the lucrative domestic market to support its refineries and other products in the petroleum industry. As the company evolved, it came to dominate the technology of various chains in the industry, and it worked toward exploring the continental sea shelf. In 1996, Petrobras began to explore the Guaricema Field Area, reaching a depth of 30 meters off the coast of Sergipe. At the beginning of the 1970s, Link’s predictions were confirmed in Rio de Janeiro with the discovery of petroleum at the Campos Basin. The depth of Brazilian oil wells has been a challenge for Petrobras, as well as for Brazilian universities, who have helped to develop deep-water drilling technology. A fluctuating petroleum extraction system was developed. Today, Brazil is on the forefront of petroleum extraction in offshore field areas: one oil well can achieve a depth of 1,886 meters!

Brazilian reserves have continued to grow since the first field areas were established off the northeastern coast of the country. In 2006, proven reserves were 12,181 billion barrels. Petrobras has built up a reserves-production relationship of approximately 20 years, and by 2010, the company hopes to increase production to 2.3 million barrels per day. Between 2009 and 2010, new field areas were opened for production. In 10 years, Brazil more than doubled its petroleum production. In 2008, the equivalent of six times the 1997 investment amounts was provided for the country’s petroleum industry.

Starting in the 1980s, stagnation and mediocre growth became troubling news for the Brazilian economy. The media began to refer to these years as “the lost decade.” The 1990s did not recuperate from the losses. The frustrations of mediocre macroeconomic growth persist in the country. Out of all of the countries in the New World, Brazil’s growth superseded only that of Haiti. When compared to the growth of China, Korea and Russia, Brazil’s statistics are abysmal. The predictions for Brazil in the twenty-first century paint a complicated picture. Brazilian emigration has grown exponentially as citizens go abroad in search of job opportunities and social mobility. In the last twenty-five years of the twentieth century, Brazil’s growth slowed to a crawl, at an average of 2.5% per year. Between 2002 and 2006, growth averaged 3.2% per year. It is difficult to believe in the country’s ability to sustain a 5% level of multi-annual growth if there is no steady recovery of investments in energy and transportation infrastructure, nor without the development of any national projects that would give Brazilian society a chance to showcase its efforts.

Results from various macro sectors in energy and transportation are progressively unsettling. The country has gone back to experiencing rolling blackouts. The famous Blackouts in 2001 and 2002 and the electricity rations that resulted may return in the future if there is a combination of growth, consumption, and any changes in the “whims of Saint Peter,” as Brazilians

say, describing the Catholic saint responsible for the weather. It is well understood that inadequate or nonexistent energy supplies inhibit industrial investment. The press has reported on complaints from various sectors, including the pulp and cellulose industry, the chemicals industry, and the ceramic refractory industry; problems of insufficient energy supply threaten to interrupt projects that would increase productive capacity. These reports underscore the complementary relationship between investment in infrastructure and expanding productivity. The poor quality of public lighting in Brazilian cities imposes a lower quality of life and limits use of the city. Now that credit is easier to obtain in the country, citizens are investing more in household appliances. Citizens now expect to be able to use appliances at their homes. Brazil's credit expansion is a positive way to sustain industrial activity, but it puts a strain on the electric consumption because of the limited amounts of electricity available.

The cargo transportation system in Brazil has had to deal with the poor quality of the country's highways. Evidence on the lack of highway maintenance has continued to build up. It is estimated that the country needs to utilize 0.6% of GDP in order to properly restore and maintain its highway network. Under the Fernando Henrique Cardoso administration, spending on highways was 0.3% of GDP. Under the first years of the Luiz Inácio Lula da Silva administration, only 0.2% of GDP was used. This lack of maintenance has contributed to the exponential deterioration of Brazil's highway system. It has caused both relative and absolute price increases in freightage, and it reflects the need for restoration, as costly as it may be. In urban centers and metropolises, the roadway systems cannot support the large amount of cars and public transportation vehicles that congest them. Even medium-sized cities such as Juiz de Fora, Minas Gerais (in which there is one vehicle for every three inhabitants), are already overcrowded in terms of transportation versus the roadway infrastructure available. Commuting times are becoming increasingly longer across the country, and the frequency of traffic jams makes it difficult for citizens to organize their schedules.

Citizens also face death, pain, and lifelong injuries that result from both rural and urban highway transit. In Brazil, the rate of car accidents is much higher than those of developed countries. When compared to Japan, for example, there are six times more accidents per vehicle in Brazil. These high numbers put pressure on emergency rooms and burden the hospital system. In Brazil, there are more deaths from accidents on the road each year than there were among the American army in all ten years of conflict in Vietnam. Though there is a direct correlation between the poor quality of the highway system and the number of injured and handicapped citizens in Brazil, there is more public exposure to the structural crises of airplane travel than of the highway system's ongoing structural crisis.

The low levels of growth have done more than just hinder the energy and logistics matrices in Brazil. It is clear that growth has slowed to crippling rates. The erosion of

infrastructure can be largely explained by the slow pace of the national economy, as well as by the political and economic decisions made in these sectors in the last twenty-five years of the twentieth century.

At the beginning of the 1980s, world financial speculation led to the Latin American Debt Crisis. In Brazil, the crisis accentuated inflationary acceleration. The 1980s were a time of political and institutional reconstruction, with Brazil's transition from an authoritarian military regime to a constitutional state, and with the new Constitution that was established in 1988. Despite economic stagnation, the limited financial opportunities abroad, and the rising rates of inflation, there was a reluctance in Brazil to abandon the national development project. The Constitution established rules and concepts that would stimulate and protect programs in the energy and transportation sectors.

As is well known, the post-Cold War world leaders rallied for the ideas of globalization and renewed support for market mechanisms. The behavior of the world's periphery is referred to in the Washington Consensus. In Brazil in the 1990s, its translation generated a discourse comprised of three interpretations. The first interpretation affirmed that the national developmentalist model of growth would run its course, which led to a process called "import substitution industrialization" being terminated. Two of the main failures of this interpretation came to be the excessive isolation of Brazil's economy from the world economy and the weakness of science and technology sectors in the country.

The second interpretation was the first to bring up the idea of "competitive integration." It proposed opening the Brazilian economy to more participation in the flow of the international economy. Those in favor of this proposal supported the possibility of exploring international demand and condemned the excessive protectionism created for national products. Brazilian President Fernando Collor summarized this position by referring to a Brazilian-made car – once a source of national pride – as nothing more than a "buggy" compared to cars made in the First World. Opening the economy resulted in paradoxes such as French lettuce being sold in high-end Brazilian supermarkets.

The third interpretation established an economic and political priority of stopping the price/wage spiral that the country was experiencing. To protect its wealth, Brazil had developed a system to defend its financial assets. This system converted companies' cash into financial savings. With this system, the price/wage spiral automatically fed into itself. The failure of the Collor administration's "shock therapy" plan and the country's reticence in reducing its foreign debt created the belief that the financial system was untouchable and that Brazil needed to maximize its cooperation with the international financial system. The corollary was the Washington Consensus' adoption of a new recommendation: cuts in public spending and the privatization of state-owned enterprises.



During the first Brazilian neoliberalism movement, supporters promoted the breakdown of national development institutions that had been established in the Constitution. Constitutional amendments prohibited public monopolies, with the exception of uranium and atomic energy, and dissolved existing taxes within infrastructure programs that were meant to be used for infrastructure itself. The main features of this first neoliberalism movement were the hostility toward institutions that had inherited old national projects, and the development of new laws on the topic.

Due to the aforementioned priorities, fiscal policies were being weakened thanks to both internal practices and also to the succession of agreements with international creditors. There was an immediate backlash against public investment, from halting projects that were in process to putting holds on new projects. There was a simultaneous and accelerated decision to begin free trade, which had a devastating effect on production chains and which even took down several important ones. Naval construction came to a standstill; railway material factories disappeared, from locomotives to tracks and train cars; the heavy electrical equipment industry went into decline; furthermore, Brazil saw the beginnings of the devastation to heavy engineering construction companies and their projects.

Repeated attempts at stopping the price/wage spiral made the Brazilian financial system become more directly involved with those of other economies, for better or for worse. The country adopted a monetary regime with inflation targeting. This model increased the role of interest rates in order to combat high prices. Brazil came to adopt the largest interest rate spectrum in the world in place of the price/wage spiral, which defined company currency as financial savings accounts. With mediocre growth and the widespread loss of skilled jobs, unions began to lose bargaining power. The country experienced price stabilization, but as a result, there was economic stagnation and an involution of the functional distribution of wealth. In 1960, wages represented more than 50% of national income. As of 2009, this value had dropped to 37%. The result was not surprising, since the especially high interest rate guaranteed constant growth in returns. The economy's stagnation reduced union bargaining power, and the weak job market led to the price/wage spiral being replaced by a system that consolidated the relationship between real interest and price. The Brazilian business epicenter distanced itself from its previous state contractors and formed new relationships with the Central Bank of Brazil, a capital market institution. During this time of economic paralysis, there was economic activity in some sectors involving agricultural exports, as well as in banks and other intermediaries within the capital market.

Liberalization continued, requiring the transfer of productive public assets to private companies. There were cases of both legitimate and illegitimate privatization. Legitimately, state-owned enterprises that produced and distributed electricity were turned into private companies.

As another example, the government sold the Vale Mining Company (whose full name is *Companhia Vale do Rio Doce* in Portuguese) for a fraction of its potential value. There were also cases of hypocritical and illegitimate privatization. Record amounts of Petrobras stock was sold on the international market, and its petrochemical branch was also privatized. In 1983, the federal sphere owned 84% of Petrobras capital. The Fernando Henrique Cardoso administration sold 180 million of the company's stocks, 25% of which were acquired in the domestic market by 310,000 holders who chose to convert their rights to FGTS<sup>5</sup> accounts into Petrobras shares. Three-fourths of these stocks were sold abroad. From the profits Petrobras generated, they paid dividends to shareholders abroad. The amount paid to foreign shareholders was higher than both wages and interests paid by the company combined.

Ideally, a high priority for the use of the country's international reserves would be to buy back these stocks. It is interesting how, in defense of minority shareholders, the slogan "What comes from petroleum is yours" seemed to be the true meaning of the original slogan that was developed; however, there was no similar defense when Petrobras was forced to limit its auctions to exploration blocks. Today, the "neodefenders" of Petrobras argue that the company's main mission is "to defend its shareholders," the majority of which are private. The fallacy lies in the fact that the majority of Petrobras's owners are Brazilian citizens, and that it is completely possible to defend minority Brazilian shareholders repurchasing the stocks that are in the hands of share traders.

In the Brazilian model, privatization was supported by a liberal government. Buyers took advantage of the situation in "convenient" ways, from repayments with outdated coins to generous funding from official banks. Brazil then experienced deregulation and a transfer of powers from the state to regulatory agencies, continuing with the idea of creating a third sector between the state and the society.

The national development project was successfully put to rest. The national neoliberal project considered the word "reform" to be a synonym of "demolition." The acquisition and operation of the energy and transportation infrastructure sectors came to be seen as a new type of business front. With financial accumulation, which preserved positive returns with high interest rates, even on cash balances, a new road to wealth was formed in the country. It is easy to imagine that the benefits of high interest rates and proceedings in the purely financial earnings sphere were more attractive than any benefits that would come from investing in productive industries. Acquiring existing infrastructure is attractive for private businesses if they can also benefit from generous tariff laws. Because of its long maturation process, infrastructure was not the first choice for private investors.

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<sup>5</sup> FGTS stands for *Fundo de Garantia por Tempo de Serviço*, and it is similar to the 401(k) account system in the US (translator's note).

Neoliberal policies fragmented the once integrated electricity system, one that combined the generation, transmission, and distribution of electricity. This integration had previously made it possible to set a single tariff across all regions of the country. Under a unified system, it had been possible to reallocate incomes from hydroelectricity. Public opinion is apathetic towards the subsidies that residential consumers unknowingly give to the electro-intensive industries as a last resort. The institutional problem is the operation of tariffs on a cross-subsidies basis, and portraying them as activities in the so-called “free market,” when they were actually a black box of differential earnings among wholesale energy operations.

Competitive integration, accompanied by the loss of safeguards previously enjoyed by the Brazilian industrial system, reorganized the country’s exports. New commodities presented themselves (soy, proteins, etc), and a favorable international market for these natural resources restored Brazil to its former position as a significant primary commodity exporter. Brazil is no longer, however, the same country it was when it was still the Old Republic. At that time, the coffee industry was run by Brazilian companies. Coffee-related technology was led by the Agronomical Institute of Campinas. Coffee financiers and exporters were also represented by Brazilian companies. In the current soybean industry, however, only the farms and truck drivers are Brazil-owned. The equipment, fertilizers, and seeds are all controlled by foreign companies with branches in Brazil; most exportation is completed by transnational companies. Under this system, the sugar industry and the meat packing industry tend to thrive.

This framework contrasts with the exceptional bounty that the country possesses. In terms of hydroelectricity, the country possesses enough hydraulic resources to triple current production capacity. Brazil already has the sixth largest uranium reserve in the world, and 60% of the country has yet to be prospected for this mineral. Coal is scarce in the country, but the amount of land available for agriculture and the availability of water and solar energy would make it possible to increase biomass to complement the energy matrix. Brazil dominates the technology used to generate, transmit, and distribute electricity, and it is one of the three countries in the world that has its own technology for uranium enrichment.

As for petroleum, the existence of oil in Brazil’s pre-salt layer has created the possibility of an abundance of fuel reserves. In the petroleum industry, Brazil has access to knowledge on geology, technology, and exploration. Despite the industrial lapses that occurred under the neoliberal project, Brazil could reclaim its productive sectors relatively quickly, particularly those of petroleum equipment and services, in order to support the exploration of the pre-salt layer.

In 2006, a large underwater petroleum reserve was discovered in Brazil under the pre-salt layer. The pre-salt layer extends far out from the Atlantic coast of Brazil as a piece of the continental shelf that extends from the state of Espírito Santo to the state of Santa Catarina. This strip of the continent is 300km from the coast. It is 800km long and 200km wide. Conservative

estimates suggest that there are likely 40 billion barrels of oil under the pre-salt in the Carioca, Tupi, and Jupiter blocks. Many experts estimate that the reserves in the other blocks may reach more than 70 billion barrels' worth. These quantities would put Brazil in ninth place in the world ranking of petroleum reserves. Some more optimistic experts have come to imagine the strip of pre-salt as one solid block.

Authors have long since touted the Amazon as a potential "El Dorado". With the discovery of the pre-salt layer, Brazil came to possess a "Blue Amazon" as well. While the former is a reserve of resources, agricultural land, water, and an ample world for researching the potentials of biodiversity, the latter is a self-sustaining supply of "black gold" that is ready to be accessed. The "Green Amazon" is a reserve for an undetermined time in the future, while the "Blue Amazon" is located next to the main economic and population hubs in the country and will be available within the next few years. Since colonial times, the Green Amazon has been, in the words of Arthur Cesar Ferreira Reis,<sup>6</sup> "an object of international coveting." There are strong reasons and a geopolitical arena that make the Blue Amazon stand out as an "object of coveting" as well.

In 2005, petroleum and natural gas made up more than 43% of total world energy consumption. International Energy Outlook projections (IEO, 2004) note that this dominance will need to be sustained well into future decades: the agency's projections through the year 2025 suggest that growth in petroleum and gas consumption will be between 1.9% and 2.16% every year. It is possible to infer that, if these production and consumption levels are maintained, world petroleum reserves will last for another 41 years. In the last 20 years, increases in reserve levels have been largely due to the re-evaluation of existing oil fields. All of this evidence suggests that the cost of extracting petroleum will increase due to the use of heavy fuel oils and bituminous sands, and also due to the need for deeper and deeper extractions in areas that are progressively harder to access.

The Brazilian pre-salt layer is not easy to access. It is located under a five-thousand-meter layer of rock and fossil salt, which itself is under two thousand meters of water. The oil, however, is light, and can be adequately combined with the heavy petroleum that is currently being extracted. The cost of each oil well will be US\$60 million. The pre-salt petroleum industry will require significant investment efforts from the Brazilian economy. Given that the country has opted not to export crude oil, it is possible to project a long period of time during which existing oil fields can be used. If the productivity of typical pre-salt oil wells reaches 20,000 barrels per day, the unit cost of production will be less than US\$30 a barrel.

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<sup>6</sup> The author makes reference to the book, "*A Amazônia e a cobiça internacional*" (English: "The Amazon and International Coveting") by Arthur Cesar Ferreira Reis, published in the state of Sao Paulo by Cia Editorial Nacional in 1960 (translator's note).

The distribution of world petroleum reserves is concentrated in the Middle East, which has increased its involvement in the market over the last twenty years. In 2006, Middle Eastern oil reserves made up 61.5% of world total oil reserves (this number was 54.1% in 1980). The eleven countries that are part of OPEC (the Organization of the Petroleum Exporting Countries) control 75% of world reserves. This tendency has been accompanied by the fall in reserves in important economies, such as those of the US and the United Kingdom. Some exporting countries have been losing their positions in rankings of reserve quantities. Two particularly notable cases are the poor performance reports from Indonesia and Mexico.

The complicated geopolitical situation is rounded out by the fact that North America consumes 28.9% of the world's petroleum, while producing 16.55% and owning only 5% of world reserves; the continent imports 70% of the petroleum that it uses. In 2006, if the United States economy had used all of the petroleum produced in the New World that year, they would still have run into oil deficits. If Russia is excluded, European reserves contribute to 2% of world reserves, while Europe consumes 22.9%. China and Japan consume 15% of the world's petroleum each year, but their reserves are less than 5% of world values.

It is easy to understand how the inconsistency between the countries that consume the most petroleum and the countries that hold the most petroleum reserves forms the backdrop of recurring world tensions. The El Dorado-type vision of the Blue Amazon possesses inherently exciting possibilities, but these possibilities bring new geopolitical risks as well.

In Brazil, discourse on the environment holds an exaggerated focus on the Green Amazon. A national project in Brazil would be perfectly capable of using the Amazon while reasonably protecting the environment. The geopolitics of petroleum are much more pointed and direct; national sovereignty is compromised or lost, and hard-to-assess risks are placed upon the world's large oil reserves. It is not difficult for core countries, which have a high demand for oil, to recruit political support from peripheral countries in order to protect their own interests.

This is an important time for Brazil to demand clear and defined standards regarding petroleum, which will carry significant weight in the evolution of Brazilian society. It would not be ideal to follow the path Indonesia took. Indonesia is a member of OPEC. It exported petroleum at an insignificant price and its reserves have been diminishing. The same phenomenon has been a blemish on Mexico's recent past, as well as on that of the United Kingdom. After extracting petroleum from the North Sea, the UK has used up almost all of its reserves. Today, it is not able to sustain its petroleum needs with the oil it exports. It is easy to imagine these countries shifting from producers to importers of petroleum at progressively higher prices. Even for the US, meeting this vast demand for oil through the use of progressively costlier imports may limit or even reduce the population's current standard of living. Norway has had success in petroleum extraction using offshore platforms, and it maintains its reserves. The country has also implanted a national

diversification project with a productive base and with a fund that acquires assets from the world that will benefit the Norwegian people in the future. Iraq, which holds 9.5% of the world's reserves, is the opposite of Norway.

It is easy to predict that, in the coming years, Brazil will make efforts in the areas of transportation and energy infrastructure. The current government has been testing numerous projects that are sending the country in this direction. Ethanol and bio diesels have been at the forefront of Brazil's national agenda. These products are renewable fuels that have the potential to reduce dependence on fossil fuels. The country founded its Growth Acceleration Program (PAC), which binds a variety of projects, some of which had been put on the back burner because of the primary surplus and the high interest rate. Some progress has been made on these PAC projects, but as of 2008, the government was behind on the projected budget plans. Environmental barriers seem to have been passed in the case of the two Rio Madeira power plants, though more than ten hydroelectricity projects remain stalled due to environmental concerns, even the enormous Belo Monte dam on the Xingu River. The Araguaia River is also a potential waterway that is legally off-limits.

What the current government has done is noteworthy, but insufficient. For Brazil to go back to following a consistent trajectory of expansion, one that would be above 5% of GDP per year, two events need to occur. First, the country must recover a macroeconomic investment rate of 25% GDP. Second, it must continue in its efforts to raise this rate (in 2008 the investment rate reached 19% of GDP). In a reported attempt to curb inflationary tendencies, the Central Bank of Brazil has raised taxes on interest to numbers higher than those of Turkey, making Brazil the country with one of the highest interest rates in the world in 2008.

At this juncture, it is important to ask: what is Brazil's national project? Will the country continue in its neoliberal efforts? Is PAC an introductory program for a future national project? There is a muted frustration among Brazilian citizens over the mediocrity of the economy and the instability of the country's essential public services: healthcare, education, and safety and security. The issue of job security also is one of the most common anxieties felt by Brazilian youth, and it is why moving abroad is considered a progressively more attractive option. Furthermore, the nation's tolerance of rolling blackouts is decreasing.

Neoliberalism is losing strength as the problems in the international financial market continue to grow. Through PAC, the Brazilian government has pressed on in its attempts to sustain economic growth over the last two years. However, programs can only be sustained when they are supported by the current interests of the society in which they are implemented. In addition, there has yet to be any relevant questioning of the liberal idea of competitive integration. The exchange rate anchor persists, sustaining a political environment of capital flows attraction at any price (real interest rates). The modest PAC program, which was announced with

fanfare, has been silenced, in part, by discussions warning of a resurgence of inflation. This indecision makes it difficult for the business community to treat PAC as a concrete and predictable reality. The pre-salt layer possibility may be able to shed some light on these issues. Can the pre-salt layer truly be a Brazilian El Dorado, and not a prize to be claimed by other countries? After one considers Norway and Iraq, no doubt remains: petroleum can be either a blessing or a curse for a country.

Directives regarding the development of a future national project have been brought forward by the current government. In terms of infrastructure, the country's focus on consistently and equally integrating the Brazilian Northeast into the national economy has been extremely noteworthy. The efforts put into the San Francisco River water diversion project are highly commendable, as is the creation of the Belo Monte Power Plant on the Xingu River. Proposing thermoelectric power from natural gas and promising wind energy will not turn the Northeast into an important frontier for national development. The North-South Railway and the Transnordestina Railway, combined with the electricity produced by the Belo Monte Plant and the clean water diverted from the Sao Francisco River (a precursor to future contributions from the Tocantins River), would create a transformation in the Brazilian Northeast. This change will be similar to the changes made when the nation's capital, Brasilia, was constructed, and its logistical framework stimulated the economy of the Central-West region of Brazil, as well as that of the entire southern Amazon region.

The production of food for exportation (neoliberals speak of Brazil as the "world's breadbasket") when Brazil's own population experiences hunger at significant rates does not seem to be a project that would bring about much more social justice. Allowing international food prices to determine the prices that Brazilian citizens pay for food is a egregious social mistake, but one that can be avoided by reconstructing tax safeguards and by the proper management of regulated public food supplies. If the country resigns itself to neoliberalism, the policies will impede the development of these safeguards.

Brazil's pre-salt issue has forced the country into a discussion about its future. The government has written directives on the topic that, if maintained, followed, and elaborated upon, will make a difference in the lives of the Brazilian people. The first directive has declared that Brazil will not export crude oil. The petroleum of the Blue Amazon will be exported only in the form of derivatives and chemical products. The second directive has guaranteed that platforms, equipment, and any water shipping vessels will preferably be produced by Brazilian industries. The third directive has announced that a significant portion of these petroleum profits will be reserved to improve the quality of the Brazilian education system. Given the nature of current concessions, however, it is possible that Brazil will eventually export crude oil. There is a

hypothesis that the Brazilian government will dispossess concessions of pre-salt that had been auctioned off in blocks.

The current government seems to be seeking a balance between the neoliberal project (which is limited to currency, interest, and the financial system), and a new national developmentalist project that will focus on infrastructure, one that will be spearheaded by the institutional endeavors involving the pre-salt layer.

Those who support Neoliberal competitive integration in globalization have been those involved in campaigning for the idea of Brazil as “the world’s breadbasket.” It would not be an exact replica of Brazil as the Old Republic, when coffee and sugar were exported and Brazil was named “the dessert country of the world.” Today, foreign presence is a reality in a variety of agricultural industries. However, the vulnerability and whims of world markets are similar to those that occurred during the time of the Old Republic, and they put Brazil in a position in the area of international trade with the lowest amount of economic activity in the technology sector.

On the commodities hierarchy, there is an aggregate value scale. For example, it is better to export meat than to export cattle feed; it is certainly more efficient and convenient from an environmental perspective to use cattle feed derived from intensive farming practices than from grass. In large-scale livestock farming, this grass is obtained through the devastation of rainforests and other native vegetation. This type of intensive farming should be supplied with domestic raw materials and nationally-produced equipment. It is preferable to export processed meats than green leather and to leave this leather market to the national shoe industry. It is easy to infer that most of those involved in commodities chains of this type will add value to raw materials used for energy, as well as to service providers in the country.

Brazil still cannot claim economic autarchy, but the government should, through exports, make an effort to increase sales in markets with high aggregate value. Redefining competitive integration means that it will come second to Brazil’s national development project, and it will bring direct and tangible benefits to the Brazilian population. There is no way to substitute the possibility of exportation. However, the first directive is rightly geared toward maximizing aggregate value and stimulating industrial, scientific, and technological development. The proposed model for the pre-salt layer will definitively rescue the naval construction industry, and it will turn Brazil into an exporter of equipment for underwater prospecting, including highly specialized offshore vessels. An energy matrix that supplies sufficient amounts of electricity and fuels that are cheaper than those in other countries will allow Brazil to consider exportation with a higher aggregate value.

This directive can be applied to other exported items. Why not export shoes, rather than green leather? It is always preferable to export cattle rather than their feed; it is even better to



export processed meats. The scarcity of protein suggests that it is better to export chicken than corn. Taxes on commodity exportation would lower food prices for Brazilian consumers.

Reserves of confirmed and accessible petroleum are high-quality financial assets for those who control them. As the owner of the pre-salt layer, Brazil will have assets equivalent to the reserves held by the Central Bank of Brazil. The difference between petroleum as an asset and the items in the Central Bank's portfolio is the almost certain tendency for prices of barrels of oil to increase, while debt securities from the American Treasury are subject to oscillations and to the whims of the international financial system. The optimistic views of the pre-salt layer reflect the urgent need for a national financial investment policy. The pre-salt layer demands a national financial effort for it to become effective. Petrobras will certainly play the main role in this process. It is important to re-nationalize the company. A sovereign fund should be created with part of international Brazilian reserves, and it could be used to purchase Petrobras shares.

Net public debt (NPD) should be redefined. NPD is currently defined as the sum of all national public debt plus foreign debt, minus international reserves. NPD has been reduced over the last few years thanks to the currency appreciation of the Brazilian real, which is linked to increases in national reserves. Larger reserves were possible because of an international market that has cyclically favored Brazilian commodities, and also because of policies that kept real interest rates at high levels. This situation hinders growth, but it is appealing for short-term capital flows from abroad, as well as from "internationalized" Brazilians in search of interest arbitration. Going against commercial surpluses, a appreciated currency stimulates imports. The financial administration of strategic Brazilian reserves results in significant asset losses because of the difference between the high rate of return from Brazil's Special Clearance and Escrow System (SELIC, the overnight rate) and the low rate of return from international reserves that are concentrated in US Treasury bills.

Incorporating the assets gained through shares of lucrative state-owned companies into NPD would diversify the investment portfolio of Brazilian international reserves. Rather than taking on the debts of other countries, Brazil would be increasing strategic investment in specific sectors, which would restrengthen the national economy. A macro-dynamic with increasing investment rates is essential in the development of a self-sustaining growth trajectory. Long-term programs with increasing investments in energy and transportation infrastructure are one of the most effective ways to increase investment rates. The pre-salt layer is predicted to aid in the continuation of the modest Growth Acceleration Program.

A model of sustained demand expansion dependent upon high interest rates and long payment terms may be useful in interrupting economic stagnation, but it is a high-risk stimulant for households that will get into debt, as well as for the financial health of the capital market. It would be a reckless move to expand credit to individuals if it carries annual interest rates of 40%,

which is almost three times the SELIC rate. A family that gets into a debt of 20% of its household income will pay 8% interest on their income.

Only with an increase in high-quality jobs will it be possible to guarantee the solvency of the eventual credit bubble that will form in Brazil. Significant market protection is essential for increased investments in electricity, petroleum, and railway transit, as well as for any modernization of metropolitan transportation systems. They would turn the trajectory of stagnation into one of consistent and self-sustained growth.

Both the Green Amazon and the Blue Amazon demand that the government give priority to the operational improvement of the Brazilian Armed Forces. Military planes and ships are crucial to the preservation of national oil fields, as well as the preservation of the territory of the Amazon. Sovereignty in a world of increasing friction, especially when this friction is stimulated by the geopolitics of petroleum, requires this safeguard.

The future national project of Brazil must embrace the dream of integrating the South American continent. The Brazilian transportation and energy matrices must be considered in the country's relations with neighboring nations. As for the highways and railways, there must be efforts to connect the Atlantic to the Pacific. In terms of the waterways, Brazil and other South American countries must agree upon the rules of cabotage, with ports in both the Atlantic and the Pacific that are controlled through international cooperation. Brazil would need to soon prioritize the Port of Sepetiba, as well as the development of the northeastern region of the country, which would require at least one more intercontinental port along its coast. As for energy, Brazil already imports fuel and electricity from neighboring countries. The development of bi-national or multinational energy projects would aid in the integration of energy matrices on the continent.

Bi-national hydroelectric plants are currently underway with four neighboring countries; the plants at the Madeira river are being combined with the creation of a waterway that will serve Brazil, Bolivia, and Peru. The gas pipeline connecting Venezuela and Argentina through Brazil will be the backbone of energy integration, and it could also serve as a national symbol of partnership within the South American continent.