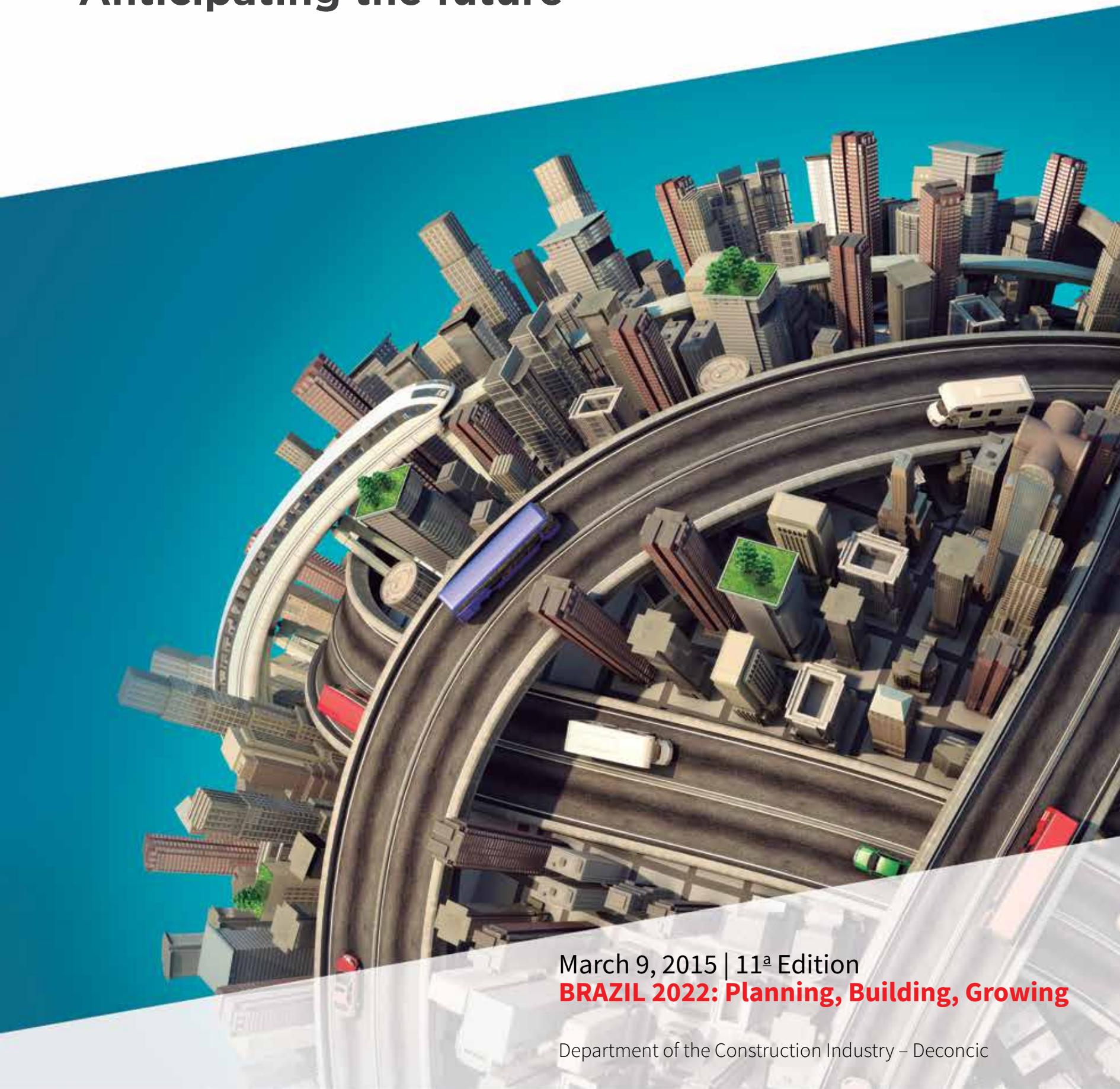


ConstruBusiness

11th Brazilian Construction Congress

Anticipating the future



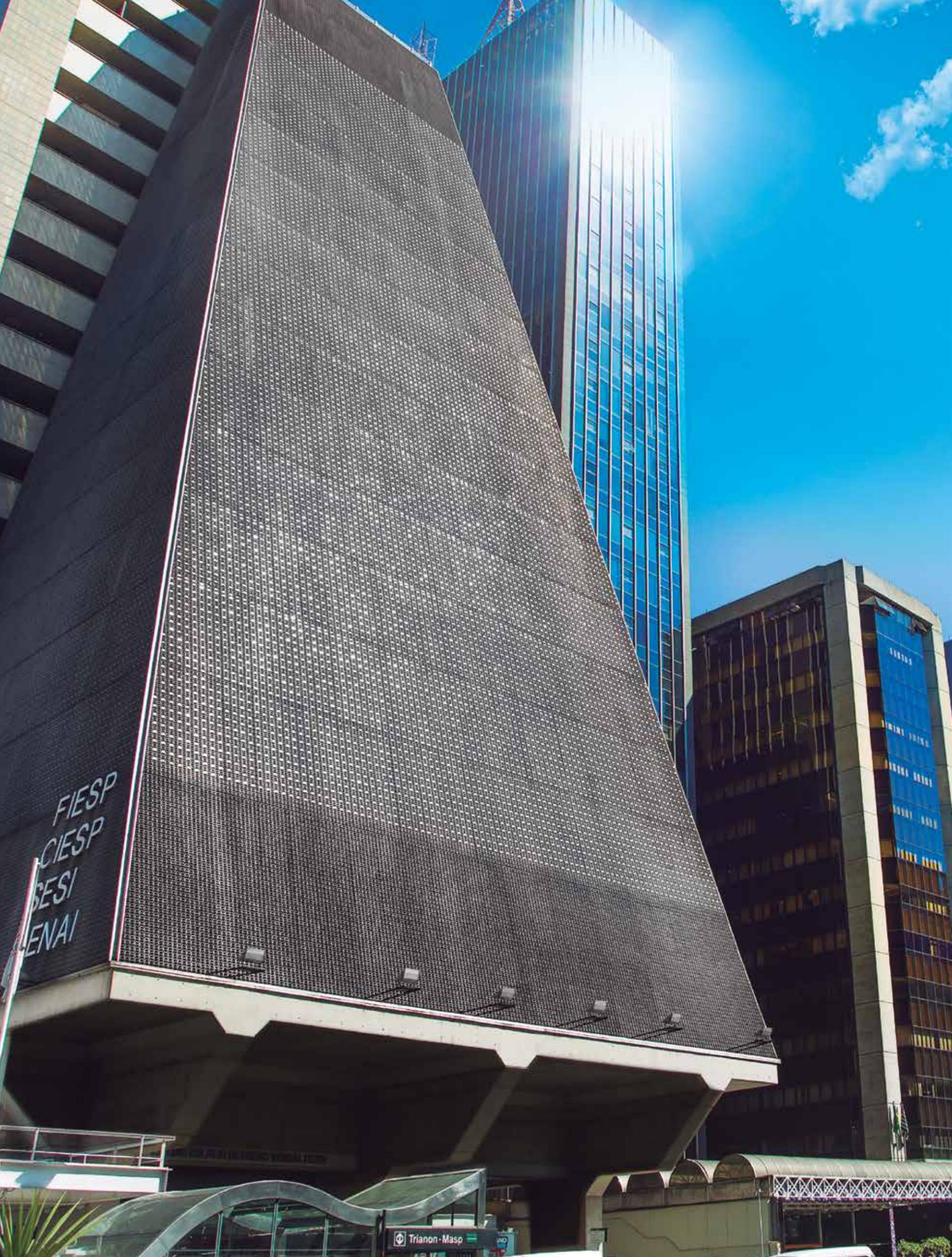
March 9, 2015 | 11^a Edition
BRAZIL 2022: Planning, Building, Growing

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BRAZIL 2022: Planning, Building, Growing



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The 11th edition of ConstruBusiness focuses on an essential topic for the future of our Country: the competitiveness increase of the civil construction industry. We have taken great strides in the past years, increasing investments, motivating production and employment expansion in construction. The investment profile in this industry has changed with programs such as the PAC - *Programa de Aceleração de Crescimento* (Growth Acceleration Program), *Minha Casa, Minha Vida* (My Home, My Life) program and the Logistics Investment Program. In that line, the measures taken to relieve taxes and change legislation have also contributed towards driving the entire construction production chain. In the upcoming years, we have focused even more efforts on facing the challenge of changing the competitiveness standard in our economy. Therefore, Brazil must continue increasing investments in social and urban infrastructure, i.e. housing, mobility and sanitation, and in economic infrastructure, that is energy, transportation and communications. We will continue to prioritize these efforts, either with government money, or through partnerships with the private sector. Accordingly, in addition to increasing the quality of our infrastructure and competitiveness in the Country, we will guarantee the motivation to continue to grow the construction industry. We will also take new and bolder strides to increase productivity of the sector to expedite the works, supporting more innovation in products and processes, more investments in qualifying labor, as we have done through Pronatec since 2011. We will adopt new measures to simplify procedures and decrease bureaucracy in processes, which will enable to unite speed, quality of the developments and the correct use of state-owned funds. The debate around successful sectorial experiences and the dialog between the government and the production sector to improve existing tools and adopt new policies are fundamental strategies so we can build a more competitive future, together, for our construction industry. We are highly willing to work together with the construction production chain and, therefore, we would like to welcome the 11th edition of the Brazilian Construction Conference, a privileged forum to outline the proposals for sustainable and competitive development of the construction industry, which is a strategic segment for the Country's development.

Dilma Rousseff
President of the Federative Republic of Brazil



The industry in Brazil has a track record of action, courage and overcoming obstacles. The country has built, with a lot of effort, a strong and diversified industry throughout over 50 years. However, today, the major achievements in the industry are threatened by an extremely high tax burden, by bureaucracy, high costs, difficulties in infrastructure, expensive credit and high interest rates, which have been overpowering the production capacity and competitiveness of the Brazilian industry.

In Brazil, the growth of the industrial sector can be translated into a passport for economic and social development. There are no examples worldwide, of countries that became rich and developed without a strong industry sector.

We, as part of the industry, are also the largest creators of wage mass in the private sector; we offer the best and most qualified jobs in the economy and account for over 22% of the bulk of total formal employment wages.

In a virtuous growth cycle, the establishment of industrial companies attracts other companies, creating and strengthening the production chains. The higher the constriction and complexity of these chains, the larger the interaction with the actual industrial sectors and with other areas of the economy—not to mention the fact that growth and economic development will also increase.

We must highlight the essential role that the civil construction industry plays in the economic scenario, as it is responsible for major investments in infrastructure, creating jobs and moving the economy

We must change this scenario so that the country can once again grow, carry out the works that are necessary, have strong foundations that drive investments, create jobs and move the economy forward.

With an eye on the current scenario, on the actions that have to be carried out and on the future opportunities, the 11th edition of ConstruBusiness, the Brazilian Construction Conference presents a structuring agenda, analyzes the role of the sector and its importance to the Brazilian economy, interpreting the current scenario, establishing goals and planning actions, thus contributing to recover the sector and resume sustainable growth.

Paulo Skaf

President of the Federation of Industries of the State of São Paulo (Fiesp), and Center of Industries of the State of São Paulo (Ciesp), Social Service of the Industry of São Paulo (SesiSP), National Industrial Training Service (Senai-SP), the Roberto Simonsen Institute (IRS) and the Brazilian Support Service for Micro and Small Companies (Sebrae-SP)



ConstruBusiness was created in the 90s, and is still strong in its fundamental mission: bring together the entire construction production chain, strengthen the sector and leverage social and economic development in the country.

I can state that, as great colleagues state, ConstruBusiness highly cooperates with works, ideas and support. I like to say that the Brazilian construction industry has two phases, one before and one after ConstruBusiness.

It is worth noting that the articulations began within the scope of the Union of the Cement Products Industry of the State of São Paulo (Sinprocim), with other major entities in the Construction Industry Council (CIC) from Fiesp.

These entities were the precursors in encouraging movements in favor of the industry. With that, ConstruBusiness has consolidated many segments, so that they would be seen as an expressive production chain, bringing together important entities, obtaining concrete results domestically, with further international expansion.

The entity's achievements and collaboration with governmental decisions size its actual importance, leveraging the entire complex construction chain, from large and modern projects, mineral extraction, material industry and trade, up to real estate maintenance, in addition to the expressive job position creation, resulting in the improvement of quality of life for the population.

In the 11th edition of ConstruBusiness, I have the honor to express how proud I am that it was created and endures, as we have always based it on breaking paradigms and innovation, knowing that we become more mature with each decision we make.

The experiences and results obtained from our ConstruBusiness conferences, throughout all of its editions give us the confidence that we are on the right track to strengthen the construction production chain and strengthen Brazil.

José Carlos de Oliveira Lima

Vice-president of the Federation of Industries of the State of São Paulo (Fiesp)

Chairman of the Superior Council of the Construction Industry (Consic-Fiesp)

Chairman of the Deliberative Boards of the National Union of the Cement Products Industry (Sinaprocim)/

Union of the Cement Products Industry of the State of São Paulo (Sinprocim)



In view of the constant challenges faced to boost Brazil's economic growth and aware of the construction productive chain importance in such process, Fiesp Construction Industry Department (Deconcic) gladly presents the 11th ConstruBusiness. This congress once again results from the sum of efforts made by several leaderships representing the sector.

The current issue is directly related to the two prior issues. The 2010 issue presented the investment in works requirements for urban development and economic infrastructure in a horizon up to 2022.

In 2012 issue, the Fiesp Compete Brazil Program was launched. It is a set of proposals intended to boost the productivity chain competitiveness, divided into six axles: planning and management, institutional and law safety aspects, funding, manpower, tax impacts and production cost, and sustainability.

Both studies have guided Deconcic activities in the last few years, which organized and conducted a series of work groups with active participation of representatives from the sector and government entities, as well as businessmen and experts.

I particularly thank such groups' coordinators who have brilliantly conducted the projects in course in the Department.

These groups subsidized the current issue with themes of relevance for the construction development in the country, such as the analysis of reasons causing work delays and standstills, building safety, construction material life cycle evaluation, industrialized construction systems and the building information modeling concept (BIM).

This issue motto – Anticipating the future – synthesizes what we've been looking for: to present the steps required to reach the competitiveness and efficiency degree necessary to develop the sector and the country's economy from experiences and actions started during the work cycle in the last years, which was characterized by big-sized projects, such as the Programa de Aceleração do Crescimento [Growth Acceleration Program], Programa Minha Casa, Minha Vida [My House, My Life Program] and the works carried out for the World Soccer cup and Olympic Games.

However, there's still a lot to be done, which makes it fundamental to carry on and extend such investments, knowing that the engagement and joint work between the business leaders and government representatives are primordial.

While adopting a positive agenda of actions agreed with the several players engaged, we'll start a new structured investment cycle, with suitable planning, integrated projects, controlled costs, in compliance with execution terms and social-environmental issues.

Carlos Eduardo Pedrosa Auricchio

*Vice-President of the Superior Construction Industry Board (Consic)
Chief Director of the Construction Industry Department (Deconcic)*



Introduction

The 11th ConstruBusiness - Anticipating the future provides an analysis of the role of the construction production chain and its economic importance, in addition to providing economic growth, urban development and the expansion of economic infrastructure outlooks for the period of 2015 through 2022. Moreover, the publication also tackles the obstacles that divert speed from works, conversing about the sources, consequences to society and what is needed to overcome them. Lastly, the book presents the lines of work and proposals for the Compete Brazil Program from the Federation of Industries of the State of São Paulo (FIESP) for construction, addressing topics and paths to increase competitiveness in the industry.

Chapter 1 opens the discussion addressing the role of the construction production chain in Brazilian economy and resuming investments and economic growth. Additionally, the chapter summarizes the investment requirements in the fields of urban development and economic infrastructure, which will be addressed in the following chapters.

Chapter 2 draws an economic quantification of the Brazilian construction chain, providing information on the gross domestic product (GDP), production and employment, among other indicators, for all the links and production segments, from mineral extraction to services. It is worth mentioning that for this assessment; an important methodological innovation was used compared to the previous ConstruBusiness editions. Data from the Brazilian Institute of Geography and Statistics (IBGE), in most part related to 2012, were supplemented with 2014 estimates based on information available up to January 15, 2015, with the purpose of keeping the industry as up-to-date as possible.

The Brazilian economy outlook for the period from 2015 through 2022 is presented in Chapter 3. The projections of investment requirements consistent with macroeconomic trends are discussed and presented in chapters 4 and 5. In this case, the innovative character of the methodology is also noticeable. Urban issues—housing, sanitation and mobility—are now being comprehensively treated, considering the balanced improvement in the quality of life of Brazilian cities. The issues relating to economic infrastructure—energy, transportation and telecommunications—are highlighted

separately and consolidated to the the macroeconomic conditions analysis.

Chapters 6 and 7 provide the analysis of what must be realized to advance the construction chain, expediting works and to bring on more competitiveness to its production segments. All of these matters were debated in several working groups organized by the Department of Industry and Construction (Deconcic): The Compete Brazil Program from Fiesp; Responsibility with Investments; Industrialized Construction; Materials, Components and Construction Systems (which integrates the Brazilian Program of Life Cycle Evaluation of Civil Construction); Building Information Modeling (BIM); and Safety in Buildings. Each group prioritized its problems and informed the direction to solve them. Additionally, the groups debated success stories in some areas. This extensive debate between corporate leaderships resulted in this set of policies and actions set forth in the 11th ConstruBusiness.



1. Construction, competitiveness and social and economic development

Regaining stability and economic growth are achievements of Brazilian society that have created the grounds for social development. Containing inflation at acceptable levels, recovering the State's investment capability and the institutional changes introduced in the economic scope in the past years have created the circumstances to increase investments in the Brazilian economy. From the historical standpoint, the volume of resources currently invested is much higher than they were a couple of years ago. For instance, in 2003, R\$ 486 billion¹ was invested, and amount equal to only 55% of what should be invested in 2014. The change has been gradual, however, after 2007, with the expansion of long-term credit and increase of payments to the federal government for investment projects, the level of gross fixed capital formation has changed in the country as shown in Chart 1.1

In the bulge of this recovery, came the expansion of civil construction activities. As the consolidated data from the construction production chain shows in Chapter 2, the investment in works increased from R\$ 205 billion in 2007 to R\$ 460 billion in 2014, indicating a growth rate of 12.2% per year. The annual variation was 6.1 percentage points above average inflation between 2007 and 2014².

The amount invested in works translates into wages, taxes and construction companies profit, into the purchase of construction and service materials, creating an effect on the entire construction chain. The gross domestic product (GDP) of the materials, machinery e equipment for construction industry achieved R\$ 53.4 billion in 2014 or 14.5% of the chain GDP and the industry generated 672,000 jobs. Construction

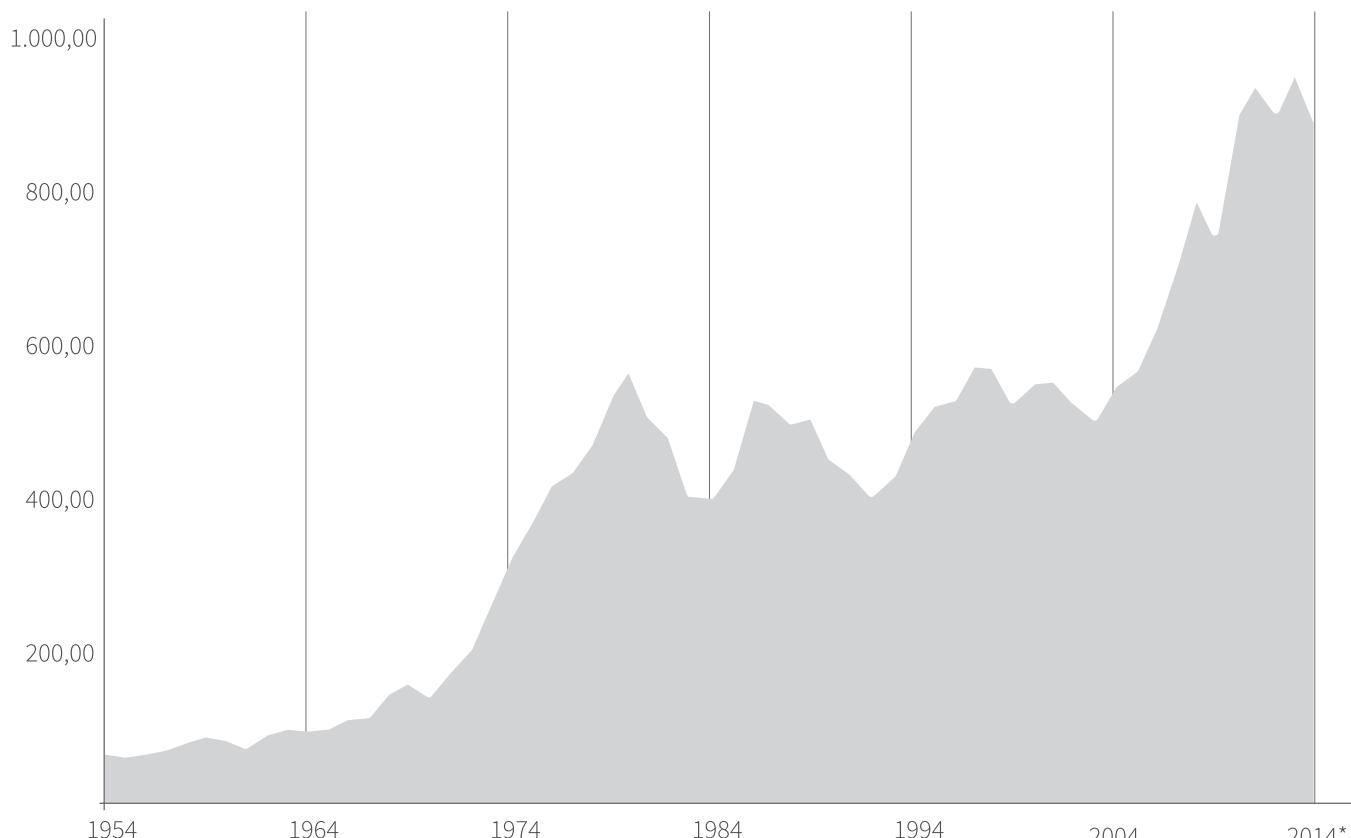


Chart 1.1. – Investments in 2014 (BRL billions). *Estimate. Source: IBGE. Prepared by: Ex Ante Consultoria Econômica.

1 At 2014 prices, according to the implicit deflator of gross fixed capital formation.

2 Extended National Consumer Price Index (IPCA).

material sales provided jobs for 1.17 million people in 2014 and added value of approximately R\$ 44.8 billion—an expressive drop in the housing deficit, noteworthy to mention the state of Bahia, where 136,000 families were no longer a part of the deficit, equal to a 9.6% drop per year from 2010 to 2013 (Table 1.1).

In recent years, investments in economic infrastructure have also grown, reaching amounts of R\$ 184.5 billion on average from 2010 through 2014 (Table 1.2). That amount equals to 3.8% of the Brazilian GDP, indicating expressive recovery compared to amounts invested in the 80s and 90s. If they continue, the impacts of those investments on the country's competitiveness will be huge, as they guarantee the supply

of transportation, energy and telecommunications services at competitive costs in the long-term.

Meaning that, in addition to contributing towards job generation during the works, the investments in infrastructure increase the competitiveness and productivity of the entire economy, with mid- and long-term effects. The importance of infrastructure to the economy is recognized in many academic articles that confirm its positive effect on economic development and growth for nations. Among the main studies on the matter are the articles of Ferreira and Malliagros (1998); Calderón and Servén (2004); Garcia, Souza and Santana (2004); and Estache and Garsous (2012).

Table 1.1- Brazilian housing deficit, 2010 vs. 2013

State	Housing deficit in 2010	Housing deficit in 2013	Variation	% per year
North	823.442	653.030	-170.412	-7,4%
Rondônia	58.759	45.275	-13.484	-8,3%
Acre	34.054	25.087	-8.967	-9,7%
Amazonas	193.910	181.147	-12.763	-2,2%
Roraima	25.237	24.321	-916	-1,2%
Pará	410.799	290.612	-120.187	-10,9%
Amapá	35.419	22.512	-12.907	-14,0%
Tocantins	65.264	64.076	-1.188	-0,6%
Northeast	2.111.517	1.839.886	-271.631	-4,5%
Maranhão	451.715	388.889	-62.826	-4,9%
Piauí	129.038	114.550	-14.488	-3,9%
Ceará	276.284	273.277	-3.007	-0,4%
Rio Grande do Norte	111.538	110.801	-737	-0,2%
Paraíba	120.741	126.686	5.945	1,6%
Pernambuco	302.377	257.545	-44.832	-5,2%
Alagoas	124.063	99.277	-24.786	-7,2%
Sergipe	74.387	83.165	8.778	3,8%
Bahia	521.374	385.696	-135.678	-9,6%
Southeast	2.674.428	2.440.605	-233.823	-3,0%
Minas Gerais	557.371	525.256	-32.115	-2,0%
Espírito Santo	106.447	106.264	-183	-0,1%
Rio de Janeiro	515.067	430.263	-84.804	-5,8%
São Paulo	1.495.542	1.378.822	-116.720	-2,7%
South	770.749	632.184	-138.565	-6,4%
Paraná	287.466	247.333	-40.133	-4,9%
Santa Catarina	179.763	167.679	-12.084	-2,3%
Rio Grande do Sul	303.521	217.172	-86.349	-10,6%
Mid-West	560.555	501.617	-58.938	-3,6%
Mato Grosso do Sul	86.009	85.733	-276	-0,1%
Mato Grosso	118.889	110.737	-8.152	-2,3%
Goiás	229.488	183.690	-45.798	-7,2%
Distrito Federal	126.169	121.457	-4.712	-3,3%
Total	6.940.691	6.067.322	-873.369	-4,4%

Source: João Pinheiro Foundation and the IBGE. Prepared by: Ex Ante Consultoria Econômica.

Based on the perspective of increasing competitiveness and increasing the standard of living for the Brazilian population is how the 11th ConstruBusiness provides the investment requirements in urban development and expansion of infrastructure for the upcoming years. These estimates were made considering the needs of Brazilian society and the possibilities in technical terms and funding, establishing a sustainable path in the long-term. As shown in the data in Table 1.3, the investments in these two areas should be approximately R\$ 560 billion a year, equal to 9.8% of the Brazilian GDP in this period.

In the field of urban development, a major area of well-being for Brazilian society, credit must be fostered and granted for investments in housing, sanitation and urban mobility. In the housing area, investments, subsidies and real estate credit in the Minha Casa, Minha Vida – PMCMV (My Home, My Life) Program must receive investments for 750,000 units per year from 2015 through 2022. The requirements for housing investments total R\$ 202 billion per year for new housing and R\$ 104 billion for renovations, extensions and construction of commercial buildings. The expansion of water distribution and sewage collection networks, sewage treatment stations and solid waste treatment should consume R\$ 18 billion per year. In the mobility field, R\$ 12 billion are necessary annually for subway, urban trains, bus rapid transit (BRT), light rail transit (LRT), bicycle paths and other public transportation solutions. Additionally, funds for financing commercial real estate (offices, warehouses, etc.) must be promoted.

To guarantee a path of sustained growth, fostering and granting credit for investment in the areas of people and cargo transportation, energy and telecommunications, aiming at developing domestic infrastructure and extending services with cost reductions. For such purpose, subsidized investments and credit for infrastructure sectorial investment programs must be extended, especially the Growth Acceleration Program, from 2015 through 2022. The investment requirements in transportation total R\$ 45.5 billion per year for highways, railways, ports

and airports. Moreover, R\$ 47.4 billion for expansion of electricity generation, transmission and electricity distribution systems and R\$ 96 billion for the exploration, production and distribution of oil and gas expansion projects are required.

Table 1.2 – Investments in infrastructure in 2014 (BRL billions)

Industry	2010-2014* Actual	
	Annual average	% of the GDP
Transportation	31,8	0,6%
Highways	17,0	0,3%
Railways	8,5	0,2%
Waterways (ports and waterways)	4,4	0,1%
Airways	1,9	0,0%
Energy	121,2	2,5%
Electricity	51,8	1,1%
Oil and gas	69,4	1,4%
Telecommunications	31,4	0,6%
Overall Total	184,5	3,8%

*The data for 2014 are estimates, which could result in different figures in the future. Prepared by: Ex Ante Consultoria Econômica.

Table 1.3 – Investments in urban development and economic infrastructure, outlook for 2015 through 2022 in 2014 (BRL billions)

Account	Industry	2015-2022	Annual average	(%) GDP
A = (1 + 2 + 3)	Urban development	2.687,076	335,884	5,9%
1 = (1.a + 1.b)	Real Estate	2.444,027	305,503	5,4%
1.a	Construction	1.612,880	201,610	3,5%
1.b	Retrofits	831,147	103,893	1,8%
2	Sanitation	144,459	18,057	0,3%
3	Urban mobility	98,590	12,324	0,2%
B = (4 + 5 + 6)	Economic infrastructure	1.773,269	222,874	3,9%
4 = (4.a + 4.b + 4.c + 4.d)	Transportation	364,254	45,532	0,8%
4.a	Highways	163,624	20,453	0,4%
4.b	Railways	124,100	15,513	0,3%
4.c	Waterways (ports and waterways)	56,200	7,025	0,1%
4.d	Airways	20,331	2,541	0,0%
5 = (5.a + 5.b)	Energy	1.147,440	144,645	2,5%
5.a	Electricity	379,056	48,597	0,9%
5.b	Oil and gas	768,384	96,048	1,7%
6	Telecommunications	261,574	32,697	0,6%
C = (A + B)	Total investments	4.460,345	558,758	9,8%

Prepared by: Ex Ante Consultoria Econômica.

2. Construction production chain: evolution of investments in construction and generation of job and income

The construction chain gathers companies from the production stages and investors in any kind of activity produced by construction. The investors are at the end of the chain, demanding housing, offices, commercial centers, highways, metropolitan train networks, airports and all kinds of buildings and infrastructure. Companies design and build real estate, manufacture or sell building materials, fund operations, among others activities.

In Brazil, this group of companies gathered a contingent of approximately 6.4 million workers in 2014, with work contracts, meaning 13% of the country's workforce. Considering entrepreneurs, self-employed workers, employees without a work contract and interns in the construction chain, the number of people employed was 11.3 million in 2014, or 8.6% of the population employed in the country (Chart 2.1).

Construction projects carried out by construction companies

The more recent consolidated statistics show that construction companies developed construction works and services amounting to R\$ 336 billion in 2012. Based on that performance, the hike in investments in construction achieved an expressive rate of 25.7% per year compared to the works executed in 2007. Totaling a growth of 16.8% per year in actual terms. The evolution of the amount of these works since 2007 is shown on Chart 2.2.

Of the works carried out in 2012, R\$ 133 billion equal the amount of building constructions. Infrastructure works—which include highways, railways, urban works, bridges, tunnels, seaports and infrastructure works for power,

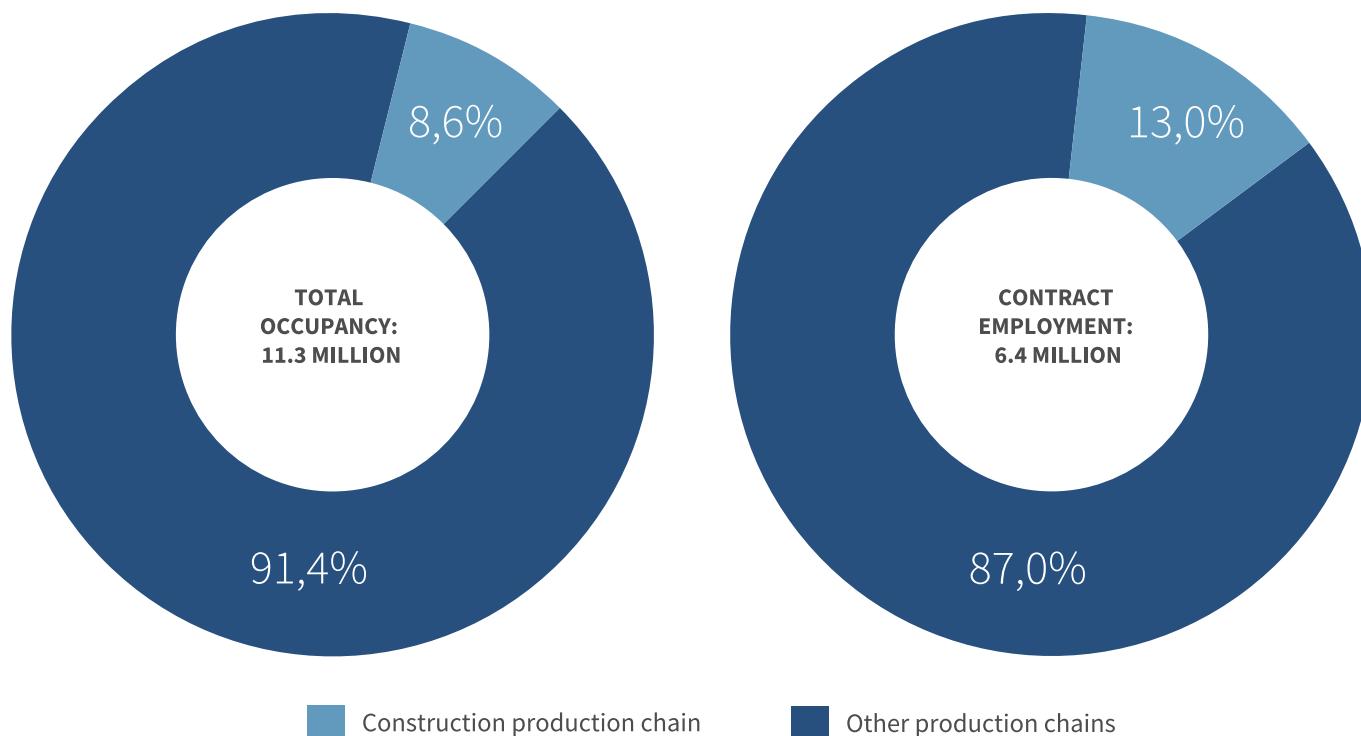


Chart 2.1 – Construction production chain share in occupation and contract employment. Brazil, 2014.

Source: IBGE. Ex Ante Consultoria Econômica Estimate.

telecommunications, water, sewage and pipelines—totaled R\$ 137 billion this year. Specialized services for construction—a segment that includes demolition and earthmoving companies, foundation, electric and water utilities and finishing works—carried out works in the amount of R\$ 56 billion.

Production, employment and construction prices progression as from 2012 enable the estimation of the works and services amount carried out by construction companies in 2013 and forecast that figure for 2014. From 2012 and 2013, estimates show that the number of projects has increased 9.5%, achieving R\$ 368.1 billion. In 2014, with the conclusion of important works and the slowdown in new projects, net growth should be only 5.1%, in turn, the investment levels would sum R\$ 387 billion. That growth is notably lower than inflation, pointing out to market retraction in actual terms.

Self-construction, self-management and renovations

Construction and renovations made by the families themselves, who hire labor or personally do the job, represent an important fraction of construction material sales and in moving the economy of this sector.

Estimates of the works carried out through self-building, self-managing and renovations achieved R\$ 85 billion in 2012, meaning 21% of the amount of production in construction. Occupation created in this segment, however, has a higher share: 66% of total number of people employed in construction. Meaning that labor productivity in this segment is much lower: R\$ 9,900 per worker against R\$ 56,600 in construction companies.

Chart 2.3 shows that, between 2007 and 2012, this segment grew less—only 3.4% per year—compared to construction companies. The evolution was also irregular in the period, alternating between high expansion rates, such as the 14.2% growth in 2010, with moderate retractions.

As in construction companies, employment and prices from 2012 through 2014 enable us to estimate the amount of works and services carried out in the self-building, self-managing and renovation segment in 2013 and forecast that figure for 2014. From 2012 and 2013, estimates show that the number of projects has dropped 10.8% achieving R\$ 75.8 billion. The hike in interest rates and credit restrictions led to an expected nominal retraction of 3.5%, where investments amount to R\$ 73.1 billion in 2014.

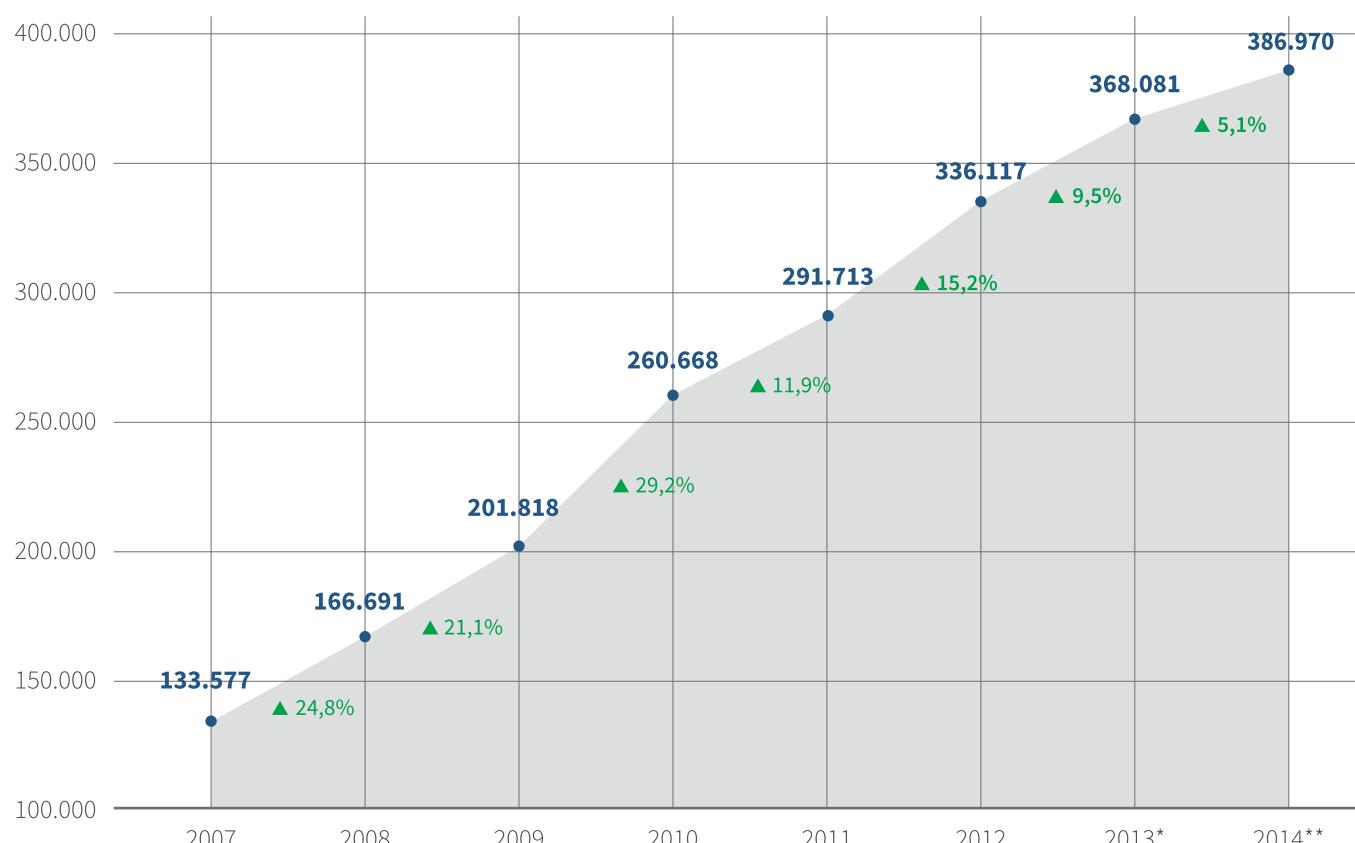


Chart 2.2 – Construction works and services developed by construction companies (BRL millions).

Source: IBGE. *Estimate and **outlook: Ex Ante Consultoria Econômica.

Production stages

Production can be seen on worksites all over the country. In them, workers operate machinery, equipment and tools that assemble, mix and transform different types of construction materials. The materials industry produces the inputs used in works: Cement and mortar; concrete and cement artifacts and fiber cement; steel bars and metal products; frames and window frames; brick, roof tiles and ceramic products; wires, cabling and electric material; paints and varnishes; tubes, connections and plastic products; glass; bathroom fixtures and valves; elevators, escalators etc.

On the other hand, these industrial products are made up of raw material from other industries and mineral extraction products. Examples are steel bars production, which uses pig iron made from iron ore, and the production of aluminum window frames, made from profiles that come from metal made from bauxite.

Part of the construction materials is destined for industrialized systems, while the other is sent to wholesalers and retailers, responsible for directing materials to real estate construction and heavy construction (infrastructure), according to their demands. Industrialized systems consist in pre-manufacturing works components split into modules, whose merger into the

construction has its own technique, making up the industrial construction.

The construction department is part of the real estate services, maintenance and renovation sectors. The real estate sector is responsible for selling houses and buildings. Then again, the maintenance and renovations sector is responsible for expanding buildings' life cycle. Lastly, developments, demolitions and rebuilding takes place.

Labor is required at all levels as it permeates all the different stages of the chain, as well as specialized technical services such as engineering and architecture. When analyzing the construction chain based on the sustainability perspective, the specialized technical services can be established as the first agent of the chain, regardless of the life cycle stage of the development. The sustainability approach requires that all activities carried out in the construction chain be preceded by across-the-board planning. Choosing development location; the type, quantity and quality of materials to be used; well-being of users are variables that must be taken into account, measured and validated before moving any other links in the chain. That calls for engineers, architects, geologists, biologists, managers, economists, among other professionals, who must work together to guarantee that any initiative will create the best net effects, that is, the best benefit at the lowest cost and waste possible.



Chart 2.3 – Self-built and self-managed construction works and services (BRL millions).

Source: IBGE. *Estimate and **outlook: Ex Ante Consultoria Econômica.

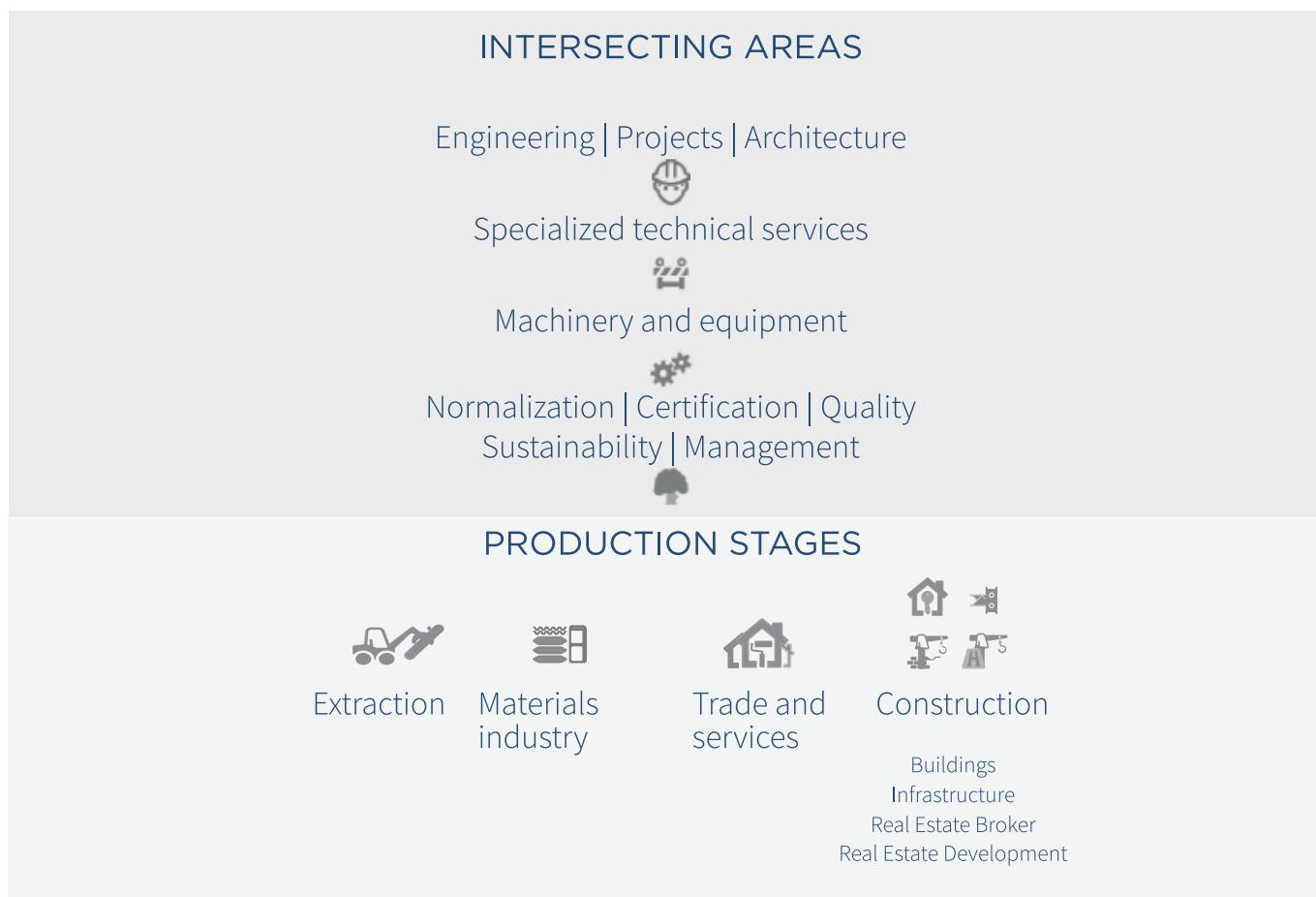


Figure 2.1 - Construction production chain

There is also a great number of companies that provide mineral extraction services in the materials, trade and construction industry. Professional services companies (law firms, accounting, advertising and marketing and consulting, for instance), logistics services (mainly transportation), financial services (insurance and financing) and services that support economic activity (security, food, IT, communications etc.).

The construction chain production also supports the activities of the machinery and equipment industry, given that all production stages employ capital goods to manufacture the products. Trucks for transportation, boilers in the materials industry, computers in commerce or the construction company cranes (Figure 2.1).

Main figures of the production chain

In total, estimates show that construction investments should achieve R\$ 460 billion in 2014, equal to 52.5% of gross fixed capital formation and 9.1% of the gross domestic product (GDP) of the country in 2014 (Chart 2.4). This figure includes expenses with works carried out by construction companies, which totaled almost R\$ 387 billion, and the self-built works

and renovations, amounting to R\$ 73 billion. Meaning that, in 2014, the amount invested in the country on highways, airports, sewage networks, schools, hospitals, residential and commercial buildings, industries, maintenance and renovation works totaled almost R\$ 2,300 per inhabitant.

Estimates show that these expenses were also accountable for an added value of R\$ 367.3 billion, or 7.3% of the Brazilian³ gross domestic product (GDP)³. On the other hand, labor compensation in the entire construction chain achieved R\$ 163.4 billion, or 44.5% of income generated. The surplus of gross operations, including labor compensation for self-building and taxes levied on income, was R\$ 203.8 billion.

In relation to employment, the construction chain activities employed 11.3 million people in the entire country, where 77.8% of this number was in works. The materials, machinery and equipment industry accounted for 5.9% of labor, where trade and services accounted for 16.2%.

In 2014, the largest portion of the production chain—61.0% or R\$ 224 billion—was generated in the construction industry, not only including construction companies' production

³ To market prices

who execute the works or engineering works stages, but also self-managing, self-building and renovations. Of that total, 83.7% was related to construction company activities and 16.3% to revenues generated by the self-managing, self-building and renovation segment.

The materials, machinery and equipment for construction industry is the second sector that added most value to the chain: A total of R\$ 53.4 billion or 14.5% of the chain GDP, employing 672,300 people. The sale of construction materials—represented by wholesalers and retailers—employed 1.17 million people in 2014 an added value of approximately R\$ 45 billion—12.2% of the total added in the sector.

Services activities include development, purchase and sale of real estate, machinery and equipment rental and professional technical services, such as engineering and architecture projects. These activities generated R\$ 44.9 billion in 2014, or 12.2% of the chain's GDP, accountable for 5.9% of employment, approximately 665,000 people (Chart 2.5, Tables 2.1 and 2.2).



Chart 2.4. – Investment in construction (BRL millions), and share (%) in the Brazilian gross domestic product (GDP). Source: IBGE. *Estimate and **outlook: Ex Ante Consultoria Econômica.

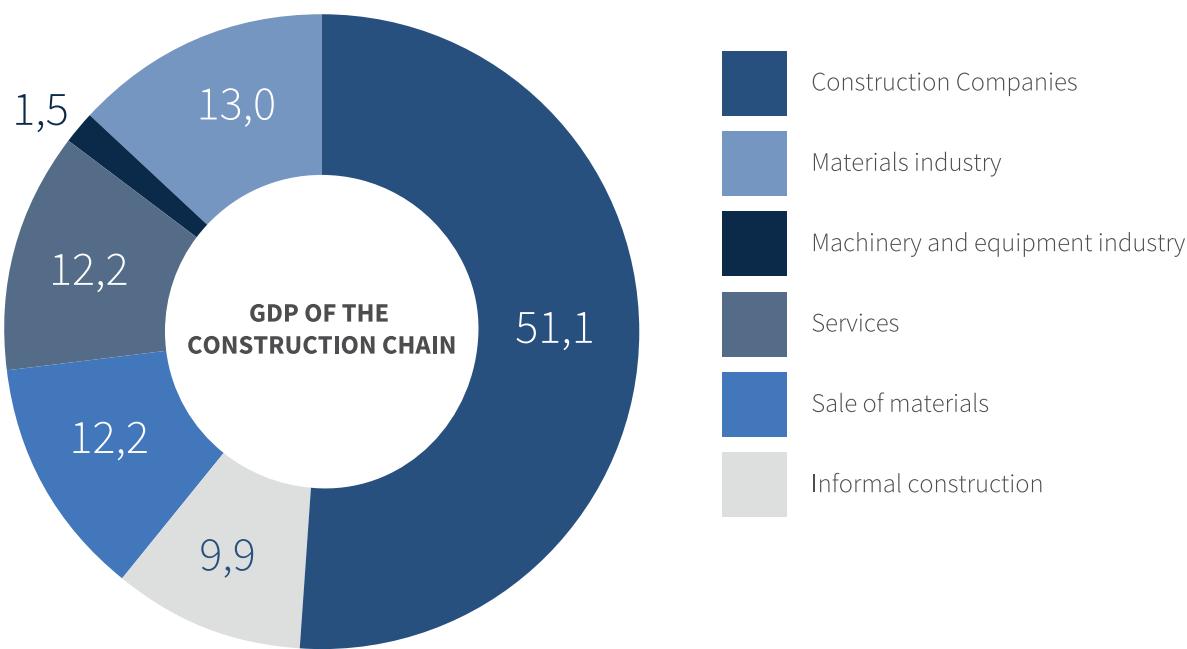


Chart 2.5 – Gross domestic product (GDP) of the construction chain: share (%) of the sectors in 2014.
Source: Ex Ante Consultoria Econômica (estimate).

Table 2.1 – Production, income and employment in the construction chain (2014) (BRL millions)

Variable	Production links									Total of chain (A+B+C)
	Industry (A)			Civil Construction (B)			Trade and services (C)			
	Machinery and Equipment	Materials	subtotal	Construction Companies	Informal	Subtotal	Sale of materials	Services*	Subtotal	
Added Value, GDP	5.610,17	47.792,92	53.403,08	187.659,14	36.473,13	224.132,27	44.780,69	44.943,71	89.724,41	367.259,76
Intermediary consumption	14.732,83	102.740,65	117.473,47	180.576,96	36.666,83	217.243,79	120.748,53	14.831,88	135.580,41	470.297,67
Production total	20.343,00	150.533,56	170.876,56	368.236,11	73.139,95	441.376,06	165.529,22	61.097,25	226.626,47	838.879,09
Individuals occupied	68.557	603.739	672.297	2.925.508	5.871.363	8.796.871	1.169.946	665.078	1.835.024	11.304.191

Source: Ex Ante Consultoria Econômica (estimate). *Engineering, architecture and services that support construction.

Table 2.2 – Production, income and employment in the construction chain (2014) (%)

Variable	Production links									Total of chain (A+B+C)
	Industry (A)			Civil Construction (B)			Trade and services (C)			
	Machinery and Equipment	Materials	subtotal	Construction Companies	Informal	Subtotal	Sale of materials	Services*	Subtotal	
Added Value, GDP	1,5	13,0	14,5	51,1	9,9	61,0	12,2	12,2	24,4	100,0
Intermediary consumption	3,1	21,8	25,0	38,4	7,8	46,2	25,7	3,2	28,8	100,0
Production total	2,4	17,9	20,4	43,9	8,7	52,6	19,7	7,3	27,0	100,0
Work factor (occupations)	0,6	5,3	5,9	25,9	51,9	77,8	10,3	5,9	16,2	100,0

Source: Ex Ante Consultoria Econômica (estimate). *Engineering, architecture and services that support construction.

Materials, machinery and equipment industry

The materials, machinery and equipment industry for construction is detailed in Tables 2.3 and 2.4, which provide production amount estimates, intermediary consumption, added value and employed people for each segment in 2014 and the actual variation between 2007 and 2014⁴. According to these estimates, the ceramic products, cement and concrete artifacts, cement and fiber cement segments accounted for the highest chunks of the amount added by the materials industry in 2014. In terms of actual GDP growth, between 2007 and 2014, four sectors deserve special mention: cement (13.9% per year), paints and varnishes (12.6% per year), rock and sand extraction (12.3% per year) and concrete artifacts, cement and fiber cement (9.0% per year).

Table 2.3 – Production, income and employment in the materials, machinery and equipment industry in 2014 (BRL millions)

Industry	Production total	Intermediary consumption	Added Value	Individuals Occupied	Productivity
Extraction of rocks, sand and clay	8.209	4.448	3.761	43.914	85.650
Wood breakdown	612	372	240	5.434	44.195
Wood products production, cork	4.107	2.581	1.526	24.857	61.392
Paint, varnish, enamel, lacquer and related products manufacturing	7.896	5.466	2.430	14.878	163.341
Plastic material production	8.991	6.884	2.107	45.075	46.741
Glass and glass products production	2.764	1.883	881	11.492	76.667
Cement production	21.279	13.791	7.488	26.205	285.759
Concrete, cement, fiber cement, gypsum and plaster manufacturing	16.262	12.017	4.244	82.750	51.291
Ceramic products manufacturing	13.619	8.690	4.929	122.492	40.236
Stone tumbling and lime production and other non-metallic mineral products	7.133	4.520	2.613	29.220	89.419
Pig iron and ferroalloy production	3.409	2.012	1.397	5.848	238.812
Steelmaking	16.116	11.874	4.242	18.847	225.091
Tube manufacturing – except for steel mills	3.133	2.382	751	8.728	85.997
Non-ferrous metal metallurgy	5.427	4.319	1.108	6.019	184.079
Metallic structures manufacturing and heavy boiler works	11.561	7.020	4.541	94.346	48.132
Tanks, boilers and metal reservoir manufacturing	480	319	161	2.577	62.468
Diverse metal products manufacturing	807	599	208	3.082	67.547
Electric power distribution and control equipment manufacturing	15.718	11.523	4.195	44.347	94.600
Lightbulb and other lighting equipment manufacturing	786	440	345	4.356	79.317
Engine, pumps, compressors and transmission equipment manufacturing	2.224	1.599	625	9.272	67.423
Construction material Industry	150.534	102.741	47.793	603.739	79.162
Cutting, sawing and manual tools manufacturing	2.085	1.251	834	12.894	64.716
Machinery and equipment for general use manufacturing	7.306	5.072	2.234	31.867	70.106
Machinery and equipment used in mineral extraction and construction manufacturing	10.952	8.410	2.542	23.796	106.810
Machinery and equipment Industry	20.343	14.733	5.610	68.557	81.832
Total	170.877	117.473	53.403	672.297	79.434

Source: Ex Ante Consultoria Econômica (estimate).

4 Considering the annual inflation at 5,82%, measured by IPCA.

Table 2.4 – Production, income and occupation in the materials, machinery and equipment industry in 2014, BRL millions (actual variation* 2007-2014)

Industry	Production total	Intermediary consumption	Added Value	Individuals Occupied	Productivity
Extraction of rocks, sand and clay	8,4%	5,7%	12,3%	7,2%	4,8%
Wood breakdown	-7,8%	-9,1%	-5,6%	-6,9%	1,5%
Wood products production, cork	-6,1%	-7,1%	-4,2%	-6,8%	2,8%
Paint, varnish, enamel, lacquer and related products manufacturing	8,0%	6,4%	12,6%	7,5%	4,8%
Plastic material production	6,3%	6,7%	5,2%	8,5%	-3,0%
Glass and glass products production	2,0%	3,5%	-0,8%	5,0%	-5,5%
Cement production	7,1%	4,5%	13,9%	5,4%	8,0%
Concrete, cement, fiber cement, gypsum and plaster manufacturing	9,4%	9,6%	9,0%	9,5%	-0,4%
Ceramic products manufacturing	2,6%	2,4%	3,0%	3,5%	-0,6%
Stone tumbling and lime manufacturing and other non-metallic mineral products	2,2%	2,0%	2,7%	4,5%	-1,7%
Pig iron and ferroalloy production	-3,2%	-5,4%	0,8%	-1,6%	2,5%
Steelmaking	-0,5%	1,2%	-4,4%	4,2%	-8,3%
Tube manufacturing – except for steel mills	-4,1%	-4,1%	-4,0%	2,9%	-6,7%
Non-ferrous metal metallurgy	-2,3%	-1,2%	-5,9%	-0,8%	-5,2%
Metallic structures and heavy boiler works manufacturing	2,9%	1,9%	4,6%	7,0%	-2,2%
Tanks, boilers and metal reservoir manufacturing	-3,3%	-3,1%	-3,6%	2,8%	-6,2%
Diverse metal products manufacturing	4,2%	4,2%	4,2%	5,8%	-1,5%
Electric power distribution and control equipment manufacturing	2,6%	1,8%	5,2%	3,3%	1,8%
Lightbulb and other lighting equipment manufacturing	-9,3%	-11,0%	-6,5%	-6,3%	-0,2%
Engine, pumps, compressors and transmission equipment manufacturing	-0,7%	-0,2%	-1,9%	3,2%	-5,0%
Construction material Industry	2,9%	2,4%	3,8%	4,4%	-0,6%
Cutting, sawing and manual tools manufacturing	4,1%	4,5%	3,6%	7,7%	-3,8%
Machinery and equipment for general use manufacturing	2,6%	2,7%	2,3%	7,6%	-5,0%
Machinery and equipment used in mineral extraction and construction manufacturing	0,8%	0,9%	0,4%	0,2%	0,2%
Machinery and equipment Industry	1,7%	1,8%	1,6%	4,6%	-2,9%
Total	2,7%	2,4%	3,5%	4,5%	-0,9%

Source: Ex Ante Consultoria Econômica.

Twelve sectors on the spotlight





Rock and sand extraction

The rock and sand extraction industry should achieve R\$ 3.8 billion in 2014. Thus, the nominal GDP growth for the sector should reach 18.8% per year between 2007 and 2014, equal to a 12.3% expansion per year in actual terms. Production amount, which consists of the product between the production volume and average price of sector goods, should be close to R\$ 8.2 billion in 2014, which corresponds to an 8.4% advance per year since 2007 in actual terms. For the 2014 average, employment in the sector should reach 44,000 job positions, over two-fold compared to 2007. GDP per sector worker should be R\$ 85,700 in 2014, showing an actual growth in work productivity of 4.8% per year since 2007.



Cement

The cement sector GDP should be R\$ 7.5 billion in 2014, with a nominal increase of 20.5% per year between 2007 and 2014 and actual expansion of 13.9% per year. The industry alone should be accountable for 14.0% of the materials, machinery and equipment industry for construction GDP. Estimates show that production amount will reach R\$ 21.3 billion this year, resulting in actual average growth of 7.1% per year in the same period. Evolution of employed people presents a growth rate of 5.4%. The employed contingent should notably reach 26,200 for the 2014 average. The estimated GDP per worker should reach R\$ 285,800 in 2014, with an actual growth of 8.0% per year between 2007 and 2014.



Concrete artifacts, cement and fiber cement

In 2014, the GDP the concrete artifacts, cement, fiber cement, gypsum and similar materials sector should reach R\$ 4.2 billion, equal to 8.0% of the materials, machinery and equipment industry for construction GDP. Estimates show that the actual expansion of the sector GDP will be 9.0% per year from 2007 through 2014. Output should be R\$ 16.3 billion in 2014. Between 2007 and 2014, the average actual growth of the production amount should be 9.4% per year. Sector employment should reach 82,800 people on average per year, 88.5% higher than people employed in 2007, which was 44,000 people.

Ceramic products



In 2014, the Brazilian industry of ceramic products for construction GDP should be R\$ 4.9 billion. Compared to 2007, this result equals an average nominal growth of 9.0% per year. In actual terms, the value added to the ceramic products sector should reach an average expansion of 3.0% per year in this comparison. The production amount should achieve R\$ 13.6 billion this year, with an actual growth of 2.6% from 2007 to 2014. Intermediary consumption, on the other hand, had a positive expansion of 2.4% per year in actual terms, resulting on average from the hike in fuel expenses. This industry should employ 122,500 people on average this year, resulting in a GDP per worker of R\$ 40,200 in 2014.

Plastics



O PIB da indústria de material plástico para construção deve chegar a R\$ 2,1 bilhões em 2014, cerca de 4% do PIB da indústria de materiais, máquinas e equipamentos para construção. O crescimento médio anual foi de 5,2% em termos reais entre 2007 e 2014. O emprego deve superar 45,0 mil trabalhadores na média do ano, com crescimento de 8,5% ao ano desde 2007. Isso indica queda da produtividade (PIB por trabalhador) de 3,0% ao ano. O valor da produção, por sua vez, deve chegar a R\$ 9 bilhões em 2014, apontando para um crescimento médio anual de 6,3% em termos reais desde 2007.

Paint and varnishes



The GDP of paint, varnish, enamel, lacquer and products alike for construction should reach R\$ 2.4 billion in 2014. From 2007 through 2014, the average nominal GDP growth of this industry should achieve 19.2% per year, equals to an increase of 12.6% per year in actual terms. Estimates show that the production value will reach R\$ 7.9 billion in 2014, with an average actual growth of 8.0% since 2007. This industrial sector should employ 14,900 people this year, with a productivity of R\$ 163,300 per worker. Compared to 2007, the GDP per worker in this industry has increased 4.8% per year.



Steelmaking

The GDP of the steelmaking and steel products for construction industry should reach R\$ 4.2 billion in 2014. This figure is practically the same as 2007. In actual terms, however, the value added by the Brazilian steelmaking portion related to civil construction dropped at a 4.4% rate per year from 2007 through 2014. The production amount should reach R\$ 22.7 billion in 2014. The annual average growth was 5.3% from 2007 through 2014, equal to an actual drop of 0.5% per year in the period. The higher drop of the GDP compared to the production amount indicates an increase of intermediary consumption, mainly triggered by the cost of energy.



Metallic structures

O PIB da indústria brasileira de estruturas metálicas – que inclui as esquadrias metálicas e estruturas pré-fabricadas – deve alcançar R\$ 4,5 bilhões em 2014. Assim, o crescimento nominal do PIB do setor deve atingir 10,7% ao ano entre 2007 e 2014, o que equivale a uma expansão de 4,6% ao ano em termos reais, um crescimento de 2,9% ao ano desde 2007. Na média de 2014, o setor empregou 94,3 mil pessoas, um volume quase 7% maior que o nível registrado em 2007. O PIB por trabalhador no setor deve ser de R\$ 48,1 mil em 2014, indicando queda real de 2,2% ao ano em termos reais desde 2007.



Energy distribution equipment

The GDP of the energy distribution equipment for the construction industry should reach R\$ 4.2 billion in 2014, roughly 7.9% of the materials, machinery and equipment for construction industry GDP. Estimates show that the output will reach R\$ 15.7 billion this year, resulting in actual average growth of 2.6%. Evolution of employed people presents a larger growth rate at a high of 3.3%, employing 44,300 people on average per year. Estimates show that the production amount per worker will reach R\$ 94,600 in 2014, with an actual growth of 1.8% per year between 2007 and 2014.

Construction machinery and equipment



The construction machinery and equipment industry⁵ should account for a GDP of R\$ 5.6 billion in 2014. The average growth in nominal terms should be 7.5% per year since 2007, resulting in an actual increase of 1.6% per year. The production amount should achieve R\$ 20.3 billion this year, with an annual growth of 7.6% since 2007, or 1.7% per year in actual terms. Estimates show that this industry will employ approximately 68,600 workers on average this year, creating a GDP per worker close to R\$ 81,800. Labor productivity in the construction machinery and equipment industry has recorded an actual drop of 2.9% per year since 2007.

Sale of materials



The sale of construction materials should render a GDP of R\$ 44.8 billion in 2014, including wholesalers and retailers. The amount is equal to 12.2% of the Brazilian construction production chain GDP. The production amount should reach R\$ 165.5 billion in 2014. Employment in this segment of the chain should reach 1.17 million workers on average, with a productivity of R\$ 38,300 per employee. In actual terms, the value added by the construction material sales has increased at a rate of 8.5% per year from 2007 through 2014, and employment has increased at a rate of 6.5% per year.

Engineering, architecture and construction support services



The engineering and architecture and support services for construction should account for a GDP of R\$ 44.9 billion in 2014. The average growth in nominal terms should be 9.9% per year since 2007, resulting in an actual increase of 3.9% per year. The output for these sectors should reach R\$ 61.2 billion in 2014. Estimates show that the engineering, architecture and construction support services industry will employ approximately 665,000 workers on average this year, creating a GDP per worker close to R\$ 67,600. Employment in these services has recorded an increase of 6.1% per year since 2007, rendering an actual productivity decrease of 2.1% per year.

⁵ This industry is made up of three sectors: (i) cutting, sawing devices and manual tools; (ii) general use machinery and equipment, and; (iii) machinery and equipment for mineral extraction and construction.



3. Macroeconomic scenario: Brazilian economy growth potential from 2015 through 2022

The Brazilian economy has had satisfactory performance in the past twelve years, which was provided by achieving economic stability, recovering credit terms and consequently, increase in investments. Social policies played an important role in reducing extreme poverty, while at the same time have provided social mobility. In this period, investments increased systematically, family consumption and exports as well, not to mention new market openings for Brazilian products.

In 2010, after overcoming the worse part of the international financial crisis, the Brazilian economy grew 7.5%, remaining above market expectations for that year, although part of the growth results from the negative result in the previous year. The promising scenario of industrial policies and the perspective of a gradual improvement in external conditions created optimistic growth expectations for the following years. The 9th ConstruBusiness, published in 2010, outlined an average growth scenario of 5% per year, consistent with the domestic macroeconomic terms in force and global expansion at 2.1% per year in the following ten years.

Nevertheless, the medium and long-term perspectives for the Brazilian economy have gradually changed, leaving a very bullish scenario concerning growth potential and heading towards a more conservative outlook. The 10th ConstruBusiness, published in 2012, which already included information about what was taking place that year, adjusted the growth projections to 3.9% per year from 2012 through 2017. In 2014 and beginning of 2015, the debate about the scenario and growth potential provides disparate views, however, the majority of analysis point to effectively lower growth rates than expected years before.

In order to outline this new scenario, that supports the ConstruBusiness mid- and long-term projections, we must first analyze what happened in the Brazilian economy as from 2002, with special attention to the last four years, and assess how and to which extent these most recent happenings will affect the country's path in the upcoming years. One of the most relevant facts in the past years was the industrial crisis that began in 2012, which constricted economic growth in many sectors and made the overall economy lose momentum. We will now analyze the aforementioned and present

the path of the Brazilian economy in the past years, the recent industrial crisis and the scenario for the upcoming eight-year cycle: 2015 to 2022.

Level change

The GDP should grow approximately 3.2% per year between 2002 and 2014. That is not a high rate, however it is 40% higher than the increase ascertained between 1990 and 2003 (2.3% per year). As the demographic growth rate dropped expressively in this last quarter of century, the difference between the growth paths of these two periods had an even higher effect on what concerns the expansion of per capita income. From 2003 to 2014, the increase in the Brazilian per capita gross domestic product (GDP) will be around 2.1% per year, at a 200% higher level than ascertained from 1990 to 2002 (0.7% per year) (Chart 3.1).

The three main reasons that explain the performance of the Brazilian economy are the recovery in investments, increase of household consumption and increase in exports. Together, these three elements account for 87% of the added demand increase in the Brazilian economy from the first half of 2002 to

the same period in 2014. The first two reasons are notably the preconditions of economic stabilization and inflation control; a process that began in 1994 and was consolidated in 2004.

Gross fixed capital formation in the economy increased at a fast rate during those years. Average increase was 4.7% per year comparing the first nine months of 2014 and same period in 2002. In the same comparison, household consumption increased 3.8% per year and the external demand increased 5.8% per year. Behind each one of these movements, there are distinct changes in conditions that supported each one of these directions.

In the case of investments, the main change was credit recovery. The microeconomic reforms in the area of real estate credit—specially law no. 10.931/2004, which created the special tax regime for construction companies (*patrimônio da afetação*) and solved the issue of undisputed amount and restructuring of housing policies, which organizes funds for housing subsidies—enabling quick recovery of credit supply for housing. The number of financed units went from 193,800 in 2002, to 1.1 million in 2013. The number of subsidized⁶ housing units reached a record high in 2013, with almost 900,000 families benefited.

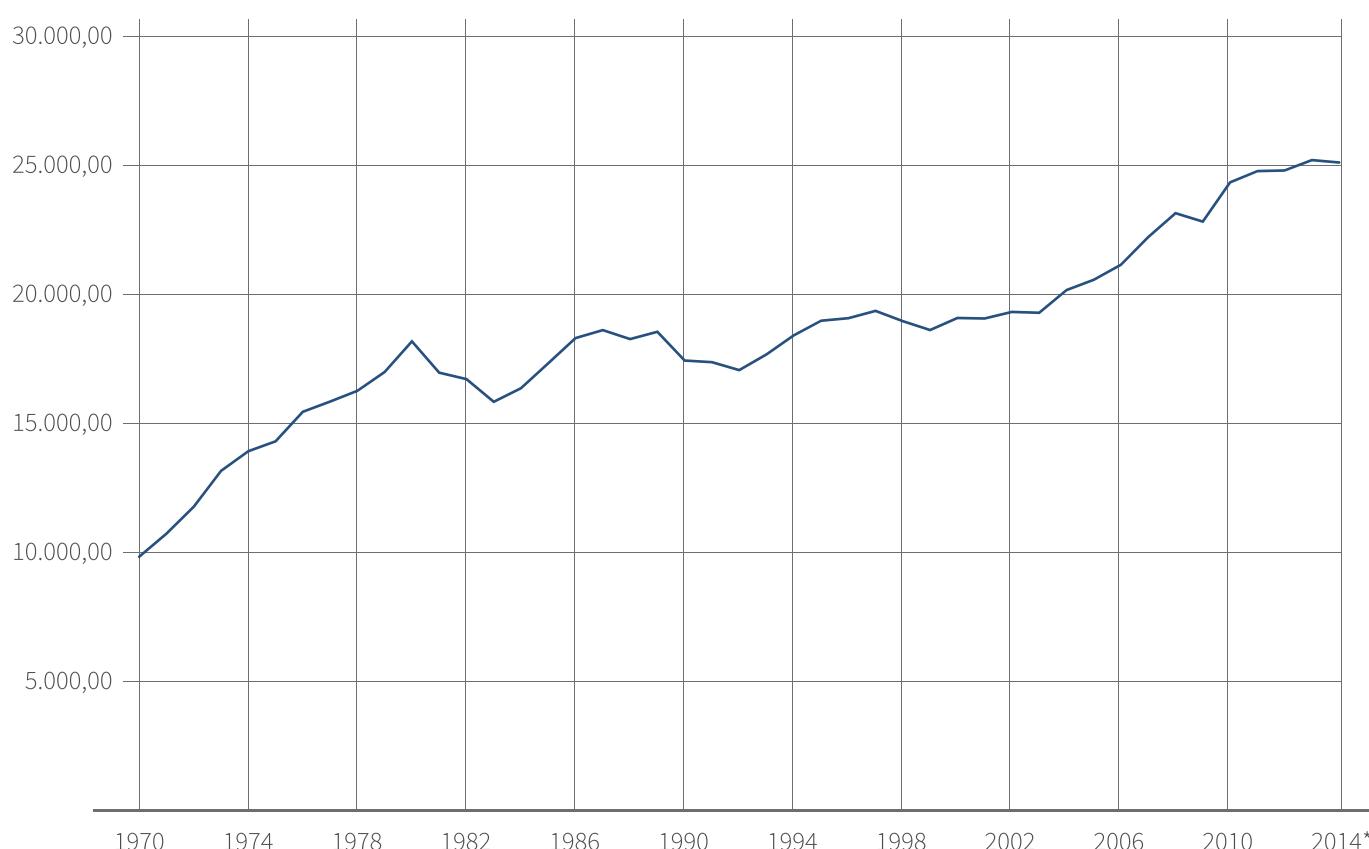


Chart 3.1 – Gross domestic product (GDP), per capita in 2014 (BRL).

Source: IBGE. Prepared by: Ex Ante Consultoria Econômica. *Outlook.

⁶ With funds from the Brazilian General Budget, from the FGTS (unemployment compensation fund for period of service) and local and state governments.

Then again, the Brazilian Economic and Social Development Bank (BNDES) received funds to extend and diversify the investments portfolio. The increase of funds came from the increase in compulsory funds levied on revenues and payroll, which increased expressively during the period. The federal government increased BNDES capital to enable it to increase its credit leverage capacity. Therefore, from 2002 to 2014, BNDES disbursements increased approximately 10% per year in actual terms.

Household consumption increase was nurtured by the job market expansion, with more jobs and increase in actual salaries, and by extending consumer credit. The continuous growth of the demand for labor was, throughout these years, reducing the unemployment rate in the country. Data from the Monthly Employment Survey from the Brazilian Institute of Geography and Statistics (IBGE), which includes the labor market evolution in the six main metropolitan regions in the country, showed strong hike in employment. The number of people employed in these regions went from 18.275 million in November 2002 to 23.383 million in November 2014, indicating an increase of over 5 million job positions.

On the other hand, the drop in unemployment promoted a salary increase in actual terms. In November 2002, 10.9% of the labor force was unemployed and in November 2014, that

rate had dropped to 4.8%. Consequently, regular compensation in the main job of these people went from R\$ 1,743.00 to R\$ 2,148.50 per month in this comparison, pointing to an actual increase of 23.3% or 1.8% per year. The bulk of paid income grew not only resulting from the increase in employment, but also because of the net increase of salaries, up to 57.7% in the November 2002 - November 2014 period—an average increase of 3.9% per year, amount very close to the household consumption growth rate (Chart 3.2).

Credit for families has also presented an expressive increase: The balance of loans to individuals was R\$ 796.2 billion in November 2014. This amount is a little over four times the balance of individual lending in November 2002, adjusted by inflation. As the credit to individuals has grown much above the Brazilian economy in these twelve years—13.0% per year compared to 3.2% per year—the debt/household income relation hit a record and surpassed 15%. This money mainly funded the purchase of durable goods (automobiles, furniture and home appliances), as well as domestic and international travel—an emerging market in that period.

The amount of exports in dollars increased 11.6% per year between 2002 and 2014, equal to a rate greater than 9% per year in actual terms. With that, the volume of external revenue surpassed US\$ 60.4 billion in 2002, to US\$ 225.1 billion

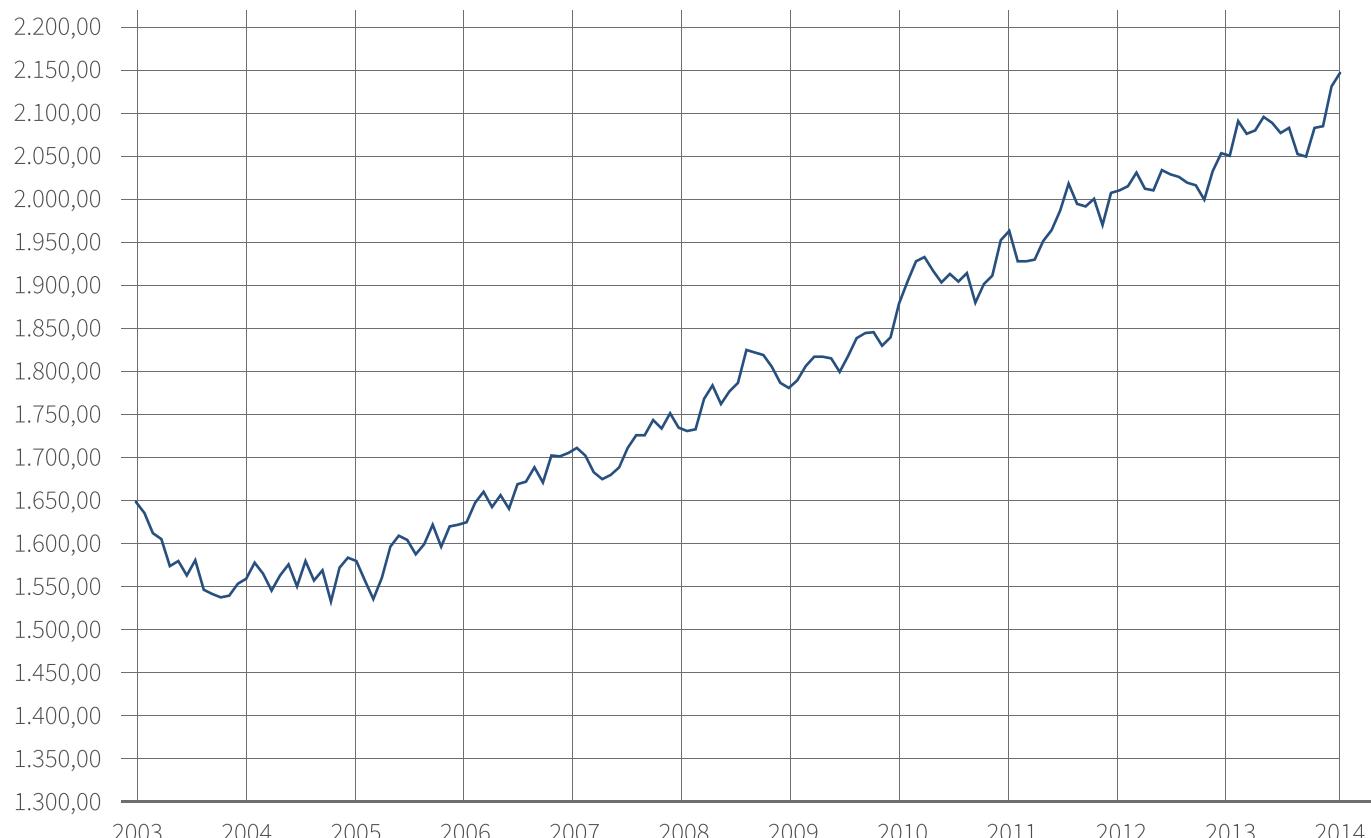


Chart 3.2 – Average monthly income of main occupation in six major metropolitan regions, in BRL, November 2014 prices.
Source: IBGE. Prepared by: Ex Ante Consultoria Econômica.

in 2014. It is worth noting that this growth took place even in an environment of an appreciated exchange rate and international crisis. The growing demand for minerals and food, as well as their international prices, were the main drivers of good performance of exporters in the country, mainly driven by China, the country with the largest economic growth in that period.

Industrial crisis

Despite Brazil's positive response to the international financial crisis in 2008, when the country decided to promote investments in construction and reduce taxes to encourage consumption, the Brazilian industry set out on a dangerous route as from 2012. The dexterous advance of imports and the continuous hike of costs has imposed considerable losses to Brazilian manufacturers with dramatic effects on output. Industrial investments, on the other hand, are undergoing strong retraction in most sectors, which worsens that state, demonstrated by the permanent losses in those segments.

From the first nine months of 2008 to the first nine months of 2014, the GDP of the Brazilian transformation industry recorded a drop in added value of -3.5%, equal to a retraction of 0.6% per year. This performance has contributed to the deflated economic growth, which was 2.2% per year in this comparison. With that, the transformation industry share in the whole of the Brazilian economy went from 12.8% in 2008 to 10.9% in 2014.

That path of the transformation industry GDP reveals a performance much beyond expected, even considering that in most of the developed economies the transformation industry has been reducing its importance systematically. Nevertheless, the decrease of importance of industry in developed economies reflects the production internationalization processes (offshoring) and outsourcing services. These processes provide productivity increases and cost reduction, increasing a company's return and propelling investment.

In Brazil's case, that did not happen. As shown in study conducted by Rangel and Freitas (2012), Brazil observed major losses in productivity and cost increase as from 1995, quickly reducing company's return. Some study data are decisive and reveal a crisis in the industry. Productivity, which is deemed as an added value per capital and work unit, dropped to a rate of 1.4% per year on average in the Brazilian transformation industry, while, for the 30 largest industrial economies, productivity increased 2.7% per year. The Chinese manufacturing industry, where the bulk of growth of Brazilian industrial product imports is coming from, had a boost in produc-

tivity of 5.2% per year. Additionally, raw material and services costs dropped at a 0.33% rate per year in that country.

Highly affecting companies' return and consequently investments. Study data shows that gross return on invested capital in the Brazilian industry was 23.9% in 1995. In 2008, that rate had already dropped to 6.9%, dropping even more in 2009, with the international crisis. In the United States manufacturing industry, benchmark in technology, logistics and production scale, the gross return on capital increased in the second half of the 2000s, achieving 40% of the invested capital in 2009.

The lack of dynamism encompasses almost all industrial sectors, with a drop in output. The IBGE Industrial Monthly Survey shows that from 2008 through 2014, the transformation industry production dropped 2.0%⁷ (Chart 3.3).

BNDES data also illustrates how this crisis is being reflected on investments. The share of the manufacturing industry in total BNDES disbursements went from an average of 47% from 2000 to 2006, to a 29% level, from 2011 to 2013. In absolute terms, while BNDES disbursements in the Brazilian economy increased at a 5.6% rate from 2010 to 2014, the transformation industry investments dropped 41.8% in that period.

⁷ November YTD variation, with seasonal adjustment.

Potential bound for 2022

The decrease in BNDES disbursements for the transformation industry as from 2010 is already an indication that the willingness to invest has dropped. The slow advance of productivity reinforces this state, indicating that the country's capacity to expand its GDP at higher average annual rates is currently reduced. It is no longer possible to expect a GDP expansion rate of 5% per year for the upcoming eight years. Still, some external and internal conditions enable the anticipation of a reasonable path of growth, with more expressive advances in some areas of the economy.

Social mobility has increased the purchasing power of a significant part of the low-income population, as they gained access to the growing market of consumer goods. On the other hand, subsidized housing programs or government guarantees increased the demand for real estate in an expressive manner in the past seven years. At low unemployment rates, even in case of a passing recession, the balanced growth of the economy will continue to pass on salary gains for families, although at slower rates than seen from 2006 through 2012. That seems clear when we see the recent trends in the growth rate: while the GDP has only increased 0.6% in the first nine months of 2014 year-over-year, family consumption increased 1.6%.

In the ConstruBusiness outlook, global economic growth is projected at 2.0% per year between 2014 and 2022. This figure is relatively lower than the historical standard, resulting from the unfolding of the international financial crisis, which maintains the economies of the European Union at a slow recovery rate. As of Brazil, in addition to the global economic conditions, there is a set of assumptions that create the outlook of the country's path bound for 2022. These assumptions include:

- Gross capital formation rate between 17.5% and 18.0% of the GDP, slightly lower level than the rate obtained between 2011 and 2014, which was 18.2% of the GDP;
- Working income growth should be 3.3% per year from 2014 to 2022, a slower rate, accordingly, to figure from 2006 to 2014 which was 7.8%;
- That income evolution standard will be mirrored on family consumption increase, which should be about 3.3% per year, slightly lower than the 4.5% increase per year observed between 2006 and 2014;
- Labor productivity has increased roughly 1% per year, enabling growth with less capital formation effort;
- In this period, capital inflow should take place at a volume that guarantees funding of external deficits, with a slight exchange rate devaluation;



Chart 3.3 – Transformation industry output, with seasonal adjustment, index-based on 2012=100. Source: IBGE. Prepared by: Ex Ante Consultoria Econômica.

- Accommodating capital costs (maintaining the long-term interest rate [TJLP] at a relatively low level) and keeping the inflation rates within the goal system parameters.

The lower investment levels than the levels in the 2007 – 2014 period is a reflection of the industrial investment reduction resulting from the advance in imports and profitability reduction of industrial sectors. As the outlook does not forecast changes in the conditions that interfere in industrial investment as a whole, the least bit of willingness to invest in industrial developments will affect the country's investment level.

Table 3.1 provides a set of output, prices and foreign trade projections for the 2015-2022 period. The projected growth for the country is 2.7% per year, which will increase the Brazilian GDP from R\$ 5.1 trillion in 2014 to R\$ 6.3 trillion in 2023 – an almost 24% increase in eight years. Employment should follow that path, however growing less than the GDP as result of the increase in labor productivity. On average for the period, employment should increase 1.3% per year.

With the hike in productivity (investments and professional qualification) and cost reduction, prices should increase less from 2015 through 2022. Inflation rates are projected at 5.5% per year (consumer prices) and 5.8% (overall price increase,

including construction and wholesaler market prices). The long-term interest rate forecasted is 5.2% per year in nominal terms in the period average. The average exchange rate (BRL/USD) for the 2015-2022 period should reach R\$ 2.854.

Income growth terms, investments, price, and exchange rate evolution imply in a continuous deterioration of the country's foreign accounts. In this scenario, exports grow at a rate of 4.6% per year in actual terms and imports increase at a rate of 5.2% per year.

It is worth noting that, considering the assumptions of the scenario where the favorable improvements to maintain social programs, competitiveness and sustainability, investment in construction will leap from 9.1% share of the domestic GDP in 2014 to 9.7% in the period average from 2015 to 2022. This evolution once again illustrates the strategic importance of the sector for Brazilian growth in the upcoming years.

Tabela 3.1 – Long-term outlook of the Brazilian economy, 2015 through 2022

Indicators	History		Perspectiva		
	2007-2010	2011-2014	2015-2018	2019-2022	2015-2022
Growth					
GDP	4,6%	1,7%	2,4%	3,0%	2,7%
Population	1,1%	0,9%	0,8%	0,7%	0,7%
GDP per capita	3,5%	0,8%	1,6%	2,3%	2,0%
Investments					
Investment rate (FBKF/GDP)	17,3%	18,2%	17,5%	17,5%	17,5%
BNDES Credit (% per year)	28,3%	2,9%	3,0%	5,0%	4,0%
Interest					
Selic Rate - % per year	11,0%	9,6%	9,0%	7,0%	8,0%
Long-term interest rate (% per year)	6,2%	5,5%	5,5%	5,0%	5,2%
Labor market					
Economically active population (PIA)*	1,6%	1,3%	1,1%	0,8%	0,9%
Occupied population**	5,3%	3,6%	1,6%	1,0%	1,3%
Average salary (% per year)	3,4%	3,3%	2,0%	2,0%	2,0%
Inflation					
Consumer Price Index (IPC)	5,1%	6,3%	6,0%	5,0%	5,5%
General Price Index (IGP)	6,6%	6,8%	6,2%	5,5%	5,8%
Exchange rate					
Exchange Rate (BRL/USD)	1,885	1,982	2,750	2,958	2,854
Actual Exchange Rate (BRL/USD)	1,812	1,982	2,641	2,860	2,750
Foreign Trade					
Exports (BRL)	2,0%	3,7%	6,8%	2,5%	4,6%
Imports (BRL)	14,8%	8,3%	7,5%	3,0%	5,2%

Source: Ex Ante Consultoria Econômica

4. Urban development: Evolution of investments in housing, sanitation and urban mobility

As from the 2000s, a series of institutional changes affected the areas of investment in urban development in the country. Law no. 10.931, 2004, set forth the principles of undisputable amount and a special tax regime for construction companies, which reestablished the housing financing system by reducing credit risks for banks and for real estate investors.

The regulatory milestone of sanitation, ruled by Law no. 11.445, 2007, established the national guidelines for the sector that proposed universal access, integrity, efficiency, public health suitability and environmental protection, articulation with urban and regional development policies and transparency of actions. Established the principle that public utility services for basic sanitation must have economic and financial sustainability guaranteed upon compensation for services, which could be charged through tariffs, charges or taxes.

On the other hand, Law no 12.587, 2012, established the National Urban Mobility Policy guidelines aiming at universal and facilitated access for cities. The law set forth the general principles of urban mobility, the role of tariffs in public transportation and services regulation, established the rights for users and set forth the competencies of each branch of power.

With new laws and regulatory milestones, investments returned, giving these markets new dynamics. In a context of ongoing credit recovery, the Minha Casa Minha Vida (PMCMV) Program was launched in 2009, as part of a group of investments to mitigate the effects of the international crisis. In 2011, the program's goals were extended and by June 2014, the PMCMV had already contracted the construction of 3.5 million housing units in the entire country, with investments forecasted at R\$ 220 billion. Investments in sanitation and urban mobility also increased in the period.

Despite the extension of resources and investments in the areas, deficiencies are still major and the future demand, which is generated by demographic pressure and city growth, is humongous. Creating major challenges for the 2015 – 2022 period, implying a growing need for investments in urban development in the country.

2022 Challenges

Urban services

In the urban policy design, the analysis of demographic factors and the social and economic dynamics that condition family formation is essential to size housing and sanitation needs. The evolution of the labor market and education are additional factors that affect urban mobility. Overall, housing and urban needs result from four main processes:

- **Family dynamics:** The process where new families are created, which is influenced by the demographic profile and by society's economic evolution;
- **Housing and sanitation deficits:** the liabilities of housing resulting from not servicing the needs during the years and lack of sanitation services;
- **Urban mobility:** comprises the transportation and movement needs in cities, especially workers' and students';
- **Depreciation:** the need to replenish housing stock, sanitation framework and transportation and street infrastructure, continuously worn out from use.

Family dynamics are characterized by new family formation process. In quantitative terms, the main component of housing needs in Brazil. The rate of family formation is influenced by demographic growth, population age profile, social habits and income evolution.

Population growth results from the balance between population fertility, mortality and migratory flow. However, there are two equally important aspects to this issue: The urbanization process and evolution of the age structure. Leaving the fields and moving into the city caused an increase in the demand for housing, in addition to implying in cultural changes, including noteworthy mention to a reduction in the number of children per family. On the other hand, the population is becoming older and that has changed the configuration of housing needs. The number of families have also been favored by economic conditions, which is benefiting early start

families and postponing their decision to have children.

The need for sanitation infrastructure results from the own urbanization process, which focuses major population contingencies in relatively small spaces. Without these services, urban agglomeration causes negative externalities and environmental degradation, with direct consequences on the quality of life.

The need for commuting in urban areas results from demographic growth and work, commercial and schooling being spread out in city territory. The strong growth of the labor market, supply and demand for education at all levels provided an overall increase for the demand for transportation in Brazilian cities.

Table 4.1 – Population estimates per state

	2014	2018	2022	(%)
North	17.231.027	18.158.149	18.983.716	1,22%
Rondônia	1.748.531	1.823.741	1.890.155	0,98%
Acre	790.101	842.290	890.220	1,50%
Amazonas	3.873.743	4.124.033	4.349.811	1,46%
Roraima	496.936	530.879	562.288	1,56%
Pará	8.073.924	8.457.229	8.789.130	1,07%
Amapá	750.912	812.961	872.187	1,89%
Tocantins	1.496.880	1.567.016	1.629.925	1,07%
Northeast	56.186.190	57.576.309	58.717.795	0,55%
Maranhão	6.850.884	7.043.339	7.189.442	0,60%
Piauí	3.193.956	3.224.536	3.239.829	0,18%
Ceará	8.843.553	9.075.744	9.272.899	0,59%
Rio Grande do Norte	3.408.510	3.538.218	3.655.233	0,88%
Paraíba	3.943.885	4.050.662	4.141.161	0,61%
Pernambuco	9.278.152	9.534.634	9.759.391	0,63%
Alagoas	3.321.305	3.391.142	3.444.654	0,46%
Sergipe	2.219.574	2.309.961	2.392.601	0,94%
Bahia	15.126.371	15.408.073	15.622.585	0,40%
Southeast	85.115.623	87.521.700	89.589.414	0,64%
Minas Gerais	20.734.097	21.235.870	21.646.641	0,54%
Espírito Santo	3.885.049	4.058.079	4.215.796	1,03%
Rio de Janeiro	16.461.173	16.798.421	17.078.778	0,46%
São Paulo	44.035.304	45.429.330	46.648.199	0,72%
South	29.016.114	29.843.748	30.567.727	0,65%
Paraná	11.081.692	11.396.262	11.666.293	0,64%
Santa Catarina	6.727.148	7.090.682	7.435.729	1,26%
Rio Grande do Sul	11.207.274	11.356.804	11.465.705	0,29%
Mid-West	15.219.608	16.086.896	16.888.857	1,31%
Mato Grosso do Sul	2.619.657	2.743.142	2.853.969	1,08%
Mato Grosso	3.224.357	3.382.487	3.523.288	1,11%
Goiás	6.523.222	6.860.047	7.170.021	1,19%
Federal District	2.852.372	3.101.220	3.341.579	2,00%
Brazil	202.768.562	209.186.802	214.747.509	0,72%

Source: IBGE.

Demographic trends

Between 2000 and 2010, the Brazilian population grew at an average rate of 1.2% per year, moving from 173.4 million in 2000 to 195.5 million in 2010. In the 2010 – 2014 period, the demographic growth declined relatively to previous years, achieving a 0.92% rate per year. The forecast for the next eight years is that this rate will decrease even more. A 0.78% growth is forecasted per year from 2014 to 2018 and 0.66% per year for the 2018 – 2022 period.

With that, the population will be 214.745 million in 2022, with an average demographic expansion rate of 0.72% per year. It's worth noting that the expected growth rate decrease, in addition to the income increase and the drop in the fertility rate, will be lower than expected years ago. In the 9th ConstruBusiness publication in 2010, population forecast for 2022 was 209,380 million, with a growth of 0.66% per year. This indicates that the demographic growth rate should not drop as strongly as expected.

Table 4.1 shows the projected path for Brazilian population in the 2010 – 2022 period by the Brazilian Institute of Geography and Statistics (IBGE). The South and Southeast regions will have demographic expansion rates of approximately 0.65% per year from 2014 through 2022 and the populations of the North and Mid-West regions will increase above average, 1.22% and 1.31% per year, respectively.

The North region will have three states with a population increase of over 1.5% per year in the next eight years: Amapá, Roraima and Acre. The Federal District, due to intense migration in the past years, will hold the highest population growth rate: 2.00% per year, between 2014 and 2022. The growth forecast for the population of the state of São Paulo is the same as the national average: 0.72% per year in the 2010 – 2022 period. Piauí and Rio Grande do Sul are the states with the lowest demographic expansion projections: 0.18% per year and 0.29% per year, in that order.

Chart 4.1 shows the Brazil age pyramid for Brazil in 2010 and in 2022. Note that the distribution of Brazilian population per

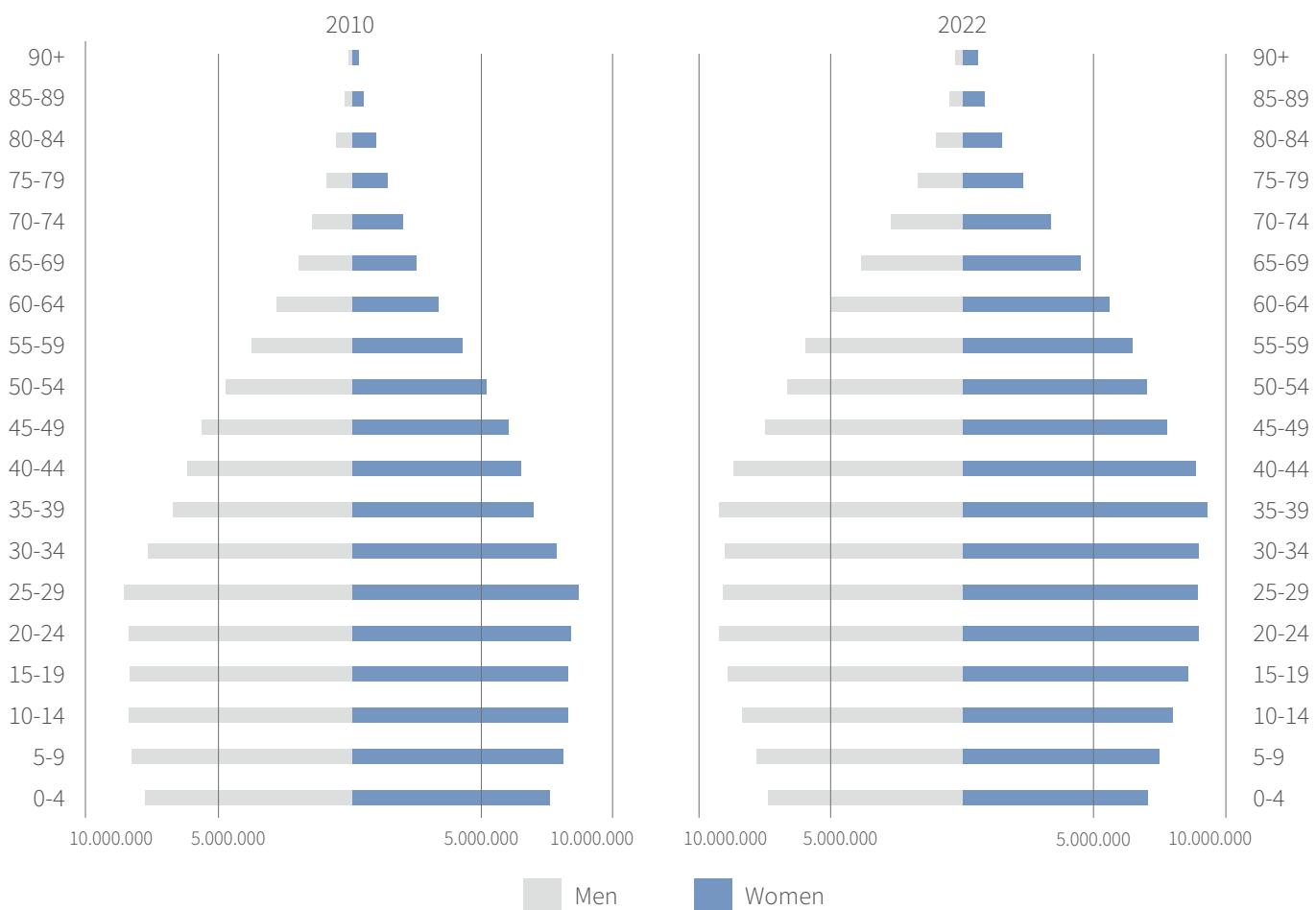


Chart 4.1 – Brazilian population age pyramid in 2010 and estimate for 2022. Source: IBGE.

age bracket will change considerably by 2022. The 2010 population was more focused on younger brackets: 45% of the population was younger than 25 years of age. The population above 26 years of age represents 55% of the total. In 2022, the population in that age group will represent 63% of the population and children and youth will reduce their participation in the population total to 37%. The change in age distribution will affect the family formation dynamics, since there will be more people in the age of building a family. The drop in the number of children in absolute terms throughout time shows that families are becoming smaller and smaller. The number of elderly, on the other hand, is getting bigger and bigger, in a population aging process (Chart 4.2).

Family building

Demographic dynamics and the moderate economic growth scenario, with the continuity of the social mobility process, even if at a slower pace, will determine and even stronger expansion of the number of families from 2014 to 2022, as shown in Table 4.2. The growth rate of number of families, from 1.57% per year, will be approximately two-fold the demographic expansion expected for the period. With that, the number of Brazilian families should go from 68.8 million to 77.9 million, jointly with education of almost 9.155 million families in eight years, or, even 1.144 million new families per year.

According to demographic trends, the South and Southeast present the lowest perspectives of family number expansion: 1.44% and 1.50% per year, respectively. In contrast, the number of families in the North and Northeast should grow 2.62% and 2.02% per year, respectively. The states in the North will have higher average family growth rates, surpassing 3% per year in Amapá. The Federal District will also have a relatively high rate, leading to the creation of 162,000 new families from

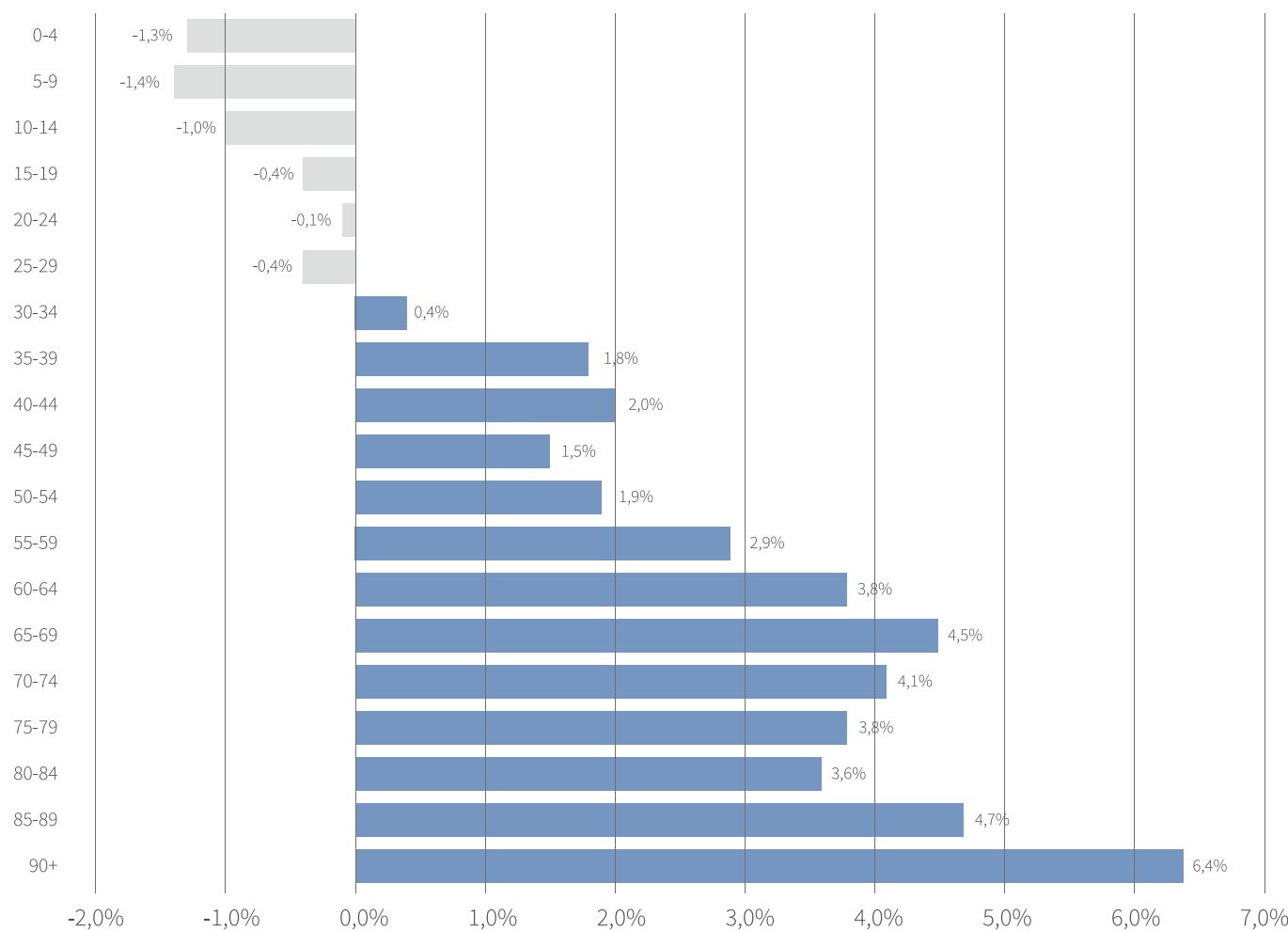


Chart 4.2 – Evolution of population per age group, 2010 through 2022, percentage (%) per year. Source: IBGE.

2014 - 2022. The number of families' growth projection for São Paulo is 1.52% per year from 2014 and 2022. Rio Grande do Sul presents the lowest family rate at 1.2% per year.

Relative growth is stronger in the North and Northeast regions, however, in absolute terms, most of the growth comes from the Southeast. Of the total of 9.155 million new families in the 2014 – 2022 period, 37.2% will be in the Southeast, meaning 3.409 million new families. São Paulo, alone, accounts for 19.2% of that increase, equal to 1.762 million new families.

In relative terms, the increase in number of families in the urban area is lower than the expected expansion in the rural area: 1.70% against 2.01% per year. However, in percentages, the new urban families will represent 83.6% of the total of new families in the country. In the North and Northeast regions the growth of the number of rural families will exceed the 2% average rate per year from 2014 – 2022.

Table 4.2 – New families per state

	2010-2014	2014-2018	2018-2022	2014-2022
North	471.745	487.313	542.844	1.030.157
Rondônia	47.061	45.272	49.390	94.662
Acre	24.143	25.793	29.006	54.799
Amazonas	102.398	107.792	121.065	228.857
Roraima	14.615	14.936	16.663	31.598
Pará	221.189	229.635	255.897	485.532
Amapá	22.781	23.686	26.831	50.517
Tocantins	39.558	40.199	43.993	84.192
Northeast	1.255.966	1.343.522	1.458.828	2.802.350
Maranhão	166.799	181.091	199.459	380.550
Piauí	67.867	74.074	80.225	154.299
Ceará	197.510	216.016	234.589	450.605
Rio Grande do Norte	75.650	81.086	87.970	169.056
Paraíba	74.375	82.979	89.093	172.072
Pernambuco	195.832	205.349	221.343	426.692
Alagoas	78.365	83.657	91.457	175.113
Sergipe	55.926	58.140	63.466	121.606
Bahia	343.641	361.130	391.226	752.356
Southeast	1.745.856	1.650.922	1.758.542	3.409.464
Minas Gerais	437.672	436.508	467.665	904.173
Espírito Santo	80.886	77.043	82.734	159.777
Rio de Janeiro	295.855	284.330	299.580	583.911
São Paulo	931.442	853.042	908.562	1.761.604
South	599.364	557.387	592.359	1.149.746
Paraná	242.277	228.152	243.507	471.660
Santa Catarina	159.640	144.086	154.005	298.091
Rio Grande do Sul	197.447	185.149	194.847	379.996
Mid-West	394.099	366.631	396.231	762.862
Mato Grosso do Sul	62.224	60.096	64.639	124.735
Mato Grosso	87.232	81.036	87.713	168.750
Goiás	159.326	147.976	159.362	307.338
Federal District	85.317	77.523	84.517	162.040
Brazil	4.467.030	4.405.775	4.748.805	9.154.580

Source: IBGE. Prepared by: Ex Ante Consultoria Econômica.

Housing deficit

Another determinant of the dwelling needs is the housing deficit, which corresponds to the liability not met in the past. The reduction of this liability, on the top of being the goal of the housing policy, represents significant gains in the social point of view, as it embraces the population with smaller purchasing power.

Table 4.3 shows the number of families part of the housing deficit according to the most commonly utilized methodology, from the João Pinheiro Foundation (FJP). In 2010, the number of families part of the housing deficit was 6.941 million. This volume corresponded to 12.1% of the existing households within the country, indicating that to normalize the housing situation in the country would require building or renovating nearly 7 million homes. The urban deficit represented 84.8% of the total housing deficit in the country.

In regional terms, one will note that the deficit is relatively greater in the North and Northeast, with rates of 20.7% and 14.1% of the total number of households, respectively.

Table 4.3 Housing deficit by area and by state in 2010

	Urban	Rural	Total	Relative (%)
North	585.725	237.717	823.442	20,7%
Rondônia	50.249	8.510	58.759	12,8%
Acre	23.934	10.120	34.054	17,9%
Amazonas	153.120	40.790	193.910	24,3%
Roraima	15.828	9.409	25.237	21,8%
Pará	263.474	147.325	410.799	22,1%
Amapá	32.019	3.400	35.419	22,7%
Tocantins	47.101	18.164	65.264	16,4%
Northeast	1.532.184	579.333	2.111.517	14,1%
Maranhão	226.847	224.868	451.715	27,3%
Piauí	78.098	50.940	129.038	15,2%
Ceará	221.099	55.186	276.284	11,7%
Rio Grande do Norte	93.483	18.055	111.538	12,4%
Paraíba	101.214	19.527	120.741	11,2%
Pernambuco	264.026	38.350	302.377	11,9%
Alagoas	100.434	23.628	124.063	14,7%
Sergipe	58.112	16.275	74.387	12,6%
Bahia	388.870	132.503	521.374	12,7%
Southeast	2.576.502	97.925	2.674.428	10,6%
Minas Gerais	507.756	49.615	557.371	9,2%
Espírito Santo	87.140	8.751	95.892	9,7%
Rio de Janeiro	517.311	8.311	525.622	9,8%
São Paulo	1.464.295	31.248	1.495.542	11,7%
South	685.111	85.639	770.749	8,7%
Paraná	253.589	33.877	287.466	8,7%
Santa Catarina	160.760	19.003	179.763	9,0%
Rio Grande do Sul	270.762	32.758	303.521	8,4%
Mid-West	506.006	54.549	560.555	12,9%
Mato Grosso do Sul	71.373	14.636	86.009	11,3%
Mato Grosso	97.865	21.024	118.889	13,0%
Goiás	213.200	16.288	229.488	12,2%
Federal District	123.568	2.601	126.169	16,3%
Brazil	5.885.528	1.055.163	6.940.691	12,1%

Source: Fundação João Pinheiro.

The states with the most precarious situation were Maranhão, Amazonas, Amapá and Pará. In absolute terms, however, the deficit was concentrated in the Southeast, with 38.5% of the total - or 2.674 million homes. The housing deficit in São Paulo, the richest state of the country, represented 21.5% of the total deficit (Table 4.4).

Families living in precarious dwellings totaled 1.343 million in 2010, that is, 19.4% of the total deficit. According to estimates of the João Pinheiro Foundation, these families were concentrated in the lower income groups: 89.8% had a monthly family income of less than 3 minimum wage salaries. Cohabitation accounted for the largest portion of the deficit: 43.1% of the total. In this case, the portion concentrated in the low-income population was significantly smaller (only 41.6%).

Excessive burden with rent still represented a great portion of the housing deficit: 30.6%. This component is concentrated, by the very definition of the João Pinheiro Foundation, in urban areas and comprises the population that allocates more than 30% of their household income to the payment of

rent. Furthermore, the excessive density encompasses urban families renting homes where more than three people sleep in each room.

Table 4.4 - Housing deficit by component and by state in 2010

	Precarious	Cohabitation	Excessive burden on rent	Excessive densification	Total
North	303.261	352.601	121.893	45.687	823.442
Rondônia	17.543	22.362	15.138	3.716	58.759
Acre	14.900	12.740	4.792	1.622	34.054
Amazonas	51.082	98.252	31.102	13.474	193.910
Roraima	11.581	7.837	4.124	1.696	25.237
Pará	175.206	168.813	47.198	19.582	410.799
Amapá	7.662	20.396	5.124	2.236	35.419
Tocantins	25.287	22.200	14.416	3.360	65.264
Northeast	603.000	923.984	479.541	104.992	2.111.517
Maranhão	277.341	132.616	31.899	9.859	451.715
Piauí	62.456	51.033	11.960	3.590	129.038
Ceará	46.028	125.745	79.478	25.033	276.284
Rio Grande do Norte	10.900	59.296	34.002	7.340	111.538
Paraíba	15.535	59.983	37.991	7.232	120.741
Pernambuco	36.254	147.365	99.235	19.523	302.377
Alagoas	21.238	58.804	36.040	7.980	124.063
Sergipe	11.832	34.195	24.250	4.111	74.387
Bahia	121.417	254.947	124.687	20.323	521.374
Southeast	175.238	1.165.196	1.067.265	266.729	2.674.428
Minas Gerais	41.075	271.652	215.986	28.658	557.371
Espírito Santo	10.482	39.105	40.540	5.765	95.892
Rio de Janeiro	24.776	208.219	240.937	51.690	525.622
São Paulo	98.905	646.219	569.802	180.616	1.495.542
South	172.822	309.276	259.799	28.853	770.749
Paraná	66.677	108.583	98.470	13.736	287.466
Santa Catarina	31.532	76.458	65.551	6.222	179.763
Rio Grande do Sul	74.613	124.235	95.777	8.895	303.521
Mid-West	89.114	240.255	195.906	35.279	560.555
Mato Grosso do Sul	22.549	32.125	26.027	5.308	86.009
Mato Grosso	31.215	48.031	32.309	7.334	118.889
Goiás	25.337	103.385	86.912	13.854	229.488
Federal District	10.013	56.715	50.659	8.782	126.169
Brazil	1.343.435	2.991.313	2.124.404	481.539	6.940.691

Source: Fundação João Pinheiro.

Sanitation deficit

The relative backwardness of sanitation in Brazil is an historic problem. In 1950, only one in every three homes was connected to the main sewage collection network or rainwater collection network. This means that only one third of the population had the sewage removed from their place of residence. From the sewage collected, less than 5% received any type of treatment before reaching the environment.

In recent decades, the situation has improved, but the pace of growth was very slow and the challenges are huge. In 2012, the number of households connected to the main sewage collection or rainwater collection networks reached 28.9 million and the homes with treated water reached 50.4 million, according to data from the National Information System on Water, Sanitation and Solid Waste (SNIS). However, the sanitation deficit in Brazil totaled 13.4 million homes without access to clean water and 34.8 million without access to sewage collection in that same year. Yet, only 39% of the water utilized in homes received treatment prior to its discharge to the environment (Table 4.5).

Between 2010 and 2012, data from the National Information System on Water, Sanitation and Solid Waste (SNIS) point to an average investment in sanitation of R\$ 7,662 billion a year by public and private companies. Already between 2013 and 2014, the utilization of the FGTS in sanitation indicate above average amounts in recent years, but still remained below R\$ 10 billion per year. Considering the period from 2010 to 2014, the average is about R\$ 8.6 billion a year - an amount lower than the needs of R\$ 13.7 billion in investments per year, published on the 9th ConstruBusiness, in 2010.

Urban mobility

Considering the nine major metropolitan regions, statistics from the National Association of Urban Transportation Companies (NTU) indicate that between October 2003 and October 2013, there was an increase of 1% per year in volume of passengers transported by bus. In terms of traveled distance, the growth was 0.9% per year. Nevertheless, the Brazilian bus fleet grew 5.8% per year between 2003 and 2013. This not

Table 4.5 - Sanitation in housing in Brazil, 2012

	Without Access		Sewage Collection	
	With Access	Without Access	With Access	Without Access
North	1.907.985	2.696.052	245.567	4.358.470
Rondônia	187.499	341.751	14.941	514.309
Acre	93.788	111.489	23.058	182.219
Amazonas	532.584	414.611	44.957	902.238
Roraima	89.247	44.195	30.853	102.589
Pará	590.871	1.562.404	58.814	2.094.461
Amapá	61.200	128.518	7.005	182.713
Tocantins	352.796	93.085	65.939	379.942
Northeast	10.989.266	5.719.478	3.286.100	13.422.644
Maranhão	761.657	1.088.183	165.434	1.684.406
Piauí	594.967	334.279	49.660	879.586
Ceará	1.814.589	772.861	652.811	1.934.639
Rio Grande do Norte	763.226	235.797	186.912	812.111
Paraíba	845.736	342.488	254.154	934.070
Pernambuco	1.851.195	977.659	446.391	2.382.463
Alagoas	524.671	421.986	96.158	850.499
Sergipe	531.644	129.970	108.606	553.008
Bahia	3.301.581	1.416.256	1.325.974	3.391.863
Southeast	25.250.131	2.635.516	20.140.861	7.744.786
Minas Gerais	5.812.502	836.221	4.485.332	2.163.391
Espírito Santo	1.036.170	195.772	492.029	739.913
Rio de Janeiro	4.544.528	1.051.622	3.023.038	2.573.112
São Paulo	13.856.931	551.901	12.140.462	2.268.370
South	8.297.467	1.433.349	3.322.920	6.407.896
Paraná	3.219.320	412.005	1.978.992	1.652.333
Santa Catarina	1.850.042	362.901	277.098	1.935.845
Rio Grande do Sul	3.228.105	658.443	1.066.830	2.819.718
Mid-West	3.919.101	925.493	1.942.356	2.902.237
Mato Grosso do Sul	685.549	190.506	220.083	655.972
Mato Grosso	624.367	376.401	136.663	864.105
Goiás	1.758.263	358.585	786.321	1.330.527
Federal District	850.922	0	799.289	51.633
Brazil	50.363.950	13.409.888	28.937.804	34.836.033

Source: SNIS, Ministério das Cidades.

only increased the available inventory of services, but also enabled the renewal of the fleet.

The fleet of cars and motorcycles, on the other hand, increased 6.4% and 12.8% per year over the same period, jamming the traffic in Brazilian cities. The historic low investments in mass transportation systems and expansion and improvement of public roads led to the loss of operational speed and to the increase on the cost of public transport, especially the urban bus. Between 2002 and 2013, according to IBGE data the cost of public transport grew 7.9% per year, compared to an inflation of 6.3% per year.

During the same period, the commute time spent between home and the workplace increased, according to data from the National Households Sample Survey

(PNAD). In 2002, 53.4% of workers in the metropolitan areas of the country took less than 30 minutes to cover the distance between their home and the workplace, while 46.5% of workers took more than 30 minutes in this same itinerary (go or return). In 2013, this ratio reversed: 46.1% of workers took less than 30 minutes between their home and the workplace, and 53.9% took more than 30 minutes. In absolute terms, from the nearly 5 million new jobs created in the metropolitan areas in this period, only 16.4% (813 thousand) took less than 30 minutes using transport to go from their home to work; 4.1 million of these new workers spent over 30 minutes (Figure 4.3).

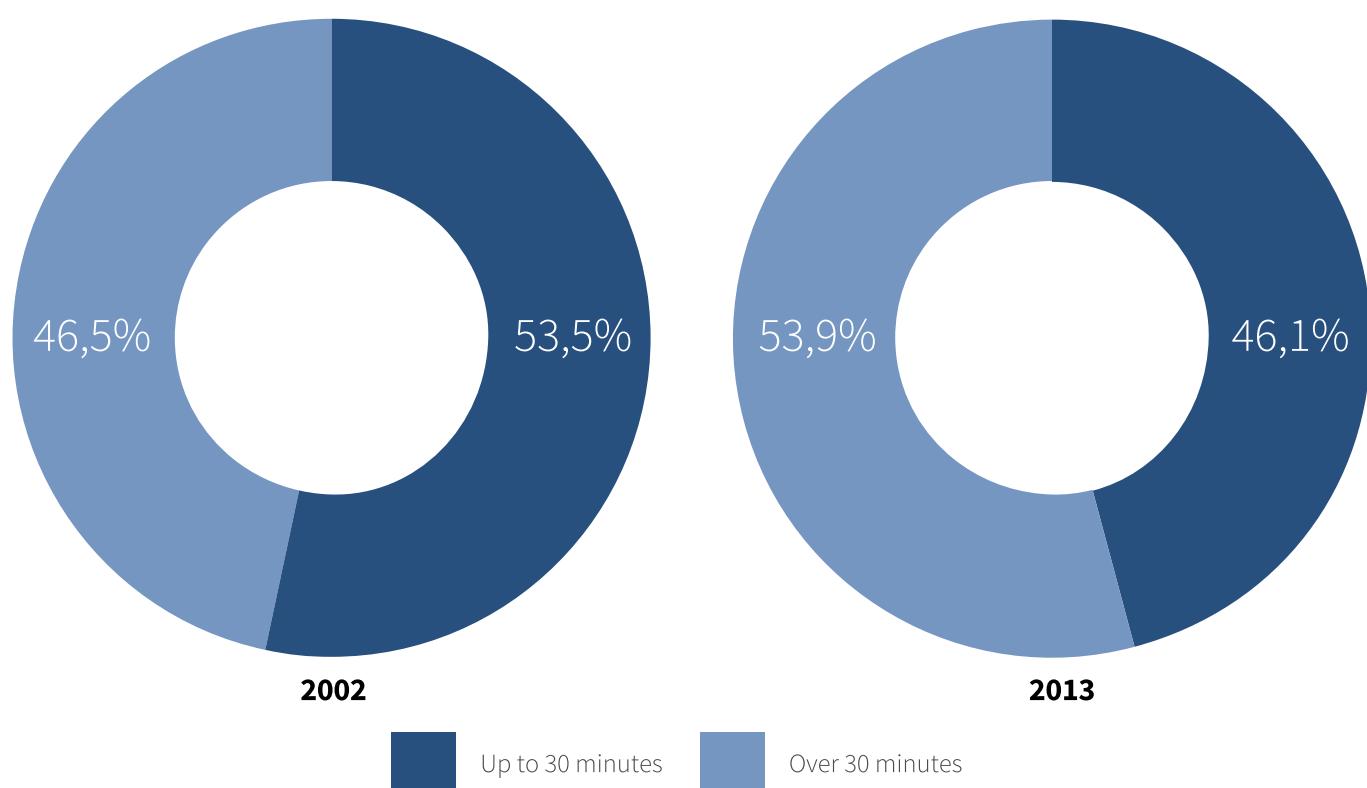


Chart 4.3 – Distribution of people by travel time between home and workplace. Source: IBGE.

Investments

New housing

The Brazilian housing policy should aim at the production of homes for new families that will be formed during the coming years and for the ones that today already face the housing deficit. This goal will meet the future housing needs while addressing the social passive of the deficit, substantially reducing it by 2022.

As seen, the rate of population growth and the economic paths of the country lead to the formation of 1.144 million new households per year on average in the 2015-2022 period. In addition, to eliminate substandard dwellings, with excessive or overly thickened burden, estimated at 3.949 million in 2010, it would require building 197,000 houses per year over the period of two decades. To this amount one can add the construction of 106,000 homes per year to eliminate the undesired cohabitation within 20 years. Table 4.6 presents these data year by year, from 2015 to 2022.

The sum of these needs - focus on new families and elimination of the deficit - provides an output of about 1.448 million homes a year. This means that to meet the housing policy goals proposed in this document requires the construction of 11.548 million homes between 2015 and 2022. This is a ma-

jor challenge, as the amount of construction equals the total numbers of homes in the three most populous states of the country in 2009: São Paulo, Minas Gerais and Rio de Janeiro.

Table 4.7 presents the effect of this policy to housing indicators. The two major consequences are (i) the reduction in the difference between the number of families and homes and (ii) the phasing out of insecurity - in 2030, all the homes would be brought to standard. In this scenario, the housing deficit of Brazilian families will be reduced from 12.1% to 4.1% in 2022.

Housing investment

The consequence of this housing policy in economic terms is the considerable increase in housing investment. The construction of new dwellings must mobilize around R\$ 201.6 billion per year on average for the period. This is a considerable advance, since the investment in new homes was less than R\$ 100 billion a year before 2010.

The value of new properties used to make the projections is R\$ 125 thousand in 2014. This amount takes into account the real estate price of varied patterns, each with a reference value. For buildings aimed at families with monthly income of up to three minimum wage salaries, the value considered is R\$ 50.5 thousand, which is used as the national average, calculated based on the PMCMV investments in 2014. As for

Table 4.6 – Needs of new housing 2015-2022

Year	New housing			Total
	To meet the new families	To eliminate precariousness *	To reduce cohabitation	
2015	1.082.799	197.469	106.220	1.386.488
2016	1.099.831	197.469	106.220	1.403.520
2017	1.117.130	197.469	106.220	1.420.819
2018	1.134.702	197.469	106.220	1.438.391
2019	1.152.550	197.469	106.220	1.456.239
2020	1.170.679	197.469	106.220	1.474.368
2021	1.189.093	197.469	106.220	1.492.782
2022	1.207.796	197.469	106.220	1.511.485
Total	9.154.580	1.579.751	849.762	11.584.093

Source: Ex Ante Consultoria Econômica. *Number that allows to eliminate precarious housing in 20 years”

Table 4.7 – Housing and demographic indicators from 2014 to 2022

Year	2014	2018	2022	% a.a.
Population	202.768.562	209.186.802	214.747.509	0,72%
Families	68.839.741	73.274.203	77.994.321	1,57%
Housing	66.273.309	71.922.528	77.857.402	2,03%
Proper Housing	63.646.025	70.515.765	77.311.617	2,46%
Housing Déficit *	5.725.934	4.511.178	3.296.421	-6,67%
Cohabitation	2.566.432	2.141.551	1.716.670	-4,90%
Precariousness	3.159.502	2.369.626	1.579.751	-8,30%
Relative Deficit	8,3%	6,16%	4,23%	-8,11%
Housing per capita	3,06	2,91	2,76	-1,29%

Source: Ex Ante Consultoria Econômica. *based on 2010 demographic census.

the properties for families with monthly income between 3 and 10 minimum wage salaries, the value is R\$ 103 thousand. For the medium-high standard properties, highly valued in the past years, it is considered an average of R\$ 500 thousand.

In the projections that follow, it is considered the process of appreciation of 3% of the properties, an increase resulting from the dynamics of investment in the real estate market. The increase in values over the years brings the average from R\$ 125 thousand in 2014 to R\$ 158.3 thousand in 2022.

Worth noting that this increase in mean values stems from

two factors: (i) valuation of real estate, a natural occurrence during the period of expansion in real estate investment and growth in family income; and (ii) social mobility, which increases the number of families in the higher classes, with demand for higher value properties, and brings down the number of families with income up to 3 minimum wage salaries.

Table 4.8 presents the values of housing investment from 2015 to 2022. The volume of investments needed to replace depreciation, that is, the amount of resources for remodeling residential properties should reach R\$ 103.9 billion on average from 2015 to 2022. This amount corresponds to 2.0%

Table 4.8 - Housing investment, in billions of reais (R \$), 2015-2022

Year	Investments		Total	PIB %
	New Housing	Reforms		
2015	173,341	90,269	263,610	5,1%
2016	180,734	93,840	274,574	5,2%
2017	188,451	97,563	286,014	5,3%
2018	196,505	101,445	297,950	5,4%
2019	204,911	105,493	310,404	5,4%
2020	213,686	109,714	323,400	5,5%
2021	222,846	114,116	336,962	5,5%
2022	232,407	118,707	351,114	5,6%
Average	201,610	103,893	305,503	5,4%

Fonte: Ex Ante Consultoria Econômica.

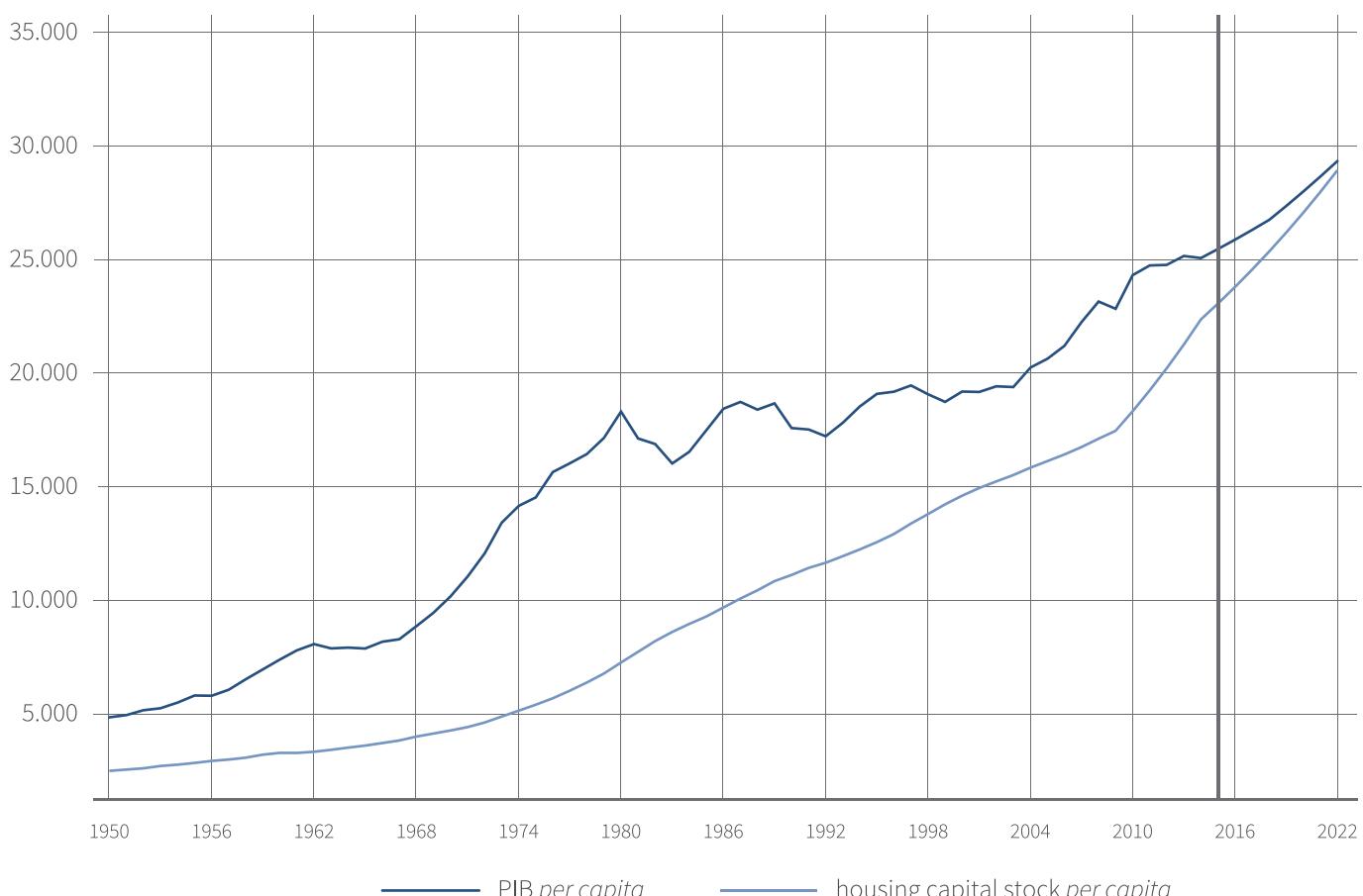


Chart 4.4 – GNP per capita.

Source: IBGE and Ex Ante Consultoria Econômica.

of the inventory of housing capital. It is important to note that the very advance of investments in new dwellings, as it expanded the inventory of real estate assets, increases the needs of investment for remodeling. Thus, to achieve the goals of the housing policy, it will be necessary investments of an average of R\$ 305.5 billion per year for the period. That equals to 5.4% of the Brazilian GDP, which is a huge challenge in terms of financing needs.

The consequence of this housing policy will be the constant accrual of real estate assets, which will increase the inventory of housing capital per capita from R\$ 22.3 thousand in 2014 to R\$ 28.8 thousand in 2022. It is worth mentioning that this process is consistent with the advancement of the Brazilian GDP per capita estimated for the period. The two variables are pre-

sented on Chart 4.4, which shows a long-term perspective of economic growth and accumulation of real estate assets.

Sanitation investment

As set out in the National Water and Sanitation Plan (Plansab), the resources required for the universal coverage of sewage collection and access to treated water in Brazil amount to R\$ 313.2 billion (based on December 2013 prices). Until 2022, investments totaled R\$ 118.7 billion, or R\$ 14.8 billion per year. Table 4.9 shows the distribution of these values in each unit of the Federation.

Table 4.9 - Investment in clean water, collection and treatment of sewage, - in BRL billions.

State	Per Year	2015-2022	(%)
North	1,425	11,400	9,6%
Rondônia	0,170	1,361	1,1%
Acre	0,051	0,406	0,3%
Amazonas	0,230	1,836	1,5%
Roraima	0,033	0,262	0,2%
Pará	0,767	6,133	5,2%
Amapá	0,067	0,538	0,5%
Tocantins	0,108	0,864	0,7%
Northeast	3,511	28,090	23,7%
Maranhão	0,509	4,068	3,4%
Piauí	0,228	1,822	1,5%
Ceará	0,558	4,463	3,8%
Rio Grande do Norte	0,177	1,415	1,2%
Paraíba	0,243	1,941	1,6%
Pernambuco	0,624	4,990	4,2%
Alagoas	0,209	1,670	1,4%
Sergipe	0,139	1,115	0,9%
Bahia	0,826	6,606	5,6%
Southeast	6,220	49,756	41,9%
Minas Gerais	1,972	15,775	13,3%
Espírito Santo	0,507	4,052	3,4%
Rio de Janeiro	2,122	16,974	14,3%
São Paulo	1,619	12,955	10,9%
South	2,365	18,921	15,9%
Paraná	0,592	4,739	4,0%
Santa Catarina	0,589	4,712	4,0%
Rio Grande do Sul	1,184	9,470	8,0%
Mid-West	1,317	10,536	8,9%
Mato Grosso do Sul	0,317	2,534	2,1%
Mato Grosso	0,362	2,898	2,4%
Goiás	0,619	4,949	4,2%
Federal District	0,019	0,154	0,1%
Brazil	14,838	118,703	100,0%

Source: Plansab, Ministério das Cidades. Prepared by: Ex Ante Consultoria Econômica.

Of these amounts, 41.9% should be done in the Southeast, where despite the relatively better living conditions, still lies the largest absolute share of the population without access to sanitation. The Northeast should receive 23.7% of these amounts, with greater weight to more populous states (Bahia and Pernambuco) or those who are in a worse relative position (Maranhão and Rio Grande do Norte). The South of Brazil requires investments of R\$ 2.365 billion, on average, to move towards universal coverage.

In addition to the investments in the expansion of access to treated water and the collection and treatment of sewage, the estimated need for investments amounts to R\$ 3.2 billion a year in macro drainage networks and collection and treatment of solid waste, which comes to an overall value of R\$ 25.6 billion between 2015 and 2022. The sanitation as a whole would have annual investments of R\$ 18 billion, or R\$ 144.3 billion in eight years.

Investment in mobility

There were improvements in the area of urban and metropolitan transport in recent years, but the needs are still growing. Investments in urban mobility focused on three major programs supported by the federal government: World Cup, Growth Acceleration Program (PAC) 2 - Mobility - Large Cities, and PAC 2 - Mobility - Medium Cities. The 45 projects for the World Cup had investments of R\$ 8.024 billion, including road works, construction of the bus rapid transit (BRT) and light rail (VLT), works in exclusive bus lanes and implementation of integrated monitoring systems (ITS, intelligent transportation system). Of the total amount, the federal government funded R\$ 4.378 billion and provided subsidies of R\$ 17.8 million; the remaining portion was spent by local governments (R\$ 3.629 billion). Most of these works, according to a survey by the National Association of Urban Transportation Companies (NTU), were completed on time or was scheduled to be completed by 2014.

The PAC Mobility encompasses 65 projects in large cities - subway, VLT, BRT, bus lanes and monorail - and 57 projects in medium-sized cities, mostly in bus lanes and BRT. Investments totaled R\$ 8.1 billion between 2011 and 2014. However, only a relatively small part of works was performed; most of the works in 2014 had preparatory action in progress, but there was still no bidding and contracting. Thus, it is estimated the investment in mobility to be around R\$ 8 billion per year between 2011 and 2014.

The package of construction works to be contracted through PAC Mobility was preliminarily budgeted at R\$ 24.4 billion,

with forecasted constructions until 2020, the equivalent to an annual value of around R\$ 4 billion. However, the needs are greater. In addition to the demographic pressure that will occur in large and medium urban centers, and increasing number of workers and students - who are the major consumers of transport services - there is a clear demand from society for qualitative improvements in the conditions of mobility. These improvements include comfort conditions and commuting time, two factors that directly affect the quality of life for users of the public transport systems. Moreover, the expansion of public transport systems and urban road network are basic conditions to improve the conditions of private transport, currently compromised by excessive traffic in cities.

Investments in mobility, due to the quantitative needs and the qualitative improvements, should involve resources of around R\$ 12 billion a year for the development of road works, construction of BRT and VLT systems, works in bus lanes, works in subway and commuter trains and implementation of integrated monitoring systems. This amount represents three times the average annual investment of the last four years, which will require additional effort from governments, especially at the federal level.

5. Economic infrastructure: expansion in the areas of transport needs, energy and telecommunications

Infrastructure importance for the economy has been discussed in several academic papers, which confirmed its positive effect on the nations' growth and economic development. Among the main studies on the subject, we cite the articles by Ferreira and Malliagros (1998), Calderón and Servén (2004), Garcia, Souza and Santana (2004) and Estache and Garsous (2012). All these papers clearly state that infrastructure expansion, continuity and diversification bring not only short- and medium-term benefits, for generating positive effects on income and employment, but mainly in the long run, due to the economy efficiency increase and product cost reduction. In such context, when infrastructure shortages are considerable, the investments in the area gain relevance and the positive effects of new infrastructure project maturation are brought to their full potential.

In the last few years, Brazil has implanted crucial institutional reforms in the infrastructure areas, which, along with the long term credit extension, allowed the sector investment expansion. Among the main measures implanted in the last twenty years, we outline: the Concession Act (nº 8.987/1995), Telecommunications Act (nº 9.472/1997), Oil Regulatory Framework (nº 9.478/1997, 12.351/2010, 12.304/2010 12.276/2010), Public-Private Partnership Act (nº 11.079/2004), National Civil Aviation Agency Act (Anac) (nº 11.182/2005) and Port Act (nº 12.815/2013).

The investments grew, but infrastructure supply in several areas is not enough yet to properly meet the country's existing demand. New infrastructure project investments are, therefore, fundamental for the Brazilian economy production increase and cost reduction, making the country suitable for an increasingly competitive global environment. It must be stressed out that the investment requirement is distinct in each segment, requiring a faster expansion in the areas which currently displays a bigger shortage. This will require that regulating, financing and environmental obstacles, which delay the project performance, are handled as priority in the next years. The role played by the sector role in such context, whether as regulator, direct investor or private initiative partner, is critical for the infrastructure sector investment recovery and expansion.

This chapter maps the infrastructure investments recently made and projects the requirements for the next eight years.

This portrait of what has been done and what must be done in the transport, power and telecommunications areas is based on surveys made by several federal government fields, in the shape of investment plans (transport) or ten-year plans (power) and through other sources, such as the National Economic and Social Development Bank (BNDES) and service provision associations.

Transportation

In the last few years, the Ministry of Transport investments in all fields have considerably increased, as shown in Graph 5.1. The annual investment average went from R\$ 7 billion, in the period from 2003 to 2009, to around R\$ 14 billion per year, between 2010 and 2014⁸. Such increase is particularly due to the road transportation investment expansion, whose annual expense average went from R\$ 5,9 billion to R\$ 11,2 billion between these two periods, and the rail system, whose average went from R\$ 700 million to R\$ 2,4 billion per year. The waterway transport investments, on the other hand, fell in such time comparison, falling from R\$ 464 million to R\$ 189 million per year.

A measure of the private sector's transport investment evolution is given by the amounts of resources disbursed by BNDES. Between 2010 and 2014 (estimate amount), the bank must disburse around R\$ 157,5 billion to the air, waterway and ground transport⁹, which corresponds to an annual average of R\$ 31,5 billion, in 2014 prices. Between 2003 and 2009, such average had reached R\$ 17,7 billion, which indicates growth by 77.9% between the periods.

As shown in Table 5.1, ground transport was the main responsible for this evolution, whose annual average in a more recent period reached R\$ 29,1 billion.

As regards the sector investment prediction, according to the evaluation made by the Ministry of Transport, in the latest ver-

8 Amounts in 2014 prices, with preliminary estimates for the last year of the statistical series.

9 This amount includes some investments in the urban mobility area – subway-train and cableway transport.

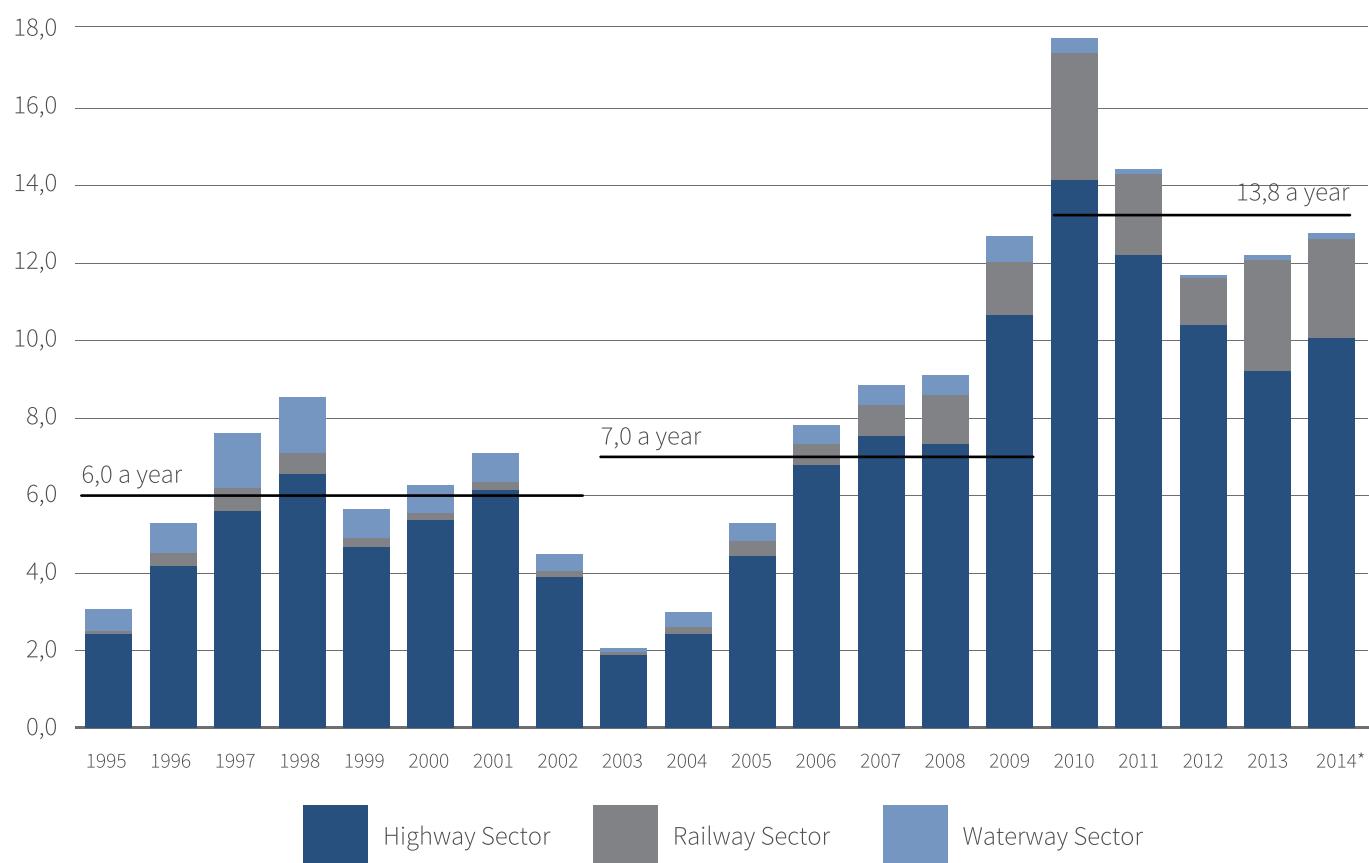


Chart 5.1 – Federal investments on transport, in billions R\$, to 2014 prices Source: Ministério dos Transportes. Prepared by: Ex Ante Consultoria Econômica. *Estimate.

sion of the National Logistics and Transport Plan, issue 2011 (PNLT 2011)¹⁰, the necessary investments to comply with the Brazilian transport infrastructure requirements account for R\$ 423,8 billion between 2012 and 2031. These investments correspond to a portfolio of 1,167 projects, which are divided into three groups: (i) priority, with larger economic viability; (ii) social-political, corresponds to the projects of lower economic viability¹¹ and not yet evaluated; and (iii) projects carried out by the federal government Acceleration Growth Program (PAC). The distribution per field of investment predicted amount is given in Table 5.2.

As detailed in PNLT, each project cost calculation was considered and the final portfolio finally obtained, including projects approved in PNLT prior versions, requests gathered by the National Transport Policy Department (SPNT) and finally projects deriving from PAC 1 and PAC 2. After acquiring such information, it is possible to discriminate the projects per field, according to their inclusion or not in PAC, as depicted by Table 5.3.

In respect with the plan schedule, the implantation of most projects of the so-called Priority Portfolio was defined as immediate as a result of its economic viability. As such, the PNLT investment schedule takes into account only the priority projects, distributed per sub-period, as depicted in Table 5.4. It is indicated that 99.6% of the investments are made by 2023, period consistent with the horizon being reviewed by the 11th Construbusiness. Investments of around R\$ 75,2 billion are, therefore, expected in transports between 2012 and 2023, which would correspond to an average of R\$ 6,3 billion per year, with the application of around 61,4% of the total amount by 2015.

Table 5.1 - Disbursements of the National Economic and Social Development Bank (BNDES) in transport, in BRL billions*

Modal	Average 2003-2009	Average 2010-2014**	Variation(%)
Aerial	0,161	0,456	182,7%
Waterway	1,016	1,922	89,3%
Terrestrial	16,532	29,124	76,2%
Total	17,709	31,503	77,9%

Source: BNDES. Prepared by: Ex Ante Consultoria Econômica. *to 2014 prices;
**2014 estimate.

10 The Target Reevaluation and Estimate Project final report was disclosed in September of 2012.

11 But whose implantation is justified due to other aspects not explicitly considered in the economic evaluation, such as amounts and interests of social-political, environmental, technologic or regional development nature.

Table 5.2 - National Plan of Logistics and Transport in 2011

Mode ou type	Quantity	Extensão (km)	Cost (R\$ million)
Road	425	50.591	129.839
Railway	101	34.008	189.967
Waterway	57	24.326	20.555
Pipeline	5	2.118	2.362
Terminals	25(a)	(b)	2.689
Harbour	353	(b)	55.904
Air Transportation	201	(b)	22.459
Total	1.167	111.043	423.774

Notes: (a) the indicated amount refers to the number of projects of terminals, each project contemplates a group of terminals in each location.

Road System

Table 5.3 - National Plan of Logistics and Transport 2011 (PNLT 2011): project costs, 2011-2031 (in millions of reais [R\$])

Mode ou type	PAC	Outside PAC	Total
Road	57.834	72.005	129.839
Railway	78.172	111.795	189.967
Waterway	2.629	17.927	20.555
Pipeline	0	2.362	2.362
Terminals	1.691	999	2.689
Harbour	1.985	53.919	55.904
Air transportation	115	22.343	22.459
Total	142.425	281.349	423.774

Source: PNLT 2011, Ministério dos Transportes. Prepared by: Ex Ante Consultoria Econômica.

Table 5.4 - National Plan of Logistics and Transport in 2011 (PNLT 2011): Priority portfolio by sub-period, from 2012 to 2031 (in millions of reais [R\$])

Deployment Period	Road	Railway	Waterway	Total
Up to 2015	23.800	17.046	5.301	46.148
2016 to 2019	2.088	9.149	–	11.237
2020 to 2023	4.591	13.208	–	17.799
2024 to 2027	193	–	–	193
After-2028	88	–	–	88
Total	30.761	39.402	5.301	75.464

Source: PNLT 2011, Ministério dos Transportes. Prepared by: Ex Ante Consultoria Econômica.

Tabela 5.5 – Plots of Investment Programme in Logistics (PIL) - Highways

Highways	State	Extension (Km)
BR-050	GO/MG	436,6
BR-262	ES/MG	375,6
BR-101	BA	772,3
BR-153 e TO-080	GO/TO	814
BR-060/153/262	DF/GO/MG	1.176,50
BR-163	MT	850,9
BR-163	MS	847,2
BR-040	MG/GO/DF	936,8
BR-116	MG	816,7

Source: EPL. Produced by: Ex Ante Consultoria Econômica.

Based on 2011 PNLT schedule, the road transport investments must exceed R\$ 30 billion by 2023, totaling 40.5% of the total investments in transport in the period. In another front, the federal government, by means of the Ministry of Transport, launched the Investment in Logistics Program (PIL), in August of 2012, covering highway and railway areas. The main program purpose is to suit the country with a transport system suitable for its size. PIL is based on an investment model that privileges the public-private sector partnership and predicts, in case of highway and railway systems, the concession agreement adoption.

According to the Ministry of Transport, PIL envisages the application of R\$ 144 billion within 30 years. The largest portion of investments, for 25 concessions predicted by the program, will be made in the first four years after environmental licensing, and such investments would be made as follows in the case of road systems:

- **Amount:** R\$ 51,6 billion for recovery, operation, maintenance, monitoring, preservation, improvement, capacity extension and service level continuity of 9 stretches of highways, totaling 7 thousand kilometers of roads.
- **Schedule:** R\$ 26,3 billion will be invested in the first five years and R\$ 25,3 billion within 25 years¹².

Afterwards, the total PIL – Roads investment amount assessed was reviewed for R\$ 46 billion, kept the concession plan of 7 thousand kilometers of highways. According to the Planning and Logistics Company (EPL) information, started up in late 2012 and linked to the Ministry of Transport, the highways belonging to the program are gathered in 9 batches (Table 5.5).

In a recent period, between 2010 and 2013, around R\$ 18,9 billion were invested by the highway concessionaires, according to information disclosed by the Brazilian Highway Concessionaire Association (ABCR). The largest portion of this investment was made by the São Paulo state concessionaires – R\$ 9,6 billion –, followed by the federal concessionaires with R\$ 6,5 billion.

¹² Upon the program launch, these amounts can still be modified since the Federal Account Court was still analyzing four batches and the studies of BR-040 and BR-116 were still being revised.

Railway

Based on the 2011 PNLT schedule, the investments destined to the railway system must reach almost R\$ 40 billion by 2023, accounting for 52,4% of the total investments predicted for transport. The investments envisaged by PIL in railway systems would take place in the following terms according to the program launch in 2012:

- Amount: R\$ 91 billion for the construction of 16 stretches, totaling 11,5 thousand kilometers of railway lines;
- Schedule: R\$ 56 billion must be invested in the first four years after the environmental licensing and R\$ 35 billion within 30 years of operation.

The total amount was then revised for R\$ 99,6 billion, with the railway system program predicting the construction and/or improvement of 11 thousand kilometers of railway lines, according to the balance submitted by EPL. Further according to the company, the railway stretches belonging to PIL – Railways are detailed in Table 5.6. In PIL scope, the model proposed for the railway field predicts the concession of

Table 5.6 - Excerpts from Investment Programme Logistics (PIL) – Railways

Railways	State
Açailândia – Porto de Vila do Conde (Barcarena)	MA/PA
Anápolis - Estrela d'Oeste - Panorama - Dourados	GO/MG/SP/MS
Lucas do Rio Verde - Campinorte - Palmas - Anápolis	MT/GO/TO
Rio de Janeiro - Campos - Vitória	ES/RJ
Feira de Santana - Suape	BA/PE
Salvador - Recife	BA/SE/AL/PE
Uruaçu - Corinto - Campos	GO/MG/RJ
São Paulo - Rio Grande	SP/PR/SC/RS
Belo Horizonte - Salvador	MG/BA
Maracaju - Eng Bley - Paranaíba	MS/PR
Ferroanel de São Paulo	SP
Feira de Santana - Parnamirim	BA/PE

Source: EPL. Produced by: Ex Ante Consultoria Econômica.

Table 5.7 - Logistics Investment Programme (LIP) - Airports: investments and deadlines

Plot	Auction Date	Airport	Planned Investments	Prazo da concessão (anos)
(R\$ billions)	Concession Term	Guarulhos	4,70	20
(years)	06/02/12	Viracopos	8,70	30
1 ^a	06/02/12	Brasília	2,80	25
Subtotal		16,20		
2 ^a	22/11/13	Galeão	5,65	25
2 ^a	22/11/13	Confins	3,50	30
Subtotal		9,15		
Total		25,35		

Source: Infraero and Valor Econômico. Prepared by: Ex Ante Consultoria Econômica.

stretches for the period of 35 years, and such concessionaires become the managers of the railway infrastructure, responsible for the infrastructure, signaling and control of train circulation.

Airway

In December of 2012, the federal government widened the PIL scope, which started including specific actions for the airport and port sectors. The airport program (PIL – Airports) has three purposes: (i) improve the service quality and airport infrastructure for the users; (ii) widen the air transport supply to the population; and (iii) rebuild the regional aviation network. From the new investment perspective, upon launch, the program predicted the concession of two major international airports – Galeão (RJ) and Confins (MG), with investments estimated in R\$ 9,2 billion – and the reconstruction and extension of 270 regional airports, with investments above R\$ 7,3 billion, in order to reinforce and restructure the Brazilian regional aviation network, expand the air transport supply and improve the infrastructure and airport service quality by means of administrative concessions. PIL – Airports also envisages the exploration induction of private commercial airports exclusively dedicated to general aviation.

The concession auction of Galeão (RJ) and Confins (MG) was conducted in November of 2013 and the winning groups took over the airport management in August of 2014. The works made in both airports which were already under public tender, contracted or in progress during the auction were carried on under Infraero responsibility. As regards Confins airport, the total estimate amount to be invested during the 30-year concession period, extendable only once for up to 5 years, is of R\$ 3,5 billion. As regards Galeão, the investment expectation is of R\$ 5,65 billion during the 25-year concession period, extendable only once for up to 5 years.

It should be reminded that the first concession batch had been auctioned in February of 2012, which included the international airports of Brasília, Guarulhos and Viracopos, in Campinas. The total investment forecast to be made during the concession period of each is of R\$ 16,2 billion. A portion of such amount has already been invested in the two first years of concession in order to meet the demand resulting from 2014 World Cup. As regards Viracopos, for instance, during the auction, the commitment to invest R\$ 873 million in the following two years had already been made (Table 5.7).¹³

¹³ It must be stressed out that, in the case of concession of Brasília, Guarulhos and Campinas airports, which were part of the first airport batch, conceded to the private initiative in 2012, and Confins and Galeão, Infraero remained with 49% of the capital stock of each concession.

In respect to the investments made by the public sector recently, in the shape of capital expenses, Infraero invested around R\$ 3,1 billion between 2010 and 2012. BNDES disbursed R\$ 2,2 billion between 2010 and 2013 for the air transport, segment which, in the classification employed by the bank, includes the passenger and cargo air transportation, in regular lines or not, and the space transport. The consulting amount in the same period, however, was quite higher, next to R\$ 10,5 billion, amount that indicates the sector resource requirement.

Waterways

The Logistics Investment Program in Ports (PIL – Ports) was also launched in December of 2012 in order to widen and retrofit the sector infrastructure and management, with investments in two fronts: (i) concessions, leasing and Private Use Terminals (TUP); and (ii) waterway and ground accesses.

In the program launch, the investment forecast in the first front was of R\$ 54,6 billion in a 5-year horizon, wherein R\$ 31,0 billion should be invested by 2014/15 and R\$ 23,2 billion should be allocated by 2016/17. The regional and per port distribution of these investments is presented in Table 5.8.

As regards the access front, the forecast was of investments of around R\$ 6,4 billion, wherein R\$ 3,8 billion in the waterway systems, inside the National Dredging Program 2, and R\$ 2,64 billion in ground systems, of which R\$ 2,204 billion in road accesses and R\$ 436 million in railway accesses. Such investments in accesses would be made within PAC level.

Table 5.8 - Logistics Investment Programme (LIP) - Harbours: investments by region and harbour in billion of reais (R \$)

Southeast				
UF	Harbours	2014/15	2016/17	
ES	Vitória	6,512	6,875	
RJ	Itaguaí/Rio de Janeiro	7,053	4,466	
SP	Santos/São Sebastião	2,944	0,805	
Subtotal		16,509	12,146	
Northeast				
UF	Harbours	2014/15	2016/17	
MA	Itaqui	2,722	1,872	
BA	Aratu/Salvador/Porto Sul/Ilhéus	1,295	2,760	
PE	Recife/Suape	1,414	0,527	
CE	Pecém	1,224	-	
PA	Cabedelo	0,107	-	
AL	Maceió	0,012	-	
Subtotal		6,774	5,159	
South				
UF	Harbours	2014/15	2016/17	
PR	Paranaguá - Antonina	1,038	3,329	
SC	Imbituba/Itajaí/São Francisco do Sul	1,343	0,781	
RS	Porto Alegre/Rio Grande	0,982	0,140	
Subtotal		3,363	4,250	
North				
UF	Harbours	2014/15	2016/17	
PA	Belém/Miramar/Outeiro/Santarém/Vila do Conde	3,137	1,505	
AM	Itacoatiara/Manaus	0,985	0,092	
AP	Macapá	0,135	-	
RO	Porto Velho	0,115	-	
Subtotal		4,372	1,597	
Total		31,018	23,152	

Source: (PIL – Portos), 2012. Produced by: Ex Ante Consultoria Econômica.

According to assessment made by the Port Department (SEP) of the Presidency of Republic, the National Waterway Transport Agency (Antaq) announced 83 port undertakings up to 2013, which totaled investments of R\$ 16,5 billion. Of such set, 19 undertakings were not qualified, without possibility of appeal lodgment. Further according to SEP assessment, between December/2013 and September /2014, 29 undertakings were qualified, to know: (i) 19 TUP, of which two expansions and one terminal capacity increase already existing; (ii) 9 cargo overflow stations (ETC); and (iii) 1 tourism port facility (IPT). Such set of undertakings account for R\$ 10,1 billion in investments¹⁴.

Energy, oil and gas

In 2014, according to the National Electric Power Agency (Aneel), the capacity installed of electric power generation in Brazil must reach 134 GW of power installed, which corresponds to an average growth of 4.7% per year between 2010 and 2014. This rate is a little higher than observed between 2003 and 2009, of 4.1% (Graph 5.2).

As regards the national oil production, this grew around 4.5% per year between 2003 and 2009, reaching an annual average of 1,69 million barrels/day, according to data of the National Agency of Oil, Natural Gas and Biofuels (ANP). However, the growth was reverted between 2010 and 2013 when the annual average rate entered the negative field, -0,5% per year. In 2014, considering the average until November, the indication is of production recovery with growth expectation higher than 10.0% upon the 2013 average, which would cause the annual growth average rate in the last 5 years (2010 to 2014) to remain in 2.1%. The recent national oil production trajectory is depicted by Graph 5.3.

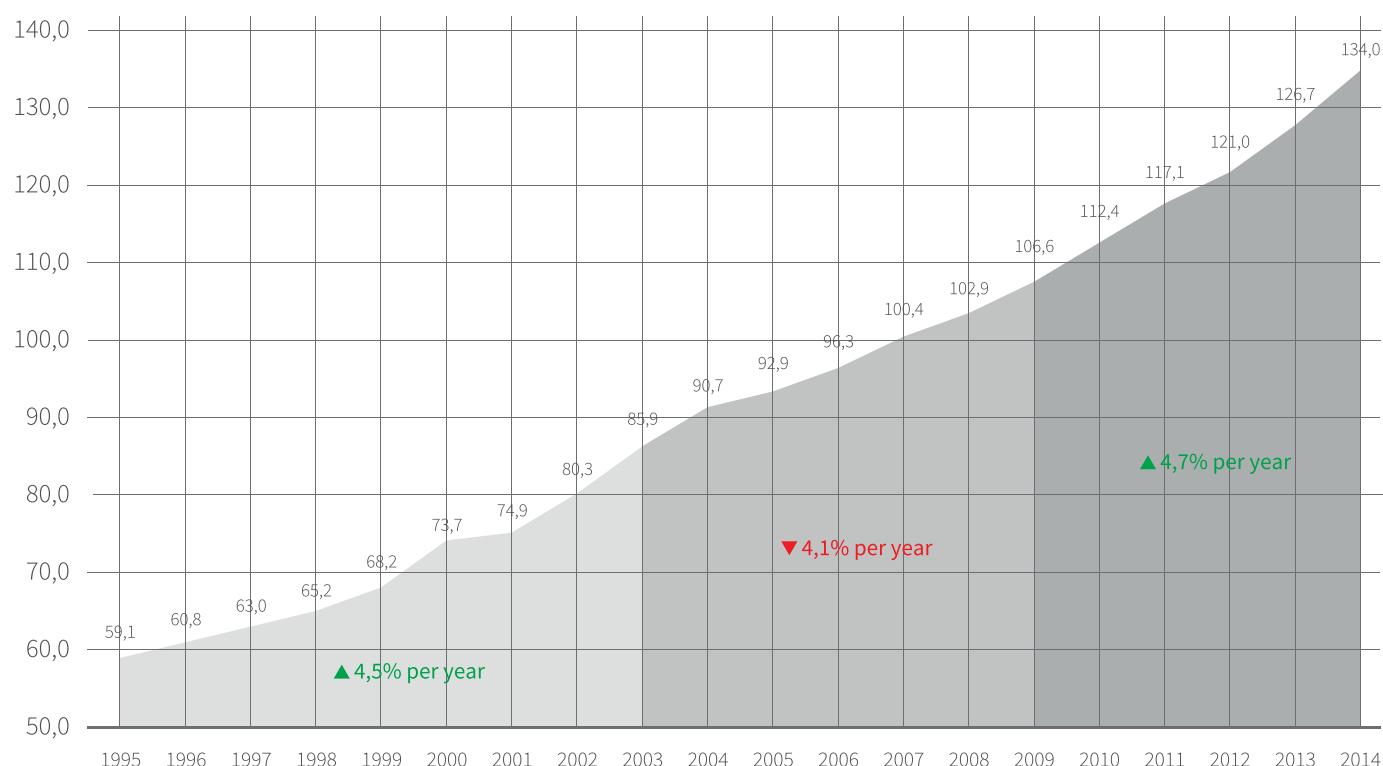


Chart 5.2 – Chart 5.2 - Installed capacity of electric power generation, in GW . Source: National Energy Balance (Base year 2013); for year 2014, Aneel. Prepared by: Ex Ante Consultoria Econômica.

14 As established by Law no. 12.815, 2013, which sets forth the direct and indirect exploration by the Federal Government of ports and port facilities and the activities carried out by the port operators, the term of the port authorization will be of up to 25 years, extendable for successive periods, provided that the port activity is maintained and the authorized party makes the investments required for port facility expansion and retrofit.

The national natural gas production, on the other hand, recorded average growth of 5.0% per year between 2003 and 2009. In the following period, 2010 to 2013, the growth went up to 7.1% per year, reaching 77,2 million of m³/day. Considering data disclosed by ANP until November, the production in 2014 must exceed 86 million m³/day, as shown by Graph 5.4.4. Therefore, the natural gas production average expansion in the country must exceed 8% per year between 2010 and 2014.

From the investment perspective in the oil and gas area, Petrobras investment data in the Exploration and Production area show an expansion trend, with level change. In 2008, a very meaningful growth was observed with later fall up to 2010. Petrobras investment recovery occurred from 2011, as shown in Graph 5.5.

According to the 2022 Ten-Year Power Expansion Plan (PDE 2022), prepared by the Ministry of Mines and Power, in 2013, and subsidized by the Power Research Company (EPE) studies, the investment amount forecast in the power sector must be of R\$ 1,15 trillion between 2013 and 2022. Table 5.9 shows the detailing per sector presented by PDE 2022. The expecta-

tion is that such investments represent an extension, in relation to 2012:

- (i) Of the electric power generation capacity installed from 121,0 GW to 183,1 GW, which would amount to an annual average growth of 4.2%, a little below, therefore, the rate recently observed;
- (ii) Of the oil production from 2,1 million barrels to 5,5 million barrel/day. Such target would amount to an annual growth of 12.3% between 2014 and 2022, rate much higher than that assessed between 2010 and 2014, of 2.1% per year;
- (iii) Of the natural gas production from 70,6 million m³/day, in 2012, to 189,1 million m³/day, in 2022. Such target amounts to an annual average growth of 10.4%, very higher than the average of 5.4% per year of national gas production between 2003 and 2011, the year before the PDE start. When the last estimate for 2014 is considered, of 86,8 million m³/day (based on data until November, according to ANP information), the average growth rate against the PDE target would change little, remaining in 10.2% per year.

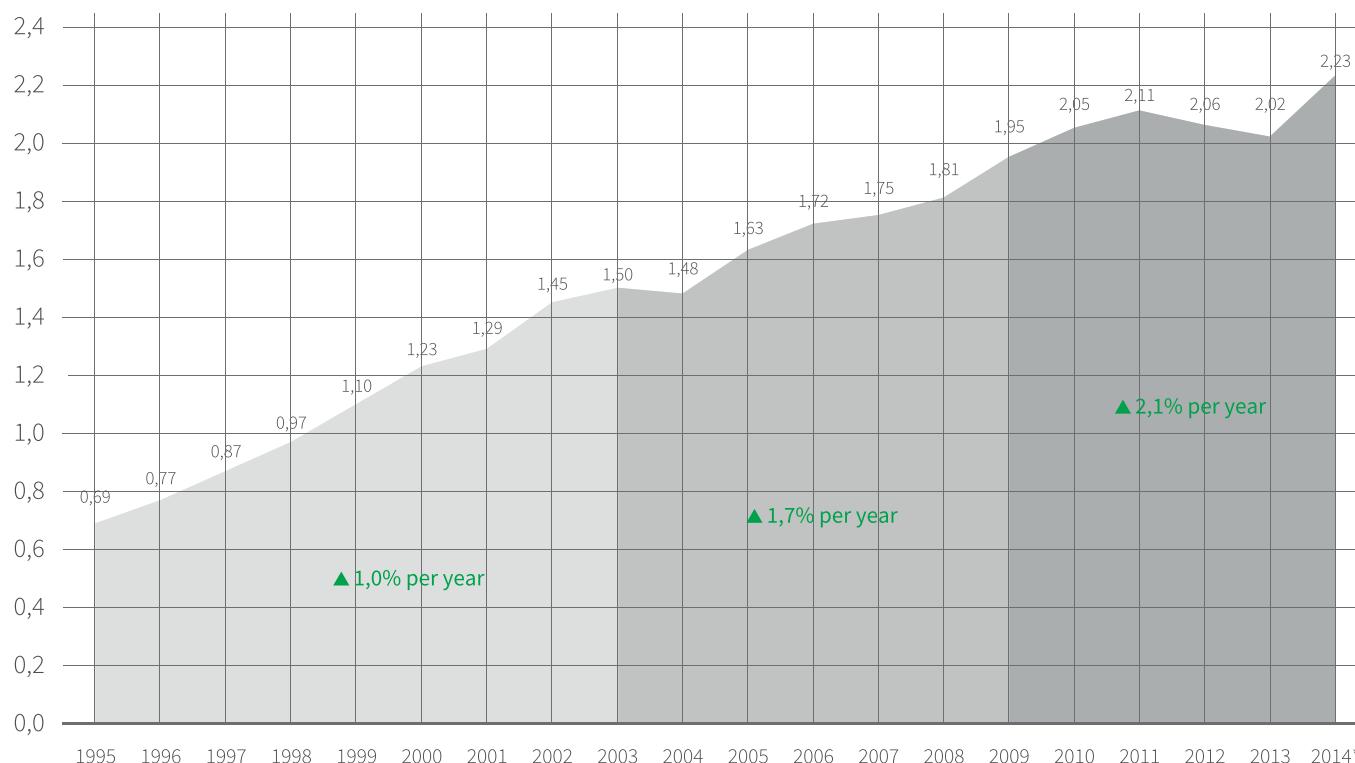


Chart 5.3 – National oil production in million barrels per day, annual and period averages. Source: ANP and EPE. *average data until November 2014. Prepared by: Ex Ante Consultoria Econômica.

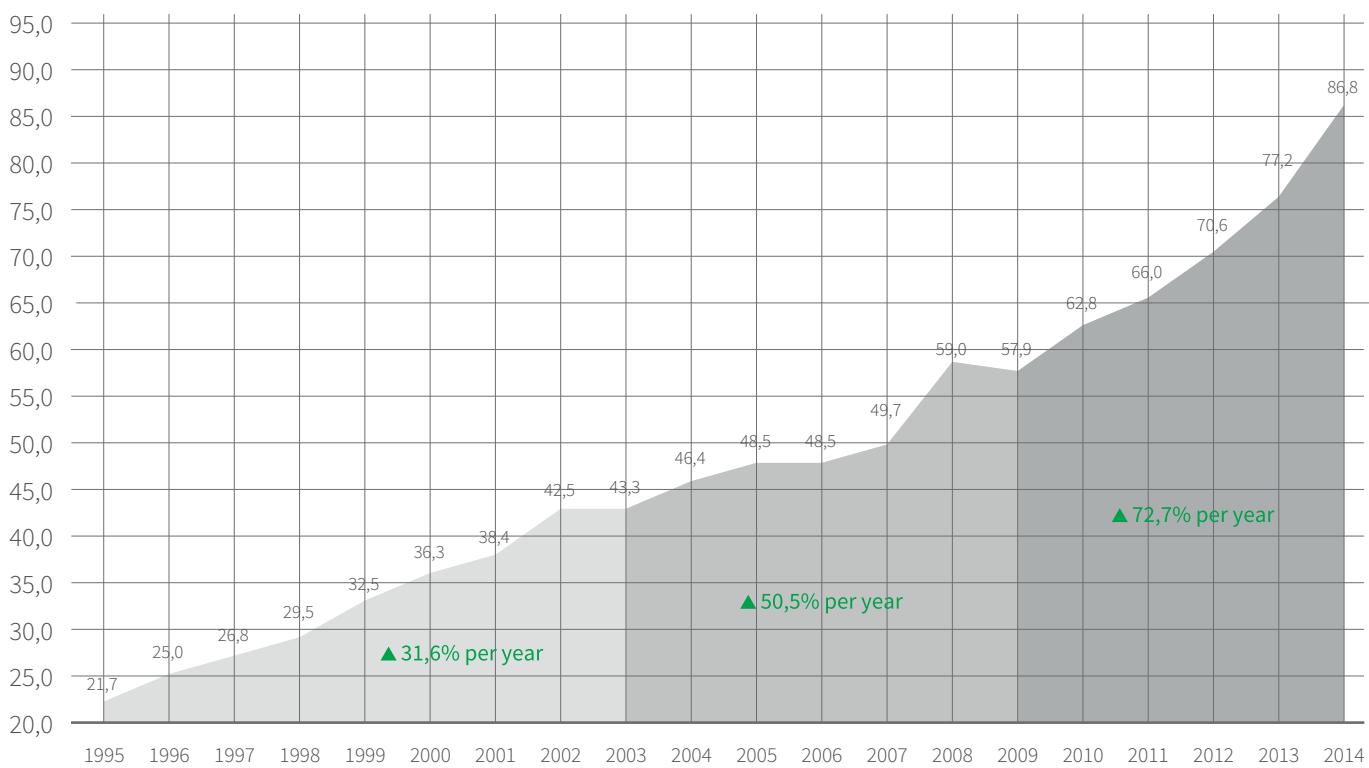


Chart 5.4 – National production of natural gas in million m³ per day, annual and average period.

Source: ANP and EPE. *Data estimate until November 2014. Prepared by: Ex Ante Consultoria Econômica.

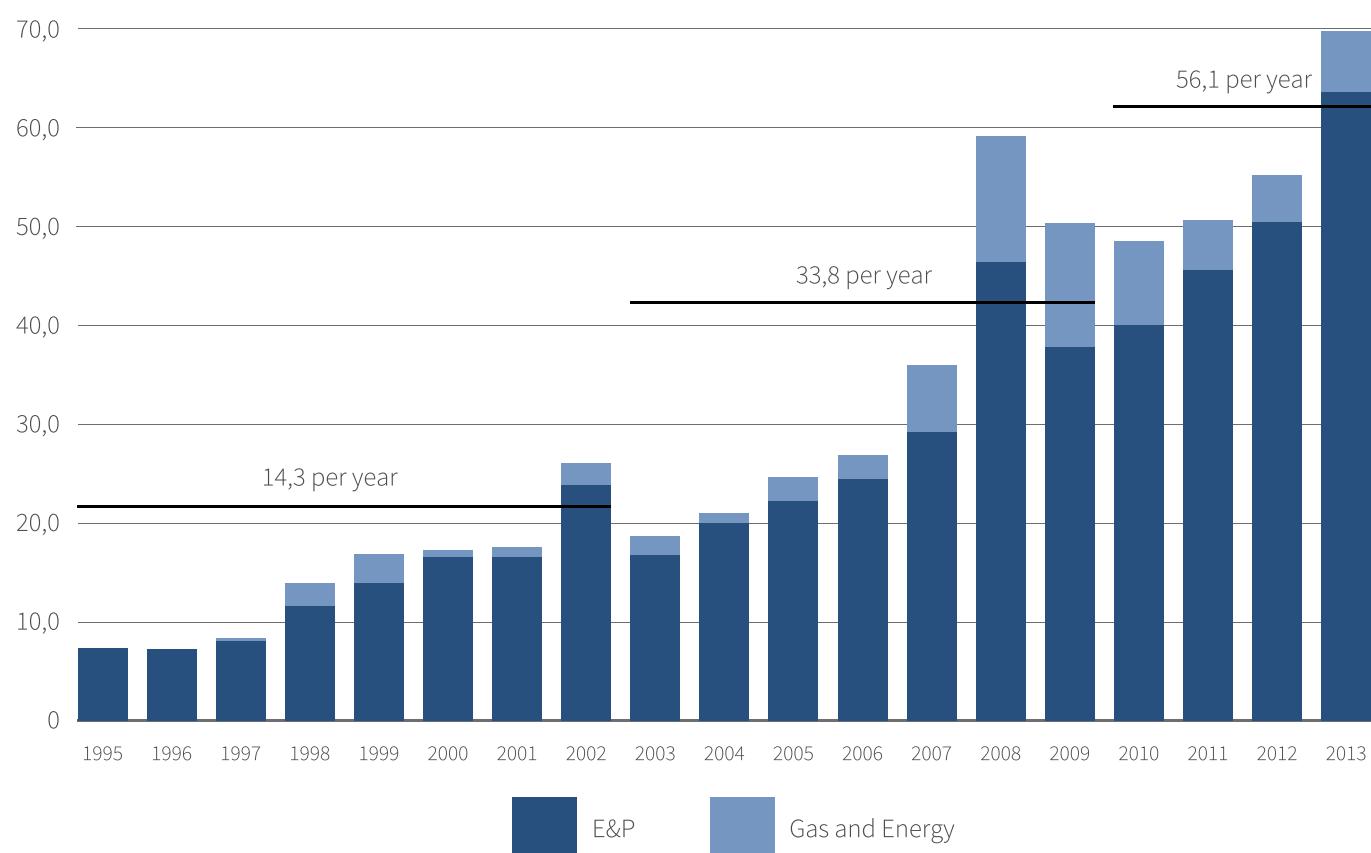


Chart 5.5 – Petrobras investments in billions of reais ,2014 prices. Source: Petrobrás. Prepared by: Ex Ante Consultoria Econômica.

Table 5.9 - Ten Year Plan for Energy Expansion in 2022 (PDE 2022): Investment estimates, 2013-2022(1)

Sector	R\$ (billions)	Participation (%)
Electric Energy Offer	260	22,6%
Geração (2)	200	17,4%
Transmission (3)	60	5,2%
Oil and Natural Gas	835	72,5%
Exploration and Production of Oil and Natural Gas	625	54,3%
- Refining	201	17,5%
Natural Gas Offer	171	14,9%
Liquid Biofuel Offer	30	2,6%
Ethanol – Production Plans	8	0,7%
Biodiesel – Production Plans	56	4,9%
Etanol – Usinas de produção	48	4,2%
Etanol – Infraestrutura dutoviária e portuária	7	0,6%
Biodiesel – Usinas de produção	1	0,1%
TOTAL	1.151	100,0%

(1) Exchange rate reference: R\$ 1.88 / R\$ (commercial - end of period, average Purchase and selling, December / 2011). Source: MME / EPE, Ten Year Plan for Energy Expansion - PDE 2022. (2) Includes plants already granted and authorized, including the plants with contracts signed in the new energy auctions. (3) Includes facilities already tendered

Out of the total investments forecast in electric power generation of R\$ 200 billion between 2013 and 2022, around R\$ 78 billion (or 39% of the total) would be destined to plants already authorized and contracted, while the remaining R\$ 122 billion (61% of the total) are related to the planned plants, as presented in Table 5.10.

With respect to investments in transmission lines and substations, the investment estimate reaches R\$ 60,4 billion, of which \$ 37,8 billion would be destined to transmission lines and R\$ 22,6 billion, to substations. Further according to the assessment made by PDE 2022, of the total forecast, R\$ 39,1 billion would refer to facilities not yet tendered, with investments in transmission lines in the order of R\$ 24,2 billion and in substations of R\$ 14,9 billion.

The investments in oil exploration and production (E&P) forecast between 2013 and 2011, as presented by PDE 2011, must remain between US\$ 317 billion and US\$ 348 billion, of which US\$ 148 billion would correspond to the investment until 2017, pointed by Petrobras in its Business Plan 2013-2017 – version presented in March/2013.¹⁵ According to the latest company business plan, disclosed in February/2014, the investments forecast for the period 2014 to 2018 in E&P must

Tabela 5.10 – Ten Year Plan for Energy Expansion in 2022 (PDE 2022): power generation investment

Type of sources	Contracted and authorized power plants		Planned power plants		Total	
	R\$ (billion)	%	R\$ (billion)	%	R\$ (billion)	%
Hydro	33,9	43,5%	74,8	61,3%	108,7	54,4%
PCH + Biomass + Wind Energy	35,2	45,2%	45,9	37,6%	81,1	40,6%
Thermoelectric	8,8	11,3%	1,4	1,1%	10,2	5,1%
Nuclear	3,5	4,5%	-	0,0%	3,5	1,8%
Natural Gas	3,5	4,5%	1,4	1,1%	4,9	2,4%
Coal	0,9	1,2%	-	0,0%	0,9	0,5%
Fuel oil / diesel	0,9	1,1%	-	0,0%	0,9	0,4%
Total	77,9	100,0%	122,1	100,0%	200,0	100,0%

Notes: (i) investments listed refer to the flow set for the period from 2013 to 2022; (ii) data base table: December 2012. Source: EPE. Elaboração: Ex Ante Consultoria Econômica.

Tabela 5.11 – Ten Year Plan for Energy Expansion in 2022 (PDE 2022): development of Internal Energy Offer

	2013		2017		2022		Variation (% a.a.)
	mil toe*	%	mil toe *	%	mil toe*	%	
Non-renewable energy	178.441	58,1%	207.169	56,3%	266.937	58,6%	4,6%
Petroleum and oil products	118.353	38,5%	132.504	36,0%	158.782	34,9%	3,3%
Natural Gas	35.055	11,4%	49.999	13,6%	73.067	16,0%	8,5%
Coal and derivatives	21.127	6,9%	20.828	5,7%	28.229	6,2%	3,3%
Uranium (U3O8) and derivatives	3.907	1,3%	3.839	1,0%	6.859	1,5%	6,5%
Renewable Energy	128.768	41,9%	160.878	43,7%	188.362	41,4%	4,3%
Hydraulics and electricity	42.947	14,0%	49.056	13,3%	56.339	12,4%	3,1%
Firewood and charcoal	25.151	8,2%	27.702	7,5%	28.019	6,2%	1,2%
Derived from cane sugar	47.979	15,6%	65.538	17,8%	80.437	17,7%	5,9%
Other renewable	12.691	4,1%	18.581	5,0%	23.568	5,2%	7,1%
Total	307.209	100,0%	368.046	100,0%	455.299	100,0%	4,5%

Source: EPL. Prepared by: Ex Ante Consultoria Econômica.*toe = tonne of oil equivalent.

15 Considering an exchange rate of R\$ 2,327, these amounts would correspond to R\$ 738 billion, R\$ 810 billion and R\$ 344 billion, respectively.

be of US\$ 153,9 billion, without considering the participation of partners, of around R\$ 44,8 billion. It must be stressed out that PDE 2022 deems total flow forecast of investments in E&P those investments associated to PAC Project Portfolio, particularly as regards the exploration and production development throughout the national territory, mainly in basins of Campos and Santos, including the discoveries in Pre-Salt layer.

This investment flow forecast up to 2022 will cause some changes to the national power matrix composition, even if the participation of each set of sources – renewable and non-renewable – does not change substantially by the end of the 10-year horizon of the plan. Table 5.11 presents the internal power supply evolution per period of five years, which will depict both the amount and the schedule of investments expected for each sub period. As it can be observed, the expectation is that the non-renewable power sources present average growth of 4.6% per year until 2023, a little above the growth pace expected for the renewable sources (4,3%).

We can outline: (i) the natural gas expansion, with average expansion of 8.5% per year, which would raise its participation in the supply of 11.4%, in 2013, to 16.0%, in 2022; and (ii) of growth expected of other renewable sources, which include wind power, vegetable oils and lixivium, which must reach 7.1% per year in average, even if, in terms of participation, the weight of such sources remain relatively modest (5.2%, in 2022). It is worth stressing out that the downturn forecast both in oil participation and derivatives (from 38.5% to 34.9%) and in hydraulic power and electricity (from 14.0% to 12.4%) between 2013 and 2022, reflection of an average growth relatively smaller during this period, from 3.3% and 3.1% per year, respectively.

With respect to the amounts invested lately in the sector, according to several PAC assessments, in its second phase (2011-2014), the axle associated to infrastructure projects in the power industry – generation, transmission, oil and gas and renewable fuels – accrues investments of around R\$ 401 billion from 2011 to late 2014, against an amount forecast of

Tabela 5.12 – Financial implementation of growth Acceleration programme 2 (PAC 2): State investment and private sector - generation, transmission, oil and renewable gas and fuel

Year	Expected*	Achieved
2011	105,2	85,3
2012	105,6	99,3
2013	114,6	113,4
2014	116,6	103,0*
Total 2011-2013	325,4	298,0
Total 2011-2014	442,0	401,0

*2014 outlook. Source: PAC 2 balance, several years. Prepared by: Ex Ante Consultoria Econômica.

R\$ 442,0 billion for the period from 2011 to 2014. Table 5.12 details the flow forecast and realized of investments per year of PAC 2 for the axle in question, taking into account both the state-made investments and the private sector ones in the program scope.

Another relevant information source as regards investments made in the power sector in the last years is related to the disbursements made by BNDES. The volume effectively disbursed by the bank between 2010 and 2013 for the electricity sector and gas¹⁶ was of around R\$ 80,6 billion, with an average of R\$ 20,2 billion per year, amount widely higher than the average recorded between 2006 and 2009, of R\$ 12,2 billion, being all these amounts in prices of 2014.

Telecommunications

In early 2000's, the telecommunications investments were directly associated to the privatization process, which was started further in 1995. As a result, the fixed and mobile telephone service providers and cable TV service providers invested an annual average of R\$ 37,9 billion between 1995 and 2002 (amounts at 2014 prices). Between 2003 and 2009, this average declined to R\$ 23,6 billion per year, going up again between 2010 and 2014, whose annual investment estimate average is of R\$ 27,4 billion (Graph 5.6). This trajectory is reflected in BNDES disbursement data for the telecommunications sector, which show a higher level in the start of 2000's, with subsequent decline until reaching certain average level, from 2003, as shown in Graph 5.7.

The privatization process and investments followed considerably impacted the telecommunications sector in the country. Based on Table 5.13, which brings the main sector indexes, it is possible to have an idea of such impact: the mobile telephone service density, given by the number of accesses per 100 inhabitants, for instance, went up from 0.9, in 1995, to 14, in 2000, reaching 46.6, in 2005, and finally 136,4, in 2013. The number of active mobile telephone lines raised from 86,2 million, in 2005, to 271,1 million, in 2013, which amounts to an accrued growth of 215% in the period.

16 Which includes, according to classification employed by BNDES, the activities of production, transmission and distribution of electric power; gas supply and steam and hot water production and distribution through a permanent system of lines, pipelines and ducts (infrastructure facilities).

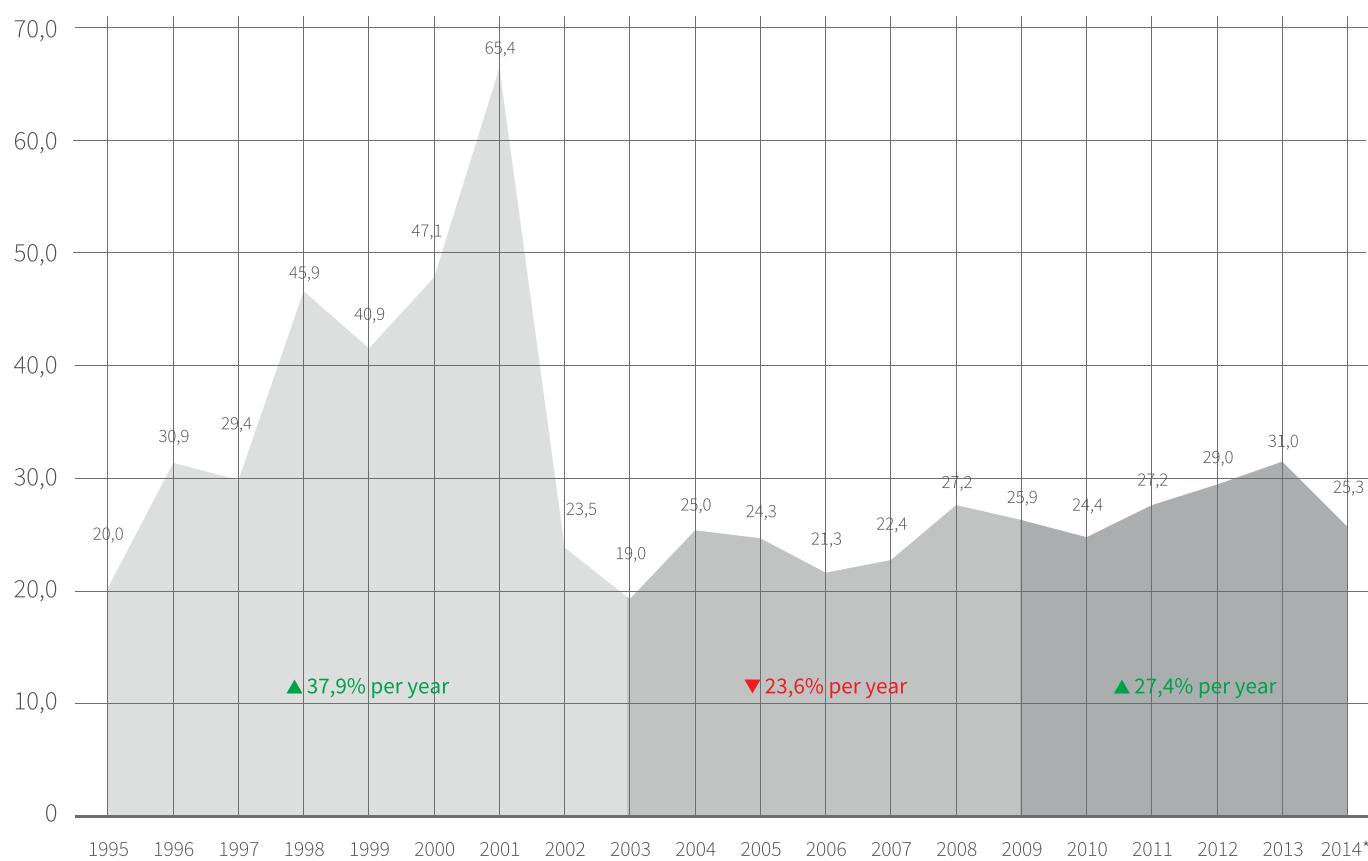


Chart 5.6 – Investments of telecommunications service providers, in billions of reais (R\$), to 2014 prices*. *Estimate.

Source: Brazilian Association of Telecommunications (Telebras) and Teleco. Prepared by: Ex Ante Consultoria Econômica.

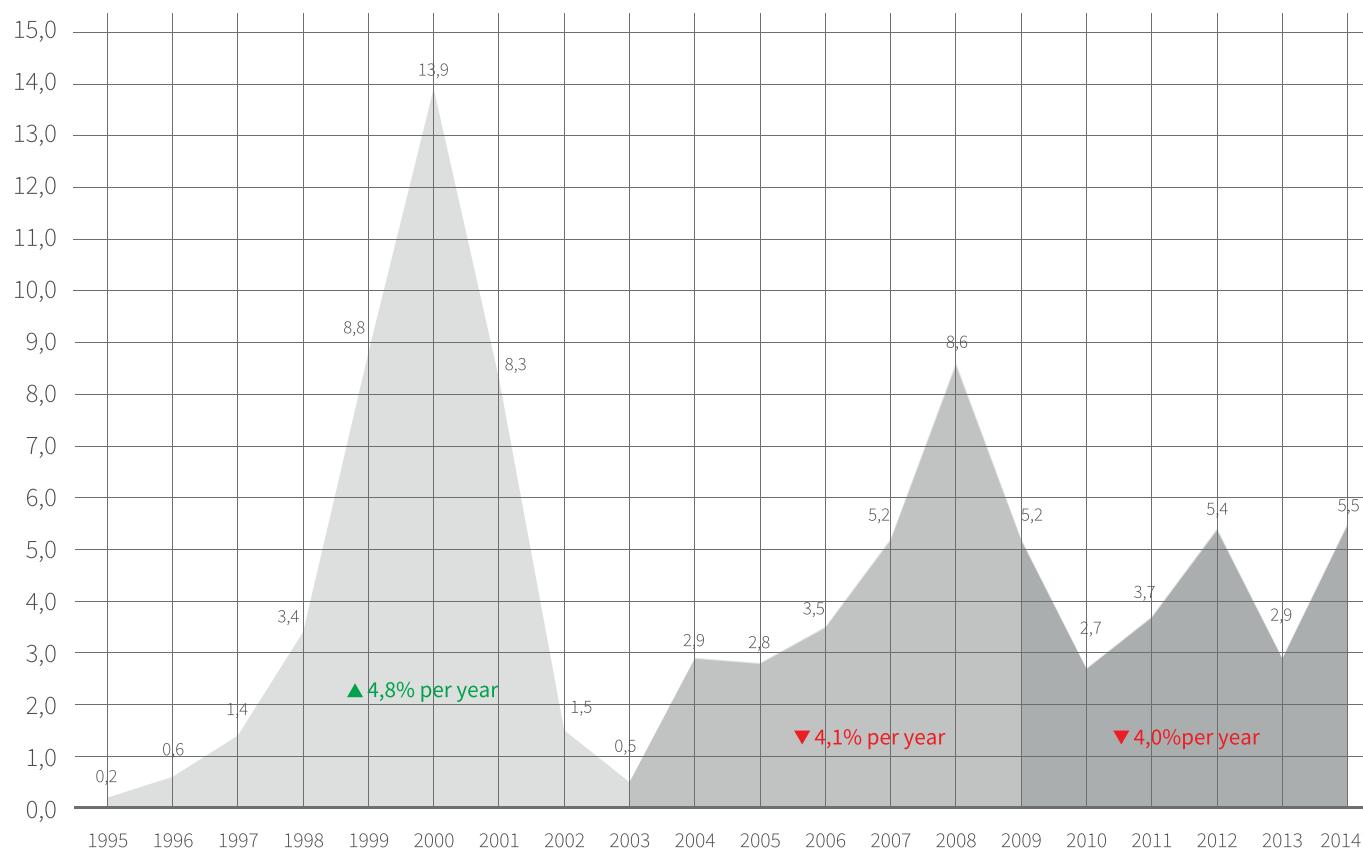


Chart 5.7 – Outlay of National Bank of Economic and Social Development (BNDES) in telecommunications, in billions of reais (R\$), to 2014 prices*. *Estimate. Source: BNDES. Prepared by: Ex Ante Consultoria Econômica.

According to the last figures of the National Telecommunications Agency (Anatel), the country closed the month of November of 2014 with 280,43 million of active mobile telephone lines, with density of 137,93 accesses per 100 inhabitants.

As a result of the vigorous mobile telephone expansion, the total number of telephones went up from 14,7 million, in 1995, to 315,8 million, in 2013, with density raising from 9,4 telephones per 100 inhabitants, in 1995, to 158,9 per 100 inhabitants, in 2013. Such trajectory counterpart is the continuous reduction of the number of public telephones, which has declined since 2001, having closed the year of 2013 with 875,7 thousand units.

From the federal government side, the National Broadband Program (PNBL) was created in 2010, whose main purpose is to massively widen the access to broadband Internet in the country, mainly in the most deprived regions as to technology. The target is to reach 40 million houses connected to the world computer network by 2014. For such, the program, managed by the Telecommunications Department of the Ministry of Communications, has operated in several fronts, such as network and access terminal tax exemption, fiber optic public network expansion managed by Telebras and the Smartphone tax exemption program. According to the Ministry, the program further envisages the so-called popular broadband, with Internet speed of 1 Mbps at the amount of R\$ 35 monthly (taxes included).

From the investment perspective, it is worth outlining that one of PNBL principles was the encouragement to

private sector so that the same invested in broadband infrastructure, on a competition basis, and the government would operate complementary by directing its direct investments in collective accesses, in order to mainly reduce the regional and social inequalities.

Investments

This ConstruBusiness issue brings infrastructure investment forecasts which must be made from 2015 to 2022. Such forecasts were made based on the assessment of the federal government programs and plans in progress for each infrastructure segment and history of private sector investment expenses and BNDES disbursements. The forecasts also took into consideration the macroeconomic and sector scenario until 2022, described in Chapter 3. Table 5.14 presents forecasts per segment as well as the amount invested in the recent period, from 2010 to 2014.¹⁷

Investments of around 1,783 trillion are forecast for the period 2015 to 2011, which amounts to an annual average of R\$ 222,9 billion, amount 20,8% higher than the average of years 2010 to 2014, of R\$ 184,5 billion. Despite the growth, the annual average amount of investments in infrastructure in relation to GDP must experience a mild increase, remaining in 3.8% according to forecasts made for the Brazilian investments and GDP. This means that the investment scenario does not predict an immediate solution of the country's lack of infrastructure. The shortfalls started to be set out in the last years, but will only be duly overcome with the continuity of effort invested by the private and public sectors in the following decades.

Tabela 5.13. – Telecommunications: key indicators Source: Anatel. Produced by: Ex Ante Economic Consulting.

Indicators	Unity	1995	2000	2005	2010	2013
Total Telephones	Millions	14,7	54,1	126,0	245,0	315,8
Total Density of Telephones	Total Telephones/100 dwellers	9,4	32,4	68,1	126,4	158,9
Switching Telephone Service – Single Use						
Installed Fixed Access	Millions	14,6	38,3	50,5	62,0	44,4
Installed Telephone Density - STFC	Installed Access/100 dwellers	9,3	23,1	27,3	32,0	22,3
Fixed Access Service	Millions	13,3	30,9	39,8	42,1	44,7
Telephone Density in Service – STFC	Access to Service/100 dwellers	8,5	18,6	21,5	21,7	22,5
LAN Scanning Rate	%	45,8	92,5	99,9	99,9	99,9
Switching Telephone Service – Public Use						
Public Telephones	Thousand	367,0	909,5	1.274,0	1.103,0	875,7
Density of Public Telephones	Telephones/1000 dwellers	2,3	5,5	6,9	5,7	4,4
Mobile Service						
Mobile Access – Cell Phone	Thousand	1.417	23.188	-	-	-
Móbil Access – personal	Millions	-	-	86,2	202,9	271,1
Telephone Density – SM	Access/100 dwellers	0,9	14,0	46,6	104,7	136,4
Pay Television						
Pay Television Service	A Thousand Subscribes	1.000,0	3.426,2	4.176,4	9.769,0	18.019,7
Density of Pay Television	Subscribes/100 Houses	2,6	7,7	8,3	16,6	28,9

Fonte: Anatel. Elaboração: Ex Ante Consultoria Econômica.

Transport

It is assessed that R\$ 364,3 billion will be invested from 2015 to 2022, which corresponds to an annual average of R\$ 45,5 billion. Such expectation reference is the full implementation of the federal government Logistics Investment Plan (PIL) by 2022 in its most diverse fronts – highways, railways, ports and airports.

The largest contribution will come from investments in highways, which must be supported by the concession of stretches envisaged by PIL – Highways, from 2015. Despite the plan delay already recorded since its launch, it is expected to be fully implemented until the end of period under analysis. Furthermore, an increase is expected in the annual investment flow of the highways already conceded, even if with rates lower than those observed in the last years.

The investments in railways must also contribute decisively to support the reversals of transport sector as a whole. PIL – Highways must be fully adopted with construction or improvement of 11 thousand kilometers of lines and R\$ 99,6 billion of investments, as previously discussed. Furthermore, we have worked with the expectation of annual investments of around R\$ 5 billion from the concessionaires already in operation, aligned with what is expected by the National Railway Transport Association (ANTF).

It is expected that the uncertainties that today affect PIL – Ports implementation are overcome in the horizon under analysis, thereby making viable the investments forecast by plan up to 2022. As a result, the annual average investments in this sector are expected to reach R\$ 7 billion.

The concessions made in 2012 and 2013 of the main country's airports must depict an important flow of new resources for the airway transport, even if a portion of such investments has been made in 2013 and 2014, in order to mainly meet the supply increase resulting from the World Soccer Cup performance in the country. PIL – Airports, with the investments

forecast for regional airports, will also contribute to the increase of total amount destined to this field up to 2022.

Power

The power sector investments must reach R\$ 388,7 billion from 2015 to 2022, amount which corresponds to the annual average of R\$ 48,6 billion. The investments in electric power production, transmission and distribution are envisaged in this global estimate. The investments and targets established by the 2022 Ten-Year Power Expansion Plan Plano (PDE 2022) for the generation and transmission areas were used as reference for the sector reversal total estimate preparation as well as BNDES disbursement history.

This data indicates an annual average investment reduction in the period from 2015 to 2022 against the period from 2010 to 2014. This occurred because the prior period concentrated a large portion of investments in the hydroelectric plants of Jirau and Santo Antônio.

Oil and gas

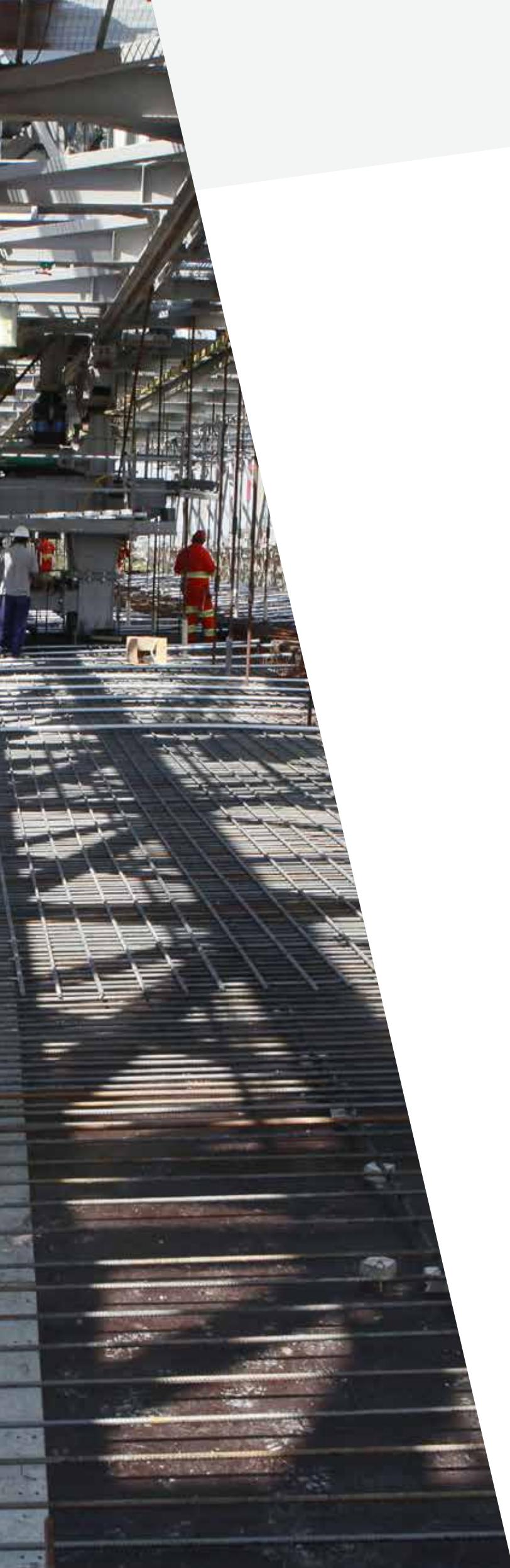
The oil and gas sector must receive R\$ 768,4 billion of investments between 2015 and 2022. As a result, the annual average of new resources must grow from R\$ 69,4 billion, in the period from 2010 to 2014, to R\$ 96 billion, from 2015 to 2022. This forecast envisages the resources predicted by 2014-2018 Petrobras Business Plan and Management, of February/2014 (latest available), for the exploration and production areas, including the participation of partners, and of gas and power. The forecast also envisages the continuity of Petrobras annual investment flow for the year subsequent to the horizon considered by this business plan up to the year of 2022

It is worth observing that the total amount of investments

Tabela 5.14 – Projection of infrastructure investments, 2015-2022, in billions of reais (R\$), 2014

Modal	Achieved 2010-2014*		Projection 2015-2022	
	R\$ (billions)	Annual Average	R\$ (billions)	Annual Average
Transportation	159,150	31,830	364,254	45,532
Highway	85,034	17,007	163,624	20,453
Railway	42,516	8,503	124,100	15,513
Waterway (harbours and waterways)	22,056	4,411	56,200	7,025
Airway	9,544	1,909	20,331	2,541
Energy	259,184	51,837	388,777	48,597
Gás and Oil	346,876	69,375	768,384	96,048
Telecommunication	157,213	31,443	261,574	32,697
Grand Total	922,423	184,485	1.782,989	222,874

* The year 2014 is estimated. Produced by: Ex Ante Economic Consulting.

A photograph showing a large-scale construction project, likely an oil platform or refinery. In the foreground, there's a complex steel framework and rebar grid. Two workers in high-visibility vests are visible; one is standing near the center, and another is further back. The background shows more of the industrial structure under construction, with various pipes, beams, and equipment.

predicted is higher than that considered by PDE 2022, of R\$ 625 billion for oil and natural gas exploration and production up to 2022. Such difference widely results from the fact that PDE considered the Petrobras 2013-2017 Business Plan and Management, of March/2013.

Telecommunications

The annual average investments in the telecommunications sector must increase around 4% between the period from 2010 to 2014 and the horizon projected from 2015 to 2022, going up from R\$ 31,4 billion to R\$ 32,7 billion. The total amount to be invested in this last period must reach almost R\$ 262 billion.

The largest contribution for this amount must be given by the fixed and mobile telephone service providers and by the cable TV service providers in order to ensure the expansion, retrofit (with inclusion) of new technologies and service quality improvement. As pointed by the BNDES Investment Perspective report, published in October/2013, the telecommunications investments must be destined to increase the data transmission capacity and network coverage, largely to comply with the increase of 3G and 4G mobile device derived traffic. The public investment contribution, in the National Broadband Plan (PNBL) context, must be relatively small up to 2022.

6. Responsibility with the investment: proposals to speed up contracted works

Today, the construction projects cycle is still very long in Brazil. Although there have been advances in company's projection and planning efforts, delays and construction halts, which are harmful both to companies and to the society, are still quite common. Delays have many consequences: they bring about unplanned demobilization of workers from the sites and the unexpected breaking off of contracts, they bring about unrecoverable losses for companies and, above all, delay the delivery of the construction, which are, quite often, endeavors crucial to the economic and social development of the country and to the people's well-being.

Good performance of the construction projects does not solely rely on a good project or planning efforts. The physical and financial execution and necessarily involves the participation of the public sector and of society, which can, if poorly managed, damage the established plan, creating unforeseen events that lead to delays and financial management issues. Problems can arise throughout all the phases which follow contracting: in the preparatory tasks for the construction project, during construction or even in the post-construction phase. This happens due to lack of commitment among all the involved players. For this reason, the actions of the public sector and of society in what pertains to the roll-out of the construction project are, many times, disjointed and untimely.

The obstacles to smooth roll-out and unnecessary delays come from unexpected interference, from difficulties with expropriation, lack of coordination among public service concessionaires, delays in obtaining environmental licenses, disjointed and untimely actions among auditors, excessive bureaucracy and delays in conceding resources. These are interferences which create unpredicted events in the construction projects, rendering useless the planning efforts, and increasing the inefficiencies of the Brazilian economy (Figure 6.1).

This chapter of the 11th ConstruBusiness describes the obstacles that slow the construction projects down, explains why they occur, and their consequences to society, and also presents what is necessary to overcome these obstacles. These questions were debated by the workgroup for Responsibility Towards the Investment, organized by the Department of Industry and Construction of the Federation of Industries of the State of São Paulo (Deconic-Fiesp – De-

partamento da Indústria da Construção da Federação das Indústrias do Estado de São Paulo), with the intention to discuss issues associated with the investment in construction in Brazil. The discussion rendered the report, "Responsibilities Toward the Investment: The Issue of Unpredictability in Construction Projects".

In addition to briefly presenting the diagnosis of the issues described in this report, the 11th ConstruBusiness brings the proposals of what should be done to change this situation. Such proposals were elaborated by the workgroup or suggested by members of society in a field study with businessmen, academics and public servants by Deconic-Fiesp's Construction Observatory. The survey collected information on impressions of the seriousness of these issues, which made it possible to guide the process of setting priorities, while also collecting suggestions for how to solve these issues. The proposals set a work agenda for Deconic-Fiesp for the following years.

Contracting Process of Construction Projects

Before a building site can be established and beginning the construction of a building or a road, for example, there is a contracting process. The construction begins with a project, which defines what will be built, to what end, and how much it will cost. After this, there is the acquisition and sale of the construction, the licensing and the contracting. These phases have specific characteristics that depend on the type of construction project (buildings or infrastructure) and type of client (public or private).

Project

Whether erecting a building or an infrastructure endeavor, the initial phase involves the development of projects. In the case of infrastructure projects, where the demand of the public sector weighs heavily, generally there are two types of project, the basic and the executive, which contain budgets. Furthermore, it is necessary to describe, through a study, the potential socio-economic and environmental impacts of the

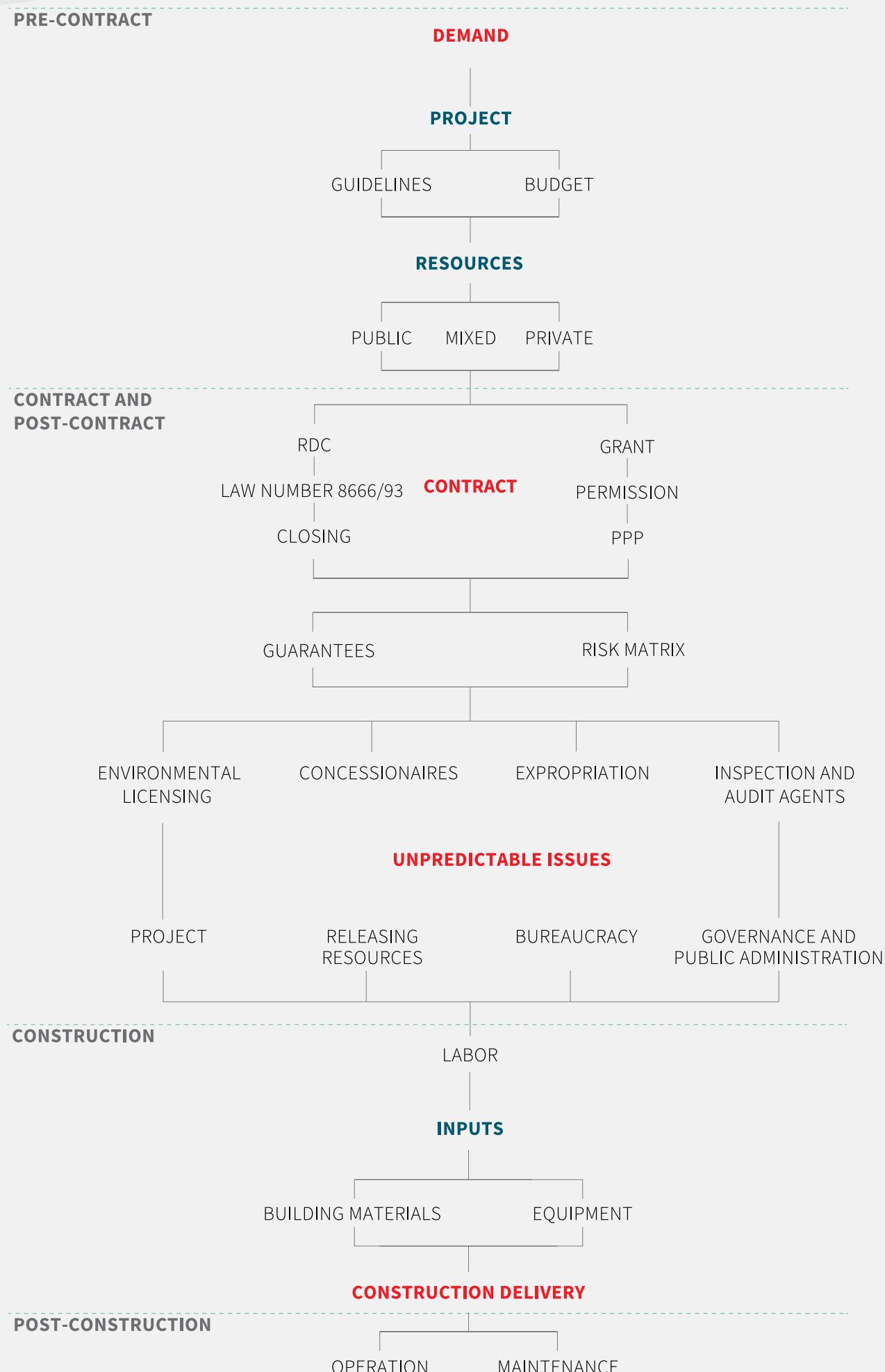


Figure 6.1 – stages for construction works realization. Source: Deconic-Fiesp (2014).

Table 6.1 – Definitions

Basic Project	Sets the elements that describe the construction project or service with minimal precision
Executive Project	Describes all the elements contained in the construction project, considering the geotechnical and engineering aspects, as well as the maintenance of the construction site.
EIS-EIR (Environmental Impact Study – Environmental Impact Report)	Models the potential social-economic and environmental impacts of the construction project and covers possible compensation or mitigation efforts regarding these impacts.
Budget	Defines in detail the expenses in construction material acquisition, labor, and services in the construction project. Both the basic and the executive projects have a budget.

EIS-EIR (environmental impact study – environmental impact report). Source: Deconcic-Fiesp (2014).

In the case of building projects, especially residential and commercial buildings, the project process is distinct. Before launching the endeavor, the companies develop a constructive project, a financial project, and a preliminary sales project to evaluate market feasibility and, afterwards, detail these projects to plan out the construction project. In these cases, detailed budget plans are developed and, depending on the size of the construction project, studies of environmental and traffic impacts are necessary.

Bidding or Sales

In the case of public construction projects, regardless if it is buildings or infrastructure, the sale is done through a bidding process, regulated by Federal Law number 8.666, of 1993, and which has been constantly updated and modernized by National Congress. In this process, there is a competitive bidding process among the construction firms to find which company will offer the lowest value for the contract, given the conditions and technical demands defined in the project.

In the case of construction projects meeting demands in the private sector, which are hired by companies and families, there is also a competitive pricing process to define which construction company will perform the construction project.

There is no specific selection process to be followed in these cases, but the pricing criteria is the dominant one in most cases.

Contracting

The contracting phase involves the definition and signing of a contract for construction that defines the terms agreed upon among the parties in regards to deadlines, prices, quality issues, guarantees, and further conditions, which the parties deem necessary. Contracting preserves the legal security of the parties and the reduction of risks for both the contractor and the contracted. In this regard, there is a great difference between the contracts established among private parties and among public and private parties. In the latter, the so-called administrative contract is subordinate to Federal Legislation, which establishes the supremacy of public interests over private ones

Debates and Field Study

To identify the obstacles that lead to delays in construction projects and establish a hierarchy according to the gravity of these issues, the Responsibility Towards Investment Work Group promoted a series of meetings with representatives of the production chain and the government between July and October of 2014 and performed a survey in the months of September and October of the same year. The meetings served to identify the obstacles to fluid running of these construction projects once contracted. In meetings, provisions to reduce these obstacles were identified. The survey complemented this assessment, bringing quantitative measurements of the gravity of the issues and indicating other provisions that could reduce the delays in executing the construction projects.

The main issues raised in the group's meetings and which will be described in greater detail in the following section are clustered in eight areas, which cover a wide range of technical-management relations between contracting, regulatory, authorizing, and investigative entities of the public authorities. The eight areas are: (i) environmental licensing, (ii) Contracting defects, (iii) expropriation and resettlement, (iv) investigation and audit agents, (v) Public Administration, (vi) Financial Resources, (vii) Bureaucracy and Legal security, and (viii) Public Services concessionaires. Along with these issues, gravity regarding issues of labor and construction material, machinery and equipment procurement were described. Opinions of politicians in these areas were also col-

lected. These aspects will be dealt with in further detail in the following chapter, since they articulate themes associated with competitiveness of the construction chain capacity.

The respondents of the survey, in a total of 95 surveys answered completely or in part, indicated the gravity of the issue as: very serious, serious, neutral, or of little importance, with the option to indicate "I don't know". Once the information was collected, the responses were transformed into scales to aggregate the responses and compare the results. The quantitative values attributed to each answer follow constant intervals: very serious (10), serious (7,5), neutral (5,0), or of little importance (2,5). In this way, gravity of an issue can vary on a scale of 2,5 to 10, where its value corresponds to the simple average of responses.

gravest issues are environmental licensing and Contracting defects. These two issues had practically the same score (8,8), which is superior to the other scores. Next come issues with expropriation and resettlement and with investigation and audit agents, where both have scores around 8,5.

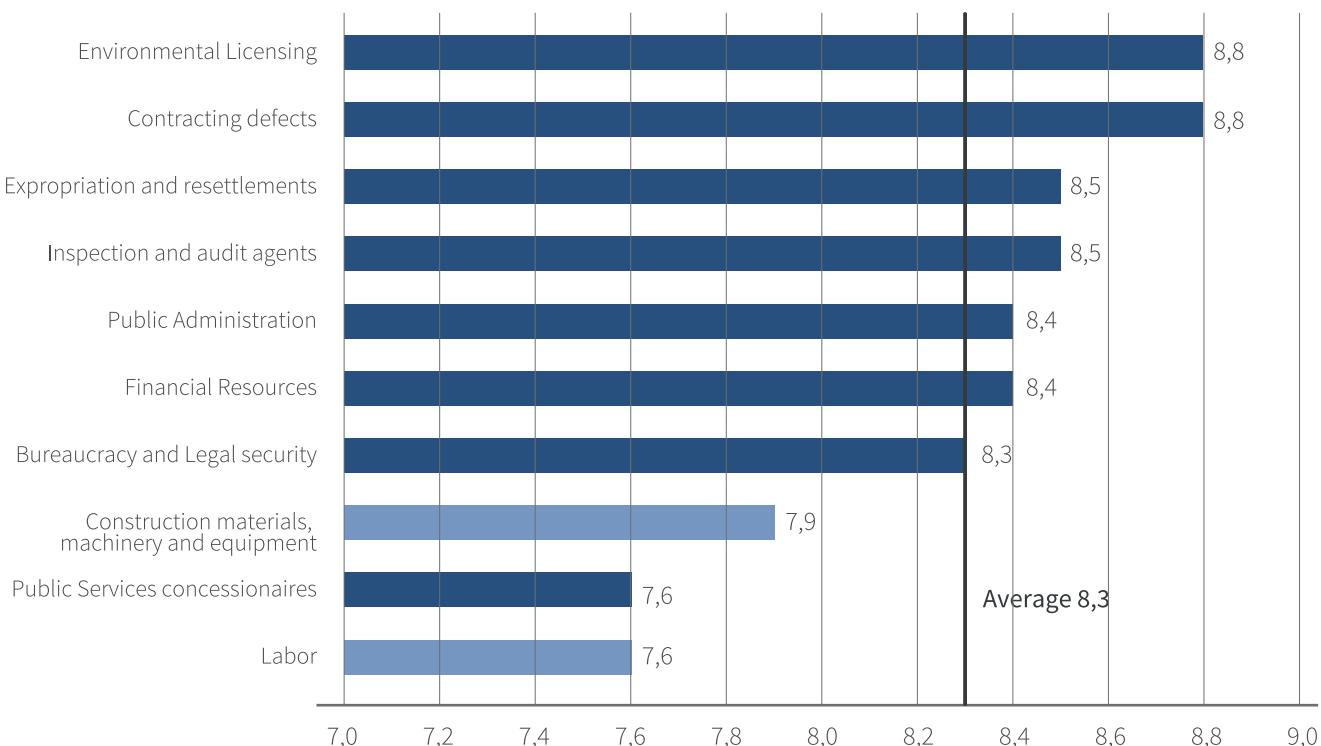


Chart 6.1 – Gravity of the obstacles to satisfactory performance at construction projects.* Source: Construction Observatory – Fiesp/Deconcic *Greater values indicate elevated gravity.

The issues of public administration and financial resources are also grave, where both have a score of 8,4. Excessive bureaucracy and legal insecurity register values that are equal to the average of the survey: 8,3. Of relatively lower importance in the opinion of the interviewed are issues of labor, the publish services and construction material, equipment and machinery concessionaires. The bars in lighter tones in Graph 6.1 represent issues that are discussed in greater depth in Chapter 7.

Obstacles: What they are and how to overcome them

It is widely accepted that the good performance of the construction projects doesn't only rely on the project design phase performed by the companies. The physical and financial execution of the construction projects necessarily implies the participation of the public sector and of the society, which can, if poorly managed, damage the established planning, creating unpredicted situations that lead to delays in the projects' roll-out and financial issues. These setbacks end up being paid for by the companies and by society.

The problems can happen in the preparatory activities for the construction project, i.e., after signing the contract, but before implementation; and they can also happen after the construction project is finished. This happens when there is no plan set for interventions or there lacks commitment from some or all of the players involved, where all the actions of the public sector and of society pertaining the execution of the construction projects are, most of the time, disjointed and untimely, leading to, therefore, obstacles to the good flow of the project and unnecessary delays. The obstacles come from unexpected interferences, from difficulties in expropriation of properties and resettlement of groups of people, from Contracting defects of the construction projects, lack of coordination with the public service concessionaires, from delays in obtaining environmental licenses, from disjointed and untimely actions of investigation agents, from excessive bureaucracy and delays in releasing resources.

These obstacles are described in greater detail below, following the order established in the survey presented in the previous section. The problems and implications associated with each issue are described and, next to the obstacle, are suggested actions to diminish these obstacles and implement these policies are summarized.





Environmental Licensing

Obtaining environmental licenses today is a large hindrance to progress of infrastructure construction projects. Created to protect the collective right to an ecologically balanced environment, environmental licensing establishes an extensive and sluggish sequence of procedures to obtain authorizations for construction and operation of roads, hydroelectric dams, ports, airports, and other installations, which impact the environment (Table 6.2).

Environmental licensing is made up of three consecutive stages: (i) the Initial Licensing, which approves location and conceptualization of the endeavor and attests to its environmental feasibility, acting as an endorsement from the environmental entity to begin planning; (ii) the Installation License, which authorizes the beginning of execution of the construction project for the installation of the endeavor, with the approval of implementation planning and the plans and programs for environmental control; (iii) Operation License, which authorizes the company to begin operation of the endeavor, establishing agreements regarding its interaction with the environment during the first years of operation.

Although there is clear definition in law which is composed of a notorious amount of administrative proceedings, environmental licensing happens at an extremely slow, costly, and bureaucratic pace. This happens because there are no previously designed environmental programs and procedures, as well as no established deadlines for decisions of public agents. On the other hand, there is a frank temerity on the part of the public agents, fueled by the concern of there being questioning of their decisions. The lack of communication between entities during licensing efforts is another source of delay in this process.

Table 6.2 – Table 6.2 – Environmental Licensing

Goal	What to do	How to do it
Reduce the slowness and increase the quality of the environmental licensing process	<p>Clearly define the competence to license the projects</p> <p>Clearly define the concept of “project of public interest”, starting with higher instances of decision making, upon which the environmental license should be issued to mitigate environmental risks.</p> <p>Unify legislations throughout the several levels of government and train the public servants.</p>	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	<p>Create strict time limits for issuing environmental licenses according to the templates of regulatory licenses and the approval of operations by the Administrative Council of Economic Defense (Conselho Administrativo de Defesa Econômica – CADE)</p>	
	<p>Establish linearity in the procedure of environmental licensing so that there are no deteriorations of the process.</p>	
	<p>Establish the responsibility of the public agent for the licensing process when granted in an incorrect or slow manner</p>	
	<p>To promote the culture of integrated assessment, i.e., to always evaluate the social, environmental and economic impacts of the construction project.</p>	
	<p>To introduce the integrated planning.</p>	To set mitigating and compensatory measures even in the pre-construction phase, taking action from quality environmental studies and projects. To address environmental licensing after beginning the construction project is guaranteed to bring about delays, embargos and damages.

Source: Construction Observatory – Deconic-Fiesp



Contracting defects

One of the gravest issues that happen in public construction projects, which is directly associated with halts and delays, is Contracting defects are failures rooted in projects and terms referred to in the contracting phase and that lead to overpricing, distorted prices or even unfeasibility in managing the construction projects (Table 6.3).

There are also issues that arise in the pre-qualification phase of the bidders, who are sometimes incapable of carrying out the tenured projects. In these cases, the simple judgment using the criteria of the lowest price leads to a situation where technical solutions are not considered, which can lead to selecting companies with greater chance of having the construction project halted due to technical conditions. Aside from lack of competence, the companies can be dishonest or have defaulted on past agreements. In these conditions, the construction project will quite probably be halted for lack of economic conditions on the part of the winning company, harming the public interest and wasting society's resources.

Regardless, contracting is done today with low technical demands in the elaboration of the projects. Poorly designed projects have greater chances of leading to impasses and halts, as well as generating implications in other areas (environment, safety, finances, etc.).

Table 6.3 – Contracting defects

Goal	What to do	How to do it
To avoid contracting issues that slow down Works and to improve quality of projects	<p>Adopt a greater range of procedures for pre-qualification in callings for tenure for truly qualified bidders</p> <p>Evaluate the public tenders with both technical and price analyses, in such a manner as to consider technical solutions.</p>	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	<p>Adopt a more robust construction insurance, with the possibility of substitution of the contracted company by the insurance company</p>	
	<p>Create a registry of companies that have solid delivery performance and those that default.</p>	
	<p>The party responsible for the quality of the contracting decision is the contracting party. Without planning, there is no coordination of activities, which leads to delays and unforeseen costs.</p>	Plan before contracting a construction project, as a good plan always precedes a good construction project.
	<p>Improve the quality of the projects</p>	<p>Modernize the legislation of the contracting and create policies to secure the project industry.</p> <p>Audit the projects by use of an independent entity.</p>
	<p>Require that the presentation of the projects with Technical Responsibility Notes of the professionals who execute budget revision, comparing information from projects, memos, budget reports, rollout plans both physical and financial.</p>	Verify and validate the budget, considering the construction plan's present relevance.

Source: Construction Observatory – Deconic-Fiesp



Expropriation and resettlement

Many infrastructure and building construction projects require land which is already occupied. This is the case, for example, of construction of roads, which end up cutting through farms, or streets in urban centers, where amplification requires land that is already built upon and occupied.

Since these construction projects have public utility or are of social interest, the State can take the necessary properties, in exchange for proper indemnity. Expropriation is done through two public acts: (i) declaration of public utility or social interest; (ii) declaration of concrete arrangements (value of the indemnity, deadlines for expropriation, etc.). Execution of expropriation can be administrative, which happens when the Public Authority and the expropriated party agree on the indemnity and the further conditions of the expropriation efforts, or it can be judicial, when the State opens an expropriatory act before the Judiciary Power – this happens, usually, when an agreement is not achieved among the parties.

For single properties, expropriation is done through financial compensation. In situations where large communities are expropriated, as happens when building hydroelectric dams, for example, it is common to resettle the people, which involves building new homes for the families and new establishments for commerce and services which were expropriated.

Although there is a consolidated legislation, in practice, these steps are cumbersome and lead to many legal claims regarding the public use of the property, the indemnity values and other rights of the affected population, which leads to halting the processes and delays in the construction projects. Supposed illegality in the act of expropriation can lead to legal impugnation, including regarding the safety and suspension injunction of expropriation until the final decision is reached.

Considering the excess in legal actions in the Brazilian legal system, the embargoes can take years, with delays of unpredictable duration in executing the construction project. The companies contracted suffer financial damages, and delays in the construction projects overbear the social interest or public utility that motivated the project, when there is no valid means to compensate the population for possible damages (Table 6.4).

Table 6.4 – Expropriation and Resettlement

Goal	What to do	How to do it
To reduce the slowness in processes of expropriation and resettlement	<p>Set deadlines for all the actors involved</p> <p>Create offices and chambers specialized in trials at the Court of Justice, as well as to train them to speed up the legal procedures.</p> <p>Demand reduction of the time taken in legal proceedings.</p> <p>Adopt a more clear description regarding the criteria for provisional certificates in the possession of necessary properties for infrastructure projects.</p> <p>Create a legal provision that allows the consignation of the indemnity payment under legal evaluation for property that has uncertain registration.</p>	<p>Create a bill or amendment, with the general norms valid for the Union, states and municipalities.</p>
	<p>Adopt an adequate risk sharing plan for expropriation in contracts, where the Public Authority is responsible for the uncertainties unmanageable by the contracted company.</p>	<p>This can be established in the call for tender or in the contract. However, a directive in law or in a decree can standardize the application by administration and increase its effectiveness.</p>
	Introduce integrated planning.	<p>Hiring good quality studies and projects, with compatible deadlines and adequate remuneration for the work scope. The integrated planning, including hiring studies and executive projects of architecture and advisory engineering, would anticipate the expropriation issues, avoiding impacts in the construction projects.</p>

Source: Construction Observatory – Deconic-Fiesp

Inspection and Audit Agents

Because it involves projects for public use, the large-scale infrastructure and urban development construction projects are subjected to a great number of inspection agents and many instances of assessment. Energy infrastructure, transport, and sanitation construction projects are contracted directly by the State or performed by public service concessionaires, which are subjected to rigorous investigation and audit procedures.

As an example, we can cite the case of sanitation construction projects, which are inspected and audited by innumerable instances of assessment with power to impose rules or halt construction projects, such as: ministries, state and municipal secretaries, financial institutions, court of auditors, district attorneys, regulatory and inspection entities. These agents assess and inspect qualitative and quantitative aspects, such as management, accounting, technical issues, operational issues, finances, and labor practices of the construction project.

As necessary elements to obtain transparency and probity in public administration, auditing and inspection performed by such agents, with such a wide range and diversity of powers, there are grave difficulties, due to, on the one hand, disjointed action among these intervening players and, on the other, the possibility of halting the construction project at any given moment, which many times happens without due assessment of the negative effects of such an extreme measure, imposing delays that are often unnecessary and unpredictable in the execution of the construction project. Unsuitable or anticipated suspension ends up imposing unexpected costs to the construction company, with halts to the financial flows, discontinuity of contracts and irrecoverable damages that, later, will be questioned in court (Table 6.5).



Table 6.5 – Inspection and Audit Agents

Goal	What to do	How to do it
Reduction of delays and gains of efficiency in inspection and audit processes	Establish deadlines for resources and define practice areas.	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	Attribute personal responsibility to the public agents in penal, civil and administrative aspects for failing to fulfill any provision of legal order.	
	Establish the function of the Court of Justice to approve annual accounts, complaints, and representations, revoking their participation in previous approvals of infrastructure projects.	
	Reduce the interference of investigation agents in every phase of construction.	
	To establish guarantees to the contract manager for taking decisions for the quick and efficient execution of the project, except in cases that violate jurisprudence or where there is evidence of dishonesty.	
	Demand that inspection agents act within the plan established for the construction, where milestones were placed strategically.	
	Promote a culture of integrated assessment, considering all the economic, social, and environmental impacts of the construction project.	

Source: Construction Observatory – Deconic-Fiesp



Public Administration

Two factors associated with public administration can provoke slowness and unpredictability in the cycle of construction projects. The first pertains to legal risks of the parties responsible for the contracts and other public acts that involve the construction projects.

The public agent can approve a construction project by granting an authorization, a license or a payment and, later, this decision can be questioned by another public auditing agent, whose power overlaps that of the person responsible for management. In an extreme situation, a public servant might have to answer with his or her own personal assets for damages alleged by other deciding or auditing entity. The pressure on their actions is clear, often leading to impasses and indecision. This imposes irrecoverable damages to companies and, again, overbears on social or public use interests of the endeavors that are under discussion.

Technical decisions are also harmed by misallocation of human resources in the public sector. The structures of positions and salaries in executive powers privilege in compensation the auditing positions, to the loss of the positions of planning and management. This induces more qualified labor to aspire for tenured jobs in auditing positions and feeds the lack of qualified professionals in planning and management positions (Table 6.6).

Table 6.6 – Public Administration

Goal	What to do	How to do it
Improvement of Public Administration	<p>Train public staff and allocate them according to their qualifications, giving priority to positions of planning and management.</p> <p>Make the actions of Brazilian Federal Court of Auditors top priority for investigations of governance and public administration.</p> <p>Demand deadlines and institute a policy of meritocracy, with a wider range of remuneration due to performance.</p> <p>Make the agents responsible for actions that harm the progress of the construction project and public interest.</p> <p>Hire, whenever possible, an insurance for public agents. In cases where the employee acted in good faith, the insured does not answer the court decision with personal assets.</p>	<p>Create a bill or amendment, with the general norms valid for the Union, states and municipalities.</p>
	<p>Regulate the Statutory Audit Board, as established in the Fiscal Responsibility Law. This council exists as a “normative force”* and would be an important contribution to the improvement of the performance of public administrators and investors in the context of public-private partnerships. The council would be an organization made up of government representatives, the Prosecutor’s Office, as well as technical entities from society, to follow and evaluate management of public resources, instituting means of awarding and recognizing public officials who have achieved outstanding results in these regards.</p>	<p>Application of article 67 of the Law of Fiscal Responsibility, with the creation of the Fiscal Management Council which was therein described, through the ordinary law. To this end, Bill number 3.744/2000 has been studied since 2000, which was undersigned by the Executive Power, which institutes the Council of Fiscal Management and regulates its composition and modes of enactment.</p>

*Toledo Junior, 2001, pg. 279. Source: Construction Observatory – Deconic-Fiesp



Financial Resources

Aside from factors that lead to unpredictability in the contracts and which are directly connected to public agents and to society, there are economic and management factors that affect the steady performance of construction projects and lead to increases in costs, with damage to planning and the returns to the companies. Lack of guarantees to the construction firms and poor financial management of the contractors can decisively interfere in the financial flows, damaging the capacity to pay for the contracts underway.

The lack of budgeted and financial resources leads to interruption of the construction projects due to lack of payment. Aside from imposing losses on the companies, with loss of revenue and increase costs due to halting the construction project, the interruption of the construction project leads to administrative and legal questioning regarding financial and economic losses. These investigations can take years to play out, generating risks both for the companies as for the Public Authority and for society (Table 6.7).

Table 6.7 – Financial Resources

Goal	What to do	How to do it
Security in the financial flows of construction projects	Guarantee payments and financing in the established deadlines.	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	Reduce the amount of stages and agents.	
	Create priority projects, which are not subject to contingencies of public resources.	
	Advances regarding “imposed budgeting” in issues of infrastructure.	
	Define clear and linear procedures for requests of economic and financial rebalancing.	Changes can be made by regulations from the regulating agencies, decrees or law. In this last case, greater long-term stability is guaranteed.
	Improvements in alternative procedures for solving conflicts and adoption of dispute boards in public contracts.	Suggestions can be made only through calls for public tender/contract, decree or law. In this last case, greater long-term stability is guaranteed.

Source: Construction Observatory – Deconic-Fiesp

Bureaucracy and Legal Security

Excessive bureaucracy is another aspect that affects the construction activities in Brazil and increases the average duration of the construction cycle. After contracting a construction project, the excess in bureaucracy can impose delays and irrecoverable costs on the companies. This bureaucracy refers to following all the norms and procedures established by law, regulation and decrees. The demands vary from city to city, due to diversity of the construction codes, of administrative standards and security demands of each town hall.

It is important to mention that, in this case, the powers of different areas of government and investigation entities overlap, creating slow and complex processes that take up the managers' time and human resources. Indicators from the World Bank's World Development Indicators place Brazil among the countries that have the slowest bureaucracies of the world. At the end of the previous decade, the average time taken to build a warehouse was on the order of 470 days, while in Europe and Central Asia this took only 217 days.

Excessive bureaucracy has negative impacts on the productivity of companies in the construction chain, while also making the service and construction efforts more expensive. If the bureaucracy impairs and increases the slowness of construction projects, it increases direct and financial costs, which grow due to time spent in efforts.

Furthermore, there is legal risk in contracts and in the very high complexity of the legal structure. Laws that deal with various aspects of economic activity cause much confusion and difficulty in dealing with specific issues, where legislation is fragmented throughout several laws (Table 6.8).



Table 6.8 – Bureaucracy and legal security

Goal	What to do	How to do it
Reduce difficulties and costs of the private sector in dealing with the public sector and legislation	Inform all the processes and eliminate unnecessary steps.	National Program to inform
	Standardize and simplify the procedures of each entity which intervenes in execution of the construction project, within an established plan, in relation to strategic construction projects.	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	Simplify processes.	Action together with competent public entities.
	Stop the publishing of the “omnibus laws”, which have several different subjects in one sole document.	The end of “omnibus laws”, which have several different subjects under one single heading, can be achieved by revoking Supplementary Law number 95/1998, which regulates the elaboration, writing, altering and consolidation of laws.
	Comply with actions established by contract.	Strengthen mediating chambers, which leads to reduction of deadlines for solving conflicts and immediate liquidation of State-issued sentences.

Source: Construction Observatory – Deconic-Fiesp



Public Service Concessionaires

Execution of the construction projects of buildings and infrastructure requires the cooperation of public service concessionaires. For example, the erection of a bridge in a consolidated urban area, usually, requires that energy and telecommunication service concessionaires relocate the cables and that the water and sewage concessionaires relocate their networks. This represents an activity outside of these companies' daily activities, and not within their direct interests, there is delay and disjointed action in the steps necessary for preparing the terrain for the construction project.

Another issue arises when the construction is ready, but cannot be delivered because the utility services have not been installed. This happens frequently in the residential buildings segment: the construction firm finishes the construction, but does not have the authorization for the families to move in because there is no electricity, gas, or treated water. It is important to emphasize that this happens even in housing projects of social interest commissioned by the government, where delivery and occupation happen four to six months after the construction has been finalized, due to delays in the installation of these services.

Other than the delays, another aspect of this issue is the decentralization of necessary actions for the refitting of public utility services. Each issue should be dealt with separately in each of the concessionaires (lighting, water, sewage, gas, telecommunications), which, in large cities, can easily involve separate conversations with more than seven separate players. Each player has its own negotiation deadlines and processes for refitting the network, leading to grave issues of coordination and high costs in articulating these actions (Table 6.9).

Table 6.9 –Public Services Concessionaires

Goal	What to do	How to do it
Reduce delays in service	Establish deadlines for the necessary activities on the part of the public service concessionaires.	Create a bill or amendment, with the general norms valid for the Union, states and municipalities.
	Establish solidary responsibility of the contractor and conceding power regarding the necessary provisions for the adequate execution of the project.	
	Establish the responsibility of the public service concessionaires for not adequately serving the public construction projects which are strategic or of public interest.	
	Improve the structure of the regulating agencies so that they can do effective accompaniment and inspection of these concessionaires' activities.	Investment in regulatory agencies and increase in social auditing.
	Introduce integrated planning	Initiate, while still in the project phase, the analysis and approval of interferences in the construction in interaction with public concessionaires.

Source: Construction Observatory – Deconic-Fiesp



7. Fiesp's Compete Brazil Program: competitiveness agenda of the construction production chain

As discussed on Chapters 4 and 5, the increased demand for housing and for infrastructure work fostered by the growth of financing resources, enabled the growth of all links in the construction chain. However, this growth was not homogeneous and had different effect in each of its segments. The base of sustainable growth and of competitive edge is the continuous growth in productivity, which can be obtained by means of technological innovation, labor training, reduction of inefficiencies in the production process and increasing the scales of production. Without these, the increased demand will have a negative impact, as it increases production costs, reducing margins and discouraging companies from investing.

For the construction companies, the evolution of productivity was strategic to face rising labor costs. Based on the data found on Chapter 2, which describe and quantify the sectors of the chain, one will realize that from 2007 to 2014 the labor productivity in the civil construction has only grown 1.8% per year in real terms. On the other hand, the average cost of labor rose at a rate of 5.3% per year, also in real terms. To face this scenario, the construction companies had to increase the use of machinery and equipment, adopt more efficient construction methods and improve the scales of operation. As a result, the Total Factor Productivity (TFP) (18) of the construction companies grew at a rate of 3.7% per year during the period, which enabled companies to maintain their returns.

On the other hand, the evolution of productivity was considerably unfavorable in the industry producing construction materials, machinery and equipment. The value added by each worker grew only 4.8% per year between 2007 and 2014, below the average inflation during the same period (5.7% per year). The average cost of labor grew 2.9% per year in real terms, putting pressure on the margins of almost all industrial segments. As these are capital intensive industries that already operated with elevated scales of production, there was not enough advance in the capital productivity to compensate the labor productivity loss, which resulted in a reduction of the materials industry's TFP to an average rate of 2.7% per year during the period.

This reflects, on one hand, the loss of competitiveness and

the increase in the import of materials, very considerable in certain sectors, such as electric equipment, ceramic products, and machinery and equipment for construction. This dynamic withheld the price of construction materials, which increased at an average rate of 5.3% per year, therefore below the inflation. On the other hand, the reduction of the TFP was a result of the high increase in energy costs, whose unit price in US dollars went up between 2007 and 2014, both in the cases of electricity and natural gas.

This chapter of the 11th ConstruBusiness presents the lines of work and the proposals for Fiesp's Program Compete Brazil for the construction industry, covering topics and paths leading to the growth of the competitive edge in this sector. The issues were discussed in various working groups organized by the Department of the Construction Industry: Fiesp's Program Compete Brazil; Responsibility with Investments; Industrialized Construction; Materials, Components and Construction Systems (part of the Brazilian Program for the Evaluation of the Lifecycle in Civil Construction); Building Information Modeling (BIM); and Safety of Buildings. Each group listed its problems, prioritizing and indicating the paths to solve them. Furthermore, the groups discussed success stories in certain areas.

More important than briefly exposing the diagnose for the problems that affect the competitiveness of the construction chain, the 11th ConstruBusiness brings the proposals of the working groups to increase productivity and the successful initiatives that are currently in place and that are supported by Fiesp. The themes are organized in four sections that address the following issues: (i) projects and process management in construction; (ii) taxation; (iii) financing of the investments; and (iv) supply of raw material and factors of production (capital and labor) to the production chain.

18: A TFP is a measurement of the average productivity of labor and capital used in production (amount added by worker and amount added by unit of capital). The productivities of labor and capital are weighted according to the salaries and gross profits in the amount added by the companies.

Management

Building information modeling

The methodology for development of projects called building information modeling (BIM) is a concept that represents digitally the physical and functional characteristics of a building, sharing and integrating knowledge in a way to build a real base for decision making during the life cycle of the projects. Traditionally, the drawings of buildings are made in two dimensions. The BIM extends this to the three primary spatial dimensions, furthermore incorporating information on the dimensions of time and cost. The information organized in the primary spatial dimensions go beyond geometry. The BIM covers spatial relations, geographic information, and quantity and properties of the construction components, which are defined in data libraries by the manufacturer.

The system integrates the information of the architectonic and landscaping projects with the ones of structural engineering and the plumbing and electrical plans, ensuring a consistency of the plans as a whole. The administrative counterparty of the financial flows, production schedules, human resources and procurement of materials and services are also integrated in the system, so that, for example, the impacts on costs for an alteration in the plumbing plans or in a window can be quickly evaluated. Along the process, the BIM incorporates the necessary changes and renews all the information system, and when the construction is finished all the information is archived, providing a complete history record of the construction, which can have diverse future uses - information support for renovations and adaptations of the buildings, insurance contracts, legal issues, etc.

In Brazil, the use of the BIM is still not widespread because of the relatively high investments necessary to carry it out and because of the culture of Brazilian companies itself and also their end customers. Use of the BIM requires the reorganization of the production structure of the company,

breaking with the traditional production processes, allowing the information interface between the various disciplines in the project development process.

The software is imported and it carries a high tax burden (import tax, income tax, Social Contribution on Net Income [CSLL], the Social Integration Program [PIS] and Contribution to Social Security Financing [Cofins]). The hardware needed to operate the tool is also more sophisticated and expensive. On the top of representing high capital expenditure for medium and small engineering and architecture companies lacking credit lines for its purchase, another issue is the need for

more qualified labor. Today, there are few professionals apt to fully utilize this tool. Construction materials produced in Brazil do not yet have libraries that adequately specify their technical and environmental properties, limiting the use of the methodology for proper reviews on sustainability.

In this sense, the advance of the use of this methodology in Brazil has to go through incentive policies for purchasing the tools and the training of labor. There is also a great task to be undertaken by the industry, which is the generation and cataloging of information on materials, machinery and equipment.

ACTIONS

- Foster the development of libraries associated with the construction materials and machinery and equipment used in the constructions;
- Promote the use of the BIM concept by reducing the tax burden on the software, and by creating credit lines;
- Support the training activities of professionals to develop projects in the BIM environment.

Integrated Constructions Permit System

In general, obtaining permits for constructions is a slow process and has to be done with the municipalities, with specific and own rituals. In some cities, the lengthy process, how it is made and the sequence of bureaucratic steps to project approval, construction and the occupancy permit (Habite-se) use a great deal of the companies' time. In addition, in most municipalities, the process is done manually, which undoubtedly reduces the pace of approval.

A recent experience, currently being implemented in the municipality of Atibaia is the Integrated Constructions Permit System (SILO), a computerized process for approval of building documents and expediting permits and documentation needed for demolition, construction, renovation and occupancy permit of buildings. SILO is a platform that operates in the web environment and receives registration records of companies and technical managers, projects, permit applications and all files and documents required for the approval of the construction works. The platform is flexible, which allows the creation of custom interfaces.

The system operates in an integrated and very simple way: the construction company registers the business and the technical managers, and for every project opens a file in the system. Next, forms related to the project are filled and all documentation are submitted electronically - the building documents are transferred in PDF format. The evaluation and approval of the project are made by technical staff of the municipality in the system itself, which sends reports and allows the online monitoring of the process. Once approved the project, demolition, construction or the occupancy permit, the system issues the permit. Upon completion, the process moves to electronic filing.

In addition to being safe, automation of the process of license approval saves a great deal of time for professionals and reduces business costs, without negatively affecting the regulations made by local governments. This is also a tool that provides transparency to the approval processes of construction works.

ACTIONS

- Promote the results from the implementation of SILO in Atibaia, highlighting the gains to society and municipalities;
- Disseminate the use of SILO to other municipalities, fostering the acquisition of necessary equipment and software, and training of the workforce.



Real estate registry

A demand of the Fiesp's Program Compete Brazil related to the institutional and management aspects is the reduction of the bureaucracy in the real estate registry. The 10th ConstruBusiness, published in 2012, brought proposals which positively progressed in recent years, leading to a major institutional reform. In October 2014, the federal government published the Provisional Act 656/2014, establishing the concentration of the acts in the property registration in order to increase security in the real estate business.

The Provisional Act, expected to become law in 2015, provides that the establishment, transfer or modification of rights on real estate will have guaranteed effectiveness. This is because the previous legal acts that do not have record of amends in the registration at the real estate registry shall have no legal value in disputes. Therefore, anyone who acquires or receives real rights on a property as guarantee no longer faces the risk of a third party claiming rights over that same property.

The information that must be registered or contain record of amends in the registration are:

- Register of citations of real or personal possessory actions;
- Amends, at the request of the concerned person, of legal constriction, the enforcement or prosecution phase action of compliance with judgment;
- Amends of administrative or conventional restriction in the enjoyment of registered rights, unavailability or other charge, when provided for by law;
- Amends, through court order, of the existence of other type of action whose results or liability equity can lead its owner to insolvency..

The Provisional Act (MP) provided legal guarantee to real estate buyers in Article 11, which states that the creation of a lien or encumbrance of autonomous units belonging to a real estate development, land subdivision or condominium lots of urban land, duly registered, may not be subject to disqualification due to a pre-existing home (eviction). The measure also dismissed the need for a notary public to transcribe the document proving payment of the Real Estate Transfer Tax (ITBI), tax certificates and certificates of property and encumbrances, requiring only to be registered in the title that the documents were submitted. The MP came into force in November 2014, covering records made from that month and granting a deadline of two years for past acts that are not in

the property registration to be properly registered, otherwise these acts may become void.

This was a major breakthrough, which will decrease legal insecurity, but there are other challenges to be considered. A proposal of the 10th ConstruBusiness, which became a priority, is to encourage the efficiency of the registry offices through greater control of the government on its performance. The idea is to create a system for measuring productivity and establish minimum performance levels. The registry office that does not meet these requirements will be subject to a fine and, ultimately, the loss of ownership. In addition, it is necessary to establish deadlines for the computerization of all registry offices in the country.

ACTIONS

- Mobilize the Government to create a performance evaluation system of the registry offices;
- Mobilize the Government to promote computerization of registry offices in the country.

Safety of buildings

The working group on Safety of Buildings of Deconic-Fiesp was created in late 2013 with the aim of gathering sector entities directly involved in the issue of safety in buildings and their facilities. In its first meeting, it was formalized the creation of three specific subgroups: (i) Legislation, Standards and Strategic; (ii) Financing and Insurance; and (iii) Qualified Labor and Certification.

Throughout 2014, the group met to chart diagnosis on safety problems in buildings, according to existing subsystems. In addition, it served in the identification of the bills that were in progress in the legislative branch in order to propose amendments. Negotiations were made with parliamentarians, leading to the inclusion of amendments for approval of bill (PL) No. 6014/2013 which determines that periodic inspections of buildings are conducted and creates the Building Technical Inspection Report.

Amendments in the PL No. 3370/2012 were also proposed, which provides for the obligation of expert surveys and periodic maintenance in buildings, and in the PL No. 2020/2007, which provides for general safety standards in venues used for shows and the like.

With regard to actions to be undertaken in 2015, the group prioritized the development of a publication to educate companies, government and society about the importance of the periodic inspection; and also prioritized the discussions on the qualifications and professional certification in the area of safety inspection of buildings.



ACTIONS

- Development of the Safe Building Guide, a publication for the awareness of society and government on the importance of periodic inspection of buildings;
- Develop actions for the qualification of professionals in this field.

Taxation

Payroll tax relief plan

The payroll tax relief plan in some sectors of the construction chain has brought benefits throughout 2013 and 2014. Although few industries have been included in the list of products that received tax relief benefits, construction companies, the engineering and architecture offices, technical tests and analysis companies, and construction material shops have been benefited. Each segment was included at different moments in time since the end of 2012, but all realized considerable economic gains.

According to the Secretariat of the Federal Revenue of Brazil¹⁹, on average during the first five months of 2014 about 20 thousand companies have benefited from the tax relief plan, including construction companies, engineering and architecture offices, technical tests and analysis companies, and construction material shops (wholesale and retail). It is estimated that, in these segments, the number of employment arrangements affected by the policy of tax relief has reached almost 1.8 million. The total savings for these companies reached R\$ 192 million per month. Table 7.1 has details on these data.

In relative terms, the 1.605 million employment arrangements in the construction companies benefited from the tax relief plan accounted for almost 55% of the workers with a formal contract in this sector. The savings for companies accounted for 1.8% of social contributions in the sector²⁰. In the construction materials business, it is estimated that 1,317 companies have been benefited, reaching over 151 thousand employment arrangements (12.9% of total employees) and generating savings of R\$ 13.8 million for these companies,

Table 7.1 - Payroll tax relief plan, 2014*

Sectors	Companies	Employment Contracts	Amounts (R\$ million)
Construction of buildings	8,195	440,844	39,088
Infrastructure work	1,852	781,317	103,426
Construction specialized services	7,606	383,546	32,042
Wholesale business	69	26,998	1,800
Retail business	1,248	124,416	11,999
Engineering and architecture services**	673	41,748	3,446
Total	19,643	1,798,869	191,801

Source: Secretariat of the Federal Revenue of Brazil, 2014. Prepared by: Ex Ante Consultoria Econômica. *Average from January to May 2014. **Includes technical tests and analysis companies.

which accounted for 0.8% of the social contributions in the sector.

Directly, this is one of the factors that contributed to the job creation in the country in the last two years. During the tax relief period - beginning of 2013 to 2014 - companies in these segments of the construction chain accounted for the opening of more than 200 thousand jobs with formal contracts.

Given the competitiveness gains generated by the payroll tax relief plan, the working group Fiesp's Program Compete Brazil concluded that maintaining this policy and extending it to other segments of the chain is beneficial. For 2015, the tax relief plan has already been secured, but it is still a policy that depends on yearly renewals - that is, it has not been permanently incorporated into the system of employers contribution. Therefore, it is necessary to make this a permanent policy, offering long-term security to the sectors. In addition to this tax relief plan, there is another portion of the cost of construction companies that can be saved without losses to society.

Construction companies pay larger amounts of taxes under environmental work hazard (RAT). The RAT is a company's tax contribution provided for in Law No. 8212/1991, which is a measure related to the hazard of the economic activity, based on what it is charged a contribution to fund the social benefits due to the degree of incidence of incapacity to work. The RAT contribution for construction companies is 3%²¹, which means that the activities are considered of serious hazard. The rate concerns the total amount of the salary.²²

An important aspect is that the degree of hazard is calculated as an average for all workers involved in construction, with no differentiation between the functions of employees or their professional qualification. Thus, people engaged in construction work supposedly face the same hazards of environmental exposure that employees in administrative office functions. Similarly, a qualified employee with technical training supposedly faces the same risk that an unqualified worker.

Considering the weight of this burden on the payroll, and in view of the benefits of the tax relief plan to the construction

19 BRASIL. Secretaria da Receita Federal, 2014.

20 Based on the National System of Costs and Construction Indexes Survey (Sinapi) of the Brazilian Institute of Geography and Statistics (IBGE), the difference of the direct labor costs per square meter of a company with the benefit and one without was 13.3% in 2014 and the total costs per square meter was 6.5%.

21 Includes all activities in the groups of the National Classification of Economic Activities (CNAE) 41, 42 and 43, with the exception of activities in CNAE 43.291 - other installation works - whose rate is 2%, equivalent to activities of medium hazard.

22 In the case of worker exposure to harmful agents that allow the granting of special retirement, there is an increase in the contribution rates according to the current legislation.

chain, the working group Fiesp's Program Compete Brazil concluded that there is a possibility to reduce these costs with RAT, adopting a system that differentiates the roles of employees and their qualification. Workers with professional certification and those performing administrative roles would have a contribution rate of 1% (low hazard). In addition to reducing costs, this proposal would encourage qualification and professional certification, with positive impacts on productivity.

ACTIONS

- Keep the payroll tax relief plan for sectors of the construction chain, expanding segments that benefit from it;
- Reduce the RAT rate to 1% in the case of administrative staff and all employees with professional certification.

Tax on Goods and Services (ICMS) in industrialized construction

As discussed in the introduction to this chapter, between 2007 and 2014, the labor productivity in the construction sector increased less than the cost of labor in real terms, negatively affecting the competitiveness of companies. Part of these negative impacts were mitigated with strategies increasing the use of machinery and equipment, adopting more efficient construction methods and raising the scales of operation. However, the adoption of construction methods with high productivity of labor in worksites still faces high tariff barriers.

A case study on the industrialization effects on productivity of labor and construction costs was presented in 2013 on a publication coordinated by the Association of the Construction Material Industry (Abramat)²³.

The study looked into housing intended for middle class population, but illustrates the extent of the savings with labor and the potential reduction in costs and real estate prices²⁴. The adopted construction method was the use of concrete precast made at the worksite, with technological support of a precast company. Despite being more expensive, this method had market reasoning: the speed of sale and delivery of the project.

The technology used could involve parts precast at a factory, not at the worksite. This alternative would bring productivity and efficiency gains arising from the industrialization process, in addition to the environmental benefits. The factory precast employ higher content of technology and capital, which raises labor productivity, as well as greater quality control. The production of parts at the worksite, on the other hand, uses machinery and equipment below their production potential, in addition to the fact that the workforce is less productive than at the factories.

However, the precast technology made at a factory is more expensive than the system with precast made at the construction site. This is due to lack of tax equality: the factory precast parts pay Value-Added Tax on Sales and Services (ICMS) and the ones made at the worksite pay Municipal Tax on Services (ISS), which implies great differential rates. Thus, the differential on construction costs due to this tax blocked the better use of economic resources (labor, capital and energy) and has indirect effects on the environment.

Data on this study indicated that the construction cost of projects using precast on site was R\$ 29.8 million. Of this amount, 44.1% corresponded to costs with labor and services, and 55.9% to materials and equipment. The share of construction costs in general sale value (VGV) reached 52.4%. The ICMS on materials on the project construction cost accounted for 6.4% and the VGV, 3.4%. But the cost of construction using factory-made precast at the time was estimated at R\$ 30.6 million, that is R\$ 805 thousand more than the construction with precast produced at the worksite. Labor and service costs would amount to 45.7% and the materials and equipment, to 54.3%. In this construction alternative, the share of building cost in the VGV would reach 53.9%, indicating loss of gross margin of 1.4%. The weight of the ICMS on materials towards the construction costs would be 9.7% and in VGV, 5.2% (Table 7.2).

In addition to the tax disincentive to the adoption of more productive and sustainable technology, companies and representatives of the sector indicated that there other barriers to technological change in the building process. The two main are: methods of measuring the progress of the work and partial benefits assessments. In the first case, the measurement of construction using precast must adapt to the fact the greater portion in the value of the construction is done at the factory. Thus, the measurement of progress for the purposes of payment by the client should take place as it is shipped from the factory to the construction site rather than when the part is being assembled at the construction site. On the other hand, the costs and benefits appraisal of methods conducted

Table 7.2 - Weight of construction costs and of the ICMS over VGV*

	Worksite-produced precasts	Factory-produced precasts
Share in the building cost		
Labor and service	44,1%	45,7%
Materials and equipments	55,9%	54,3%
ICMS on materials	6,4%	9,7%
Share in VGV*		
Building cost	52,4%	53,9%
Gross margin	47,6%	46,1%
ICMS	3,4%	5,2%

Source: CBIC, Abramat, Abcic, IABr and Associação DryWall (2013). Created by: Ex Ante Consultoria Econômica. *VGV of R\$ 56.8 million.

(23) The study Taxation, industrialization and technological innovation in civil construction (Tributação, industrialização e inovação tecnológica na construção civil, 2013) was sponsored by the following entities: Brazilian Chamber of the Construction Industry (CBIC), Association of the Construction Material Industry (Abramat), Brazilian Association of Industrialized Concrete Construction (ABICIC), Brazil Steel Institute (IABr) and Brazilian Drywall Association.

(24) The analyzed project was a residential compound with 3 blocks of residential buildings in the Vitória region. In total, the project consisted of 277 housing units, out of that 138 apartment units with 2 bedrooms (approximately 58 m²) and 139 apartment units with 3 bedrooms (approximately 69 m²). The expected mean value of sale of 2 bedroom properties was R\$ 180 thousand and the 3 bedroom, R\$ 230 thousand. These project parameters came to a potential general sale value (VGV) of R\$ 56.81 million.

by construction companies and by the government should be integrated and not partial, reflecting other criteria beyond the cost of the construction. The increased productivity, reducing the construction period and the need for unskilled labor, the higher performance of materials and positive environmental impacts should have influence in the evaluations and their benefits should be quantified in monetary terms to be used when comparing differential costs.

ACTIONS

- Promote tax equality between industrial and conventional systems;
- Adapt methods for measuring construction progress in the case of industrial systems;
- Encourage the integrated assessment of the benefits in the industrialized systems.



Financing

Real estate loans

The real estate financing had a steep expansion since 2007. The value of the real estate credit line inventory reached about R\$ 470 billion in September, 2014, which is equivalent to approximately 9.35% of the Brazilian gross domestic product (GDP). In September 2007, the balance of the real estate credit line was only 1.75% of the GDP.

This was due to the expansion of the increase of funding from saving accounts and from the Severance Indemnity Fund for Employees (Fundo de Garantia por Tempo de Serviço - FGTS), which gave room to the expansion of credit. Under the loans provided by the Housing Financial System (SFH), that includes resources from the Brazilian System of Savings and Loans (Sistema Brasileiro de Poupança e Empréstimo - SBPE) and the FGTS, the number of units financed by savings accounts exceeded for the first time the mark of 500 thousand units in 2013 and the number of real estate financed by the FGTS also reached this number. Altogether, the number of

loans, excluding the financing of building materials, exceeded one million units in that year (Chart 7.1).

The main reason for this credit line expansion was the My House My Life Program (PMCMV). Between 2009 and 2013 the number of units financed in the country totaled 4.89 million, and the contracted housing units by PMCMV totaled more than 3.24 million during the period (2/3 of the total).

Despite the strong growth of traditional sources of financing, the Housing Financial System (SFH) has a social purpose and rules limiting investments in other areas of the real estate market. The maximum amount of funding from SFH is R\$ 500 thousand per unit, which has become insufficient for medium to high standard housing in the large Brazilian cities. In addition, financing for non-residential property requires funds that are not covered by the sources of compulsory resources such as savings accounts and the FGTS. The demand for high standard residential and commercial property are funded by the Real Estate Financing System (SFI).

The bonds that attract the resources for credit in the financial market are the Real Estate Receivables Certificate (CRI), estab-

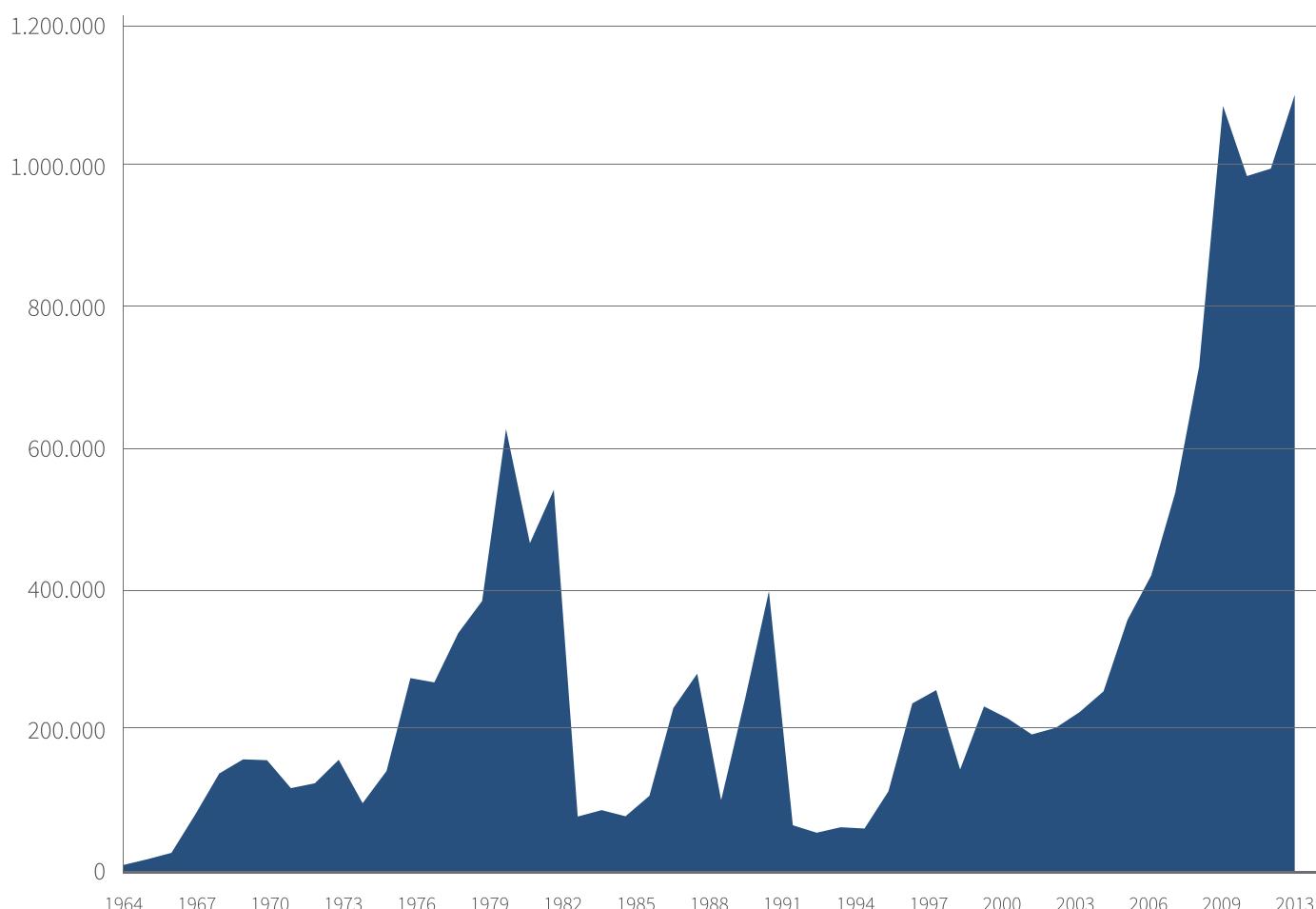


Chart 7.1 – Number of credits* from the Housing Financial System. Source: Caixa Econômica Federal. Prepared by: Ex Ante Consultoria Econômica. *Includes financing of construction materials.

lished in 1997, the Real Estate Credit Note (CCI) and the Real Estate Credit Bill (LCI), both established in 2004. According to Cetip (Central de Custódia e de Liquidação Financeira de Títulos), the inventory of CRI in circulation reached R\$ 51.973 billion on October 31, 2014, with an average annual growth of 44.4% in real terms since October 2007. The balance of CCI in circulation, in turn, totaled R\$ 82.266 billion and an average real expansion of 55.4% per year was recorded since October 2007. The inventory of LCI reached R\$ 137.805 billion in October 2014, an amount 41.0% higher than in October 2007.

To ensure the continued growth of these sources, Provisional Act 656/2014 stipulated measures to ensure greater protection of the investments in the event of the insolvency of the issuer and foster the development of the capital market, increasing the liquidity of the bonds. In order to increase the guarantee on current real estate bonds (LCI and CCI) and reduce credit risk, it was created a new bond called Real Estate Guaranteed Bill (Letra Imobiliária Garantida), which guarantees the rights of buyers of the bonds in case of insolvency of the issuer. If the issuer of the bond goes bankrupt and needs to sell its assets, including the set of assets to which the bonds are linked, the buyers of the bonds would have first priority for payment, because the assets comprising the portfolio trusted to the fiduciary scheme are detached assets, which are not to be considered as part of the issuing institution.

This legal provision, which was one of the flagships of the latest editions of ConstruBusiness, will allow to bring closer together the Brazilian real estate bonds to the so-called covered bonds, a real estate financing mechanism in the parameters earlier described, widespread in Europe. Such bonds represent considerable percentages in the total amount of credits backed by mortgages in European countries. In Denmark, the balance of covered bonds backed by mortgage amounted to 147.1% of the GDP in 2012, according to information provided by the European Covered Bond Council (ECBC). In Spain, the balance of these issued bonds reached 38.8% of the GDP on that same year.

Another important advance in the area of long-term housing financing was the expansion of low income housing subsidies. On the top of reducing the need for real estate credit, as it abates part of the property value, the subsidy reduces credit risk, encouraging the due performance of the loan agreements. This acts as an additional stimulus to real estate credit. The housing subsidies have been expanded significantly under the My House My Life Program, which will be in its third phase in 2015. As the demand for housing will be increasing in the coming years and considering that Brazil still has high social liabilities in this area, ConstruBusiness advocates that the program should become state policy, ensuring its continuity and stability until the housing shortage in the country has been remedied.

ACTIONS

- Support the implementation of the Real Estate Guaranteed Bill and its consolidation into law as a way of reducing credit risk and expanding funding for the real estate market;
- Improve the traditional SFH financing mechanisms in view of expanding the availability of FGTS funds and of savings accounts for investment in housing;
- Support establishing the PMCMV as state policy.



Public-private Partnership

The public-private partnership (PPP) was established by Law No. 11.079, 2004. According to the law, the PPP is an administrative concession contract that can be done in the sponsored or administrative modality. The ordinary concession, governed by Law No. 8987, of February 13, 1995 is not a PPP. Thus, as in ordinary concession, a PPP contract is governed by bidding in a competitive modality.

The sponsored concession is the commissioning of public services or public works in cases where the fees charged from users are not sufficient to offset the investment performed by the private partner. In this case, the government complements the remuneration of the private enterprise with regular contributions from budgetary resources (government consideration), in addition to the fees charged from users. Differently, an administrative concession is a service contract in which the public administration is the direct or indirect user. In this case, the collection of fees from users of such services is not possible or convenient. The remuneration to private enterprise is fully funded through regular contributions from government budget resources.

With the PPP, it became possible to increase the funds for financing works, to reduce project costs and improve the quality of services provided. Thus, the PPP affected service sectors provided to households and businesses, utilities services, infrastructure and also the housing sector. By allowing the expansion of investments, it contributed to the expansion of the industry that provides construction materials.

The government of the Federal District (GDF) was innovative in the area of PPP, bringing this modality to the housing sector. In two recent experiences, Terracap, a state-owned enterprise owner of the public lands in the Federal District, gave public lands in return for real estate developments. In one case, housing development Jardins Mangueiral, owned by PMCMV (Brackets 2 and 3), Terracap offered the plot and the GDF granted to the construction company the concession to provide maintenance of the area for ten years.

The company built and sold the real estate at a reduced cost. In the second case, the GDF, also through Terracap, donated an area for residential building for the construction of a bridge over Lake Paranoá, north region of Brasília. Another innovative case was the PPP of the Penitentiary Facility Ribeirão das Neves, in Minas Gerais. The state government provided the land for the penitentiary facility and the private partner developed the project, chose the construction and management technology, built the prison and was responsible for the management of the penitentiary facility in exchange for a monthly per prisoner payment by the Department of Public Safety,

as well as performance bonuses. The government follows 380 established performance criteria to measure the quality of the services provided by a private partner and, based on them, defines the bonus disbursed to the service provider.

The housing experiences enabled the expansion of available land at competitive cost to build housing in one of the most expensive regions of the country, where without the donation of land, the property would have a cost most focused on projects for higher income classes. Thus, a new perspective on the land shortage problem came about in the major metropolitan areas of the country. Parallel to that, performance-based service management has brought more efficiency and has reduced the need for public sector resources, expanding the prison system of Minas Gerais by five criminal units until 2014, with five more units planned for the coming years. Accordingly, the PPPs will have an important role in the financing of investments in the coming years, whether in the areas of infrastructure, in the housing sector or in the provision of public services, such as safety.

ACTIONS

- Encourage public-private partnerships in the housing sector for the expansion of land supply in priority urban areas;
- Encourage the use of PPP in areas that provide public services of safety, education, sanitation, health, urban transport, airports, highways, ports and environmental projects.

Production chain

Construction materials, machinery and equipment

The rapid growth of the construction business, coupled with deficiencies in the country's transport infrastructure, created serious problems in the logistics and distribution of construction materials. At times construction works reduce their pace due to lack of certain raw materials, ultimately leading to an unexpected increase in costs, compromising the planning and return of the companies.

The supply problem is particularly acute in the case of mineral goods. Environmental regulation and the new Mineral Code, which is still pending in the National Congress, creates uncertainty regarding the supply of mineral goods for construction - mostly sand and gravel. In various regions it has been noticed an increase in the distance between the mining areas from the areas of consumption, impacting the transportation cost. In others, local bans have prevented the exercise of mining with consequences to the construction companies in their own city.

In addition to the problems associated with supply and distribution, lack of planning related to the types of material used in the construction projects and how they are used can also generate delays and incremental costs. This happens mostly due to problems in the quality of projects. There is also unpredictability regarding the utilization of machinery and equipment that at times are under contract without being used, incurring costs to the construction companies. Also, the lack of machinery and equipment available for lease can slow down the process and delay works.

The production costs of the construction material industry have grown sharply, at a pace that was not followed by prices of materials in the market. This led to reduced margins, as discussed on Chapters 2 and 3. Higher costs were caused by the real increase in wages (much higher than the productivity gains of the workforce) and by rising costs of electricity, natural gas and fuel oil - particularly important for energy-intensive industries (for example chemical, cement, metallurgy of aluminum and copper, steel mill, glass and ceramics).

In this respect, a speedy review of the country's energy policy is needed in order to enable the restoration of competitiveness of the domestic industry, with a reduction of charges, taxes and the cost of primary energy itself. Particularly important are the costs of electricity for free consumers, that compete with distributors in unequal conditions over concessions of new and old energy: to distributors, energy is resold at a higher rate, yielding profits from the operation;

meanwhile, energy represents to the industry a cost that, for the sake of competitiveness, must have parity with the values practiced abroad. Other priority issue is the price of natural gas, which in Brazil costs about three times more than in the United States.

To fight unfair competition from imported products entering the Brazilian market without compliance to quality standards, Brazilian legislation made it possible to have a prior evaluation of the technical conformity of imported building materials. Products that are subject to technical standards are assessed by the National Institute of Metrology, Quality and Technology (Inmetro) before they enter the national territory, thus preventing non-conforming merchandise from reaching the market. To allow for this procedure to take place, the technical standard must be compulsory and Inmetro must be required to perform the verification.

The environmental agenda is a priority in the construction business. The construction sector is a pioneer in Brazil in the implementation of life cycle evaluation (ACV), within the Brazilian Programme for Life Cycle Evaluation. In 2014, the Civil Construction working group was created, coordinated by the National Confederation of Industry (CNI). The area of materials and construction components, coordinated by Deconcic-Fiesp and by Abramat, has already begun its work, adopting a methodology of modular ACV (ACVm), which is consistent with the existing standards of the International Organization for Standardization (ISO). The ACVm will allow companies of all sizes to manage their environmental impacts, presenting to customers the results of their effort.

The methodology developed by the Brazilian Council for Sustainable Construction (CBCS), in collaboration with the University of São Paulo (USP), and with the support of the Brazilian Portland Cement Association (ABCP) and the Brazilian Association of the Concrete Blocks Industry (BlocoBrasil) was successfully tested in a pilot project in the concrete block field. In 2015, the program will be structured with the creation of the necessary technical standardization and expanded to other production chains.

ACTIONS

- Monitor the progress of the new Mineral Code in the National Congress, avoiding the inclusion and approval of amendments that have unnecessary and excessive impact to the mineral sectors of the construction industry;
- Speeding up logistics programs and integration of modes of transportation in the country, enabling medium-term reduction of costs;
- Support policies to reduce the primary cost of electricity and charges and taxes on electricity;
- Support policies aim at increasing the supply of natural gas for industrial use and at reducing the price of energy used by a factory;
- Promote the modernization of industrial parks through the utilization of equipment with higher energy efficiency and greater productivity of labor;
- Support industrial sectors that wish to employ compulsory technical standards as a form of avoiding the entry of imported goods without technical compliance;
- Support the implementation of the ACV, structuring the program with the creation of the necessary technical standards and applying standards and methodologies to other productive sectors.

Labor

Two problems in the construction production chain are the poor qualification of labor and the rising costs with wages. These two factors have emerged in recent years with the recovery of activities in the sector. Employment grew significantly in almost all sectors of economic activity, with systematic reduction in the unemployment rate in the country. On the other hand, the professional capacitation system in Brazil was unable to properly improve the pace of labor qualification.

These factors led to shortage of qualified labor, which became highly sought after. Table 7.3 shows that in the weighted average of occupations, the construction industry had a low education workforce in 2013: 6.7 years of schooling against the national average of 8.4 years. Civil construction was ahead only of agricultural activities, whose average schooling was 4.4 years in 2013. The industries in the business of processing, mining, trade and services had much higher rates of education (at least 2.3 years more of schooling).

It is important to note that this difference is due solely to the low qualification of manpower directly involved in production. The direct labor had average schooling of 6.3 years in 2013. The high proportion of this group in the total construction industry workforce caused a reduction on the average within this sector. On the other hand, the data show that there is little difference between the construction and other economic sectors with respect to other occupations. Compared to managers and professionals in the sciences and the arts, the qualification of the construction workforce was higher than in these other activities in 2013.

The lack of workers and the low qualification of labor affect the construction companies directly and indirectly. There are problems related to the qualification of workers hired directly by the companies, as discussed earlier, as well as to the

delays caused by the lack of labor. But there are also serious issues related to qualification and shortage of labor in other links of the construction chain. There is a lack of qualified machinery and equipment operators, affecting companies that rent capital goods. Another sector that requires skills is the one of industrialized construction systems, whose productivity depends on specialized labor. These two sectors are precisely the ones that can increase labor productivity in construction works, thus becoming a matter of strategy to train professionals in these areas.

The lack of qualified labor is particularly serious because the evolution of labor productivity remained below the increase on the average cost of labor in civil construction, as discussed on the introduction of this chapter. In the case of the industry of construction materials, machinery and equipment there was in fact a reduction in labor productivity between 2007 and 2014, seriously affecting the return of companies.

In this context, comprehensive programs of professional training are priorities for the construction production chain. Priority should be given to the technical education for professionals with medium qualification and employed directly in the construction projects. The training can be provided by the company itself. The motivation that will enable this initiative of training employees is the granting of tax credits, as adopted in countries with high labor productivity: Canada, France and the United States. Furthermore, the programs of higher education in engineering and architecture must better reflect the needs of the construction industry labor market, integrating educational institutions and businesses, and re-adjusting the university curriculum.

Tabela 7.3 – Workforce schooling according to activity and occupation, 2013

Activity sector	Management	Professional in the sciences and arts	Medium-level technicians	Non-specialized	Total
Agriculture	8,5	14,5	10,1	4,4	4,4
Mineral extraction	12,8	14,8	11,9	8,4	10,2
Transformation industry	11,9	10,5	10,8	8,2	9,0
Construction	11,6	14,7	10,8	6,3	6,7
Trade and repairs	11,2	13,8	10,7	8,6	9,2
Non-financial private services	11,4	14,2	11,3	8,1	10,4
Total	11,3	13,8	11,0	7,0	8,4

Source: National research per household sample, IBGE. Prepared by: Ex Ante Consultoria Econômica.

ACTIONS

- Create incentives to promote training initiatives conducted by competent and accredited organizations, prioritizing professionals who will be actually employed in the construction projects;
- Encourage companies to train and certify their staff, by providing discounted rates or taxes (RAT, for example);
- Encourage the planning of human resources, anticipating the actions of funding and training of human capital, recognizing the value of this most important asset for the development of processes;
- Encourage partnerships, internships and joint research between the business sector and academia.
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Annex

Economic and accounting definitions

Gross revenue is the sum of revenue obtained from the main and secondary activities carried out by a company. Net revenue is obtained by excluding taxes and contributions on revenues of sales and service, on canceled sales and on rebates and unconditional discounts. The gross and net revenues of an economic activity neither include revenues from financial transactions and from active monetary variations (indexation), nor from the non-operational revenues resulting from the disposal or sale of fixed assets, or revenue originated from the reversal of provision for losses.

The gross value of production is defined as the net revenue from the sale of products and services, plus the inventory changes of manufactured products and products being manufactured, and own production of fixed assets.

In the case of the civil construction industry, the most important concept is the value of the constructions and services. This concept is defined by the Brazilian Institute of Geography and Statistics (IBGE) as the value, based on market prices, of the construction projects performed in a given year. It is different from the value of the companies' gross revenue, which can incorporate amounts of construction works from a previous period. For accounting purposes, the value of the constructions works and services corresponds to the amount invested in construction or the gross fixed capital formation in construction.

The gross value of production of a company (VP) can be divided into two components: the intermediate consumption (IC) which corresponds to the sum of costs with raw materials and services (inputs) produced by other companies and that were acquired in the production process, aimed to the production, and the value added (VA) - the final value portion that was produced by the company.

$$VP = IC + VA$$

For a company, the intermediate consumption is the result from the sum of the following expenses and costs: consumption of raw materials; services contracted to third parties; maintenance and repair services of machinery and equipment involved in the activity (provided by third parties); con-

sumption of fuel and lubricants; rentals and leases; advertising expenses; insurance premiums; royalties and technical assistance; and non-operating expenses.

The VA per construction is defined as the difference between the gross value of production and intermediate consumption: $VA = VP - IC$. The value added by a company also equals the sum of the income earned by workers and capitalists, because it is fully utilized in the payment of factors of production:

$$VA = PR + EO$$

Where PR is the payroll and EO is the gross return on capital or gross operating surplus. Alternatively, gross return on capital can be obtained from the difference between value added and payroll.

In this sense, the concept of value added corresponds to the cost with factors of production. This concept is quite distinct from the concept of operating cost (OC), which is the sum of the costs with labor, services and raw materials, that is, $OC = PR + IC$. This means that the operating cost is the difference between the gross value of production and the operating surplus (including return on capital): $OC = VP - EO$.

From an aggregate point of view, when considering a specific economical sector such as the construction material industry, the most important definition is the aggregate production in the sector. A first approach, rather intuitive, would consider it as the sum of the gross value of production of the various companies within the sector. Notwithstanding, the value of production from a company already includes in its intermediate consumption the value of production from other companies in the same sector. Therefore, if we were to freely add the value of production from all companies in the industry, this would incur in a double counting problem, which would overestimate the sector's production.

One can avoid this problem by counting the value added by all companies in the sector. As this component is defined as the difference between the gross value of production and intermediate consumption of a company, it already discounts the value added by other companies. By analogy, it is under-

stood that the production of a region is the sum of the value added by all companies operating in a certain geographical area.

Database

The databases that bring such accounting statistics are the IBGE annual surveys:

- **Annual Survey of Construction Industry (Paic):** contains information on the economic and financial situation of companies in the civil construction chain. Here one finds information on employment, wages, costs, value of construction projects, among others;
- **Annual Survey of Industry (PIA):** contains economic and financial information that will make it possible to estimate the basic structural characteristics of the business segment in the industrial activity in the country, and follow its evolution over time. It provides information on employees, salaries, withdrawals and other compensation, revenues, costs and expenses, value of production and value of the industrial transformation.
- **Annual Survey of Services (PAS):** contains data on revenues, expenses, employees, salaries, withdrawals and other compensation, as well as value added, among other aspects, especially for companies with 20 or more employees, and also regional data on the distribution and configuration of the service sector.
- **Annual Survey of Trade (PAC):** provides information on the production structure of the Brazilian trade segment and presents data on revenues, expenditures, employees, salaries, withdrawals and other compensations, purchasing, inventory and sales margins, among other aspects, especially for companies with 20 or more employees, as well as regional data on the distribution and configuration of the sector.



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