A different future is possible
Perspectives for the chemical industry in Brazil
The Brazilian Chemical Industry Association – Abiquim (www.abiquim.org.br) is a nonprofit entity created on June 16, 1964, which gathers small, medium and large-sized chemical industries, as well as service providers that work for the chemical industry in the fields of logistics, transportation, waste management and emergency response.

The association performs a statistical monitoring of the industry, promotes specific studies on products and activities of the chemical industry, monitors changes in the laws and regulations and advises member companies regarding economic, technical and foreign trade matters. The entity also represents the industry in negotiations of national and international agreements regarding chemicals.

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A different future is possible | Perspectives for the chemical industry in Brazil
The shifting point for Brazil – and for the chemical industry

It is undoubtedly possible to say that, in 2018, Brazil is going through a shifting moment in its history. After beginning the 21st century with its hyperinflation problem settled, we were engaged in a growth cycle that resulted in greater development, prosperity and social justice. However, in the subsequent years, the growth exuberance was replaced by one of the most severe downturns in our history – in addition to in-depth questionings regarding how businessmen and governments interact. We are currently living a unique moment divided between the hopeful past and the uncertain present. The choices we make, this year and in the next ones, will be essential for determining what country we want to be.

The chemical industry wishes to exercise its vocation as one of the major players in Brazil’s development. In order to do so, it needs to resume investments, which depend on the resolution of a series of obstacles that take competitiveness away from our industry. We need to return to our position in the internal production chain, without giving up the foreign trade.

The proposals presented in this report aim at removing the obstacles preventing investments and at providing the chemical industry with the conditions necessary to help Brazil and Brazilian people. In brief, the initiatives comprise measures to reduce costs and bureaucracy, modernize production processes and insert the chemical industry in the 21st century. In this sense, it is essential to create conditions so that the industries can innovate. This is the only way for the sector to be included in the context of the Industry 4.0. We are a sector that pervades the other sectors in our industry. We are part of the agribusiness chain, of the automotive industry, of the electronics segment, among many others, and we act as an important agent of the convergence marking the new economic era – an economy that is more and more digital, integrated, collaborative and, especially, interdependent. We proudly play our role of contributing with the others in order to achieve the productivity growth and gain Brazil longs for.

Have a nice read.

“The proposals presented in this report aim at removing the obstacles preventing investments and at providing the chemical industry with the conditions necessary to help Brazil and Brazilian people.”

Fernando Figueiredo
CEO of Abiquim

Marcos De Marchi
Chairman of Abiquim’s Board of Directors
Executive summary

A sector with strong participation in the economy

The chemical industry is present in nearly all economic activities – agriculture, automotive industry, electronics industry and health care sector are some examples. The companies of the sector are also responsible for creating sustainable solutions that help protecting the planet and improving the quality of life and longevity. The Brazilian chemical industry is the eight largest chemical industry in the world, and it accounts for 10% of the national industry Gross Domestic Product (GDP) (or 2.5% of the aggregate GDP) and 2 million persons, between direct and indirect jobs.

Resumption of investments is one of the challenges to be faced

Over the last few years, the Brazilian chemical industry has been facing a series of challenges that have caused production stagnation, decrease in investments, deficit in the balance of trade and closure of companies. According to Deloitte’s study, 73% of the chemical industry executives interviewed do not intend to make investments to increase the production capacity in the next two years – and 38% have already had to interrupt projects for increasing the production capacity.

An industry seeking competitiveness

The main obstacles weakening the competitiveness in the Brazilian chemical industry are the high costs of raw materials (which can represent up to 80% of the production costs of a petrochemical plant) and energy (about 20%). Other challenges are the excessive complexity of the tax system, inefficiency of the existing framework and bureaucracy of the Brazilian business environment. Over the last few years, the recession was added to this list of obstacles. The slowdown of the economic activity resulted in reduced supply of chemicals produced in Brazil to other sectors and increase in imports.
In order for the chemical industry to be strengthened, recover competitiveness and resume growth, it is necessary that the public and private sectors combine efforts regarding a renovation agenda. Abiquim translated the sector’s concerns in a set of short, medium and long-term proposals focusing on three points: cost reduction to increase competitiveness, improvement of regulatory aspects to provide security to the industry and consumers, and increase in investments. These are measures that aim at maximizing the production of wealth provided by the chemical industry to the Brazilian economy, especially considering the huge competitive potential of the sector, represented by the country’s large oil and gas natural reserves.

The results expected with the adoption of Abiquim’s proposals represent, by 2030, an accumulated increment of US$231.2 billion in the industry’s GDP, an increase of US$63.6 billion in tax payment, and an accumulated growth of US$53.1 billion in work compensation.

The chemical industry’s business model is going through a revolution caused by the implementation of the concept of Industry 4.0, and it should suffer changes with the development of digital technologies, such as advanced robotics, the Internet of Things, artificial intelligence and big data. Exploring properly the moment, the Brazilian chemical industry may be able to come out of this revolution better prepared to compete with global players in the value chains.
Executive summary

Scenario of the Brazilian chemical industry

Bottlenecks

- Business environment with low competitiveness
- High cost of basic raw materials and lack of long-term agreements
- High cost of electricity
- Logistics costs
- High bureaucratic costs

Opportunities

- Size of the Brazilian economy
- Large oil and gas reserves
- Use of energy from renewable sources
- Incentive to the sustainable development of other sectors
- Sectorial opportunities
- Chemicals 4.0
Competitive dimensions

Priority aspects for increasing the production, profitability and investments

1. Raw material
The competitiveness challenge in the Brazilian chemical industry starts with the high costs of raw materials essential for chemicals production. It is necessary to create conditions that make it possible to reduce the costs of such inputs, which can currently reach 80% of the production costs in a petrochemical plant.

2. Electricity
For the chemical industry, electricity represents 20% of the industrial costs. The Brazilian chemical industry pays a higher price for electricity than its peers from other countries. The end of such cost discrepancy will bring great competitiveness gain to the sector.

3. Logistics
Problems in waterways and in railroad and highway networks cause increases in costs and loss of efficiency and, therefore, are an obstacle to the industry’s productivity gain.

4. Innovation and Chemicals 4.0
The Brazilian chemical industry needs to follow the trend of using digital technologies, such as the Internet of Things, big data, artificial intelligence and advanced robotics to increase productivity.

5. Foreign trade
Brazil needs to sign agreements ensuring the competitiveness of the Brazilian chemical industry, defending the national production from unfair trade practices. More than that, it is necessary to promote the foreign trade, integrating the industry into global and value chains, causing exports to be part of the businessmen’s agenda.

6. Regulation
A regulatory framework that meets the diversity and complexity of the chemical industry and promotes production efficiency, compliance, security for investors and Brazil’s competitiveness in this segment.

Abiquim’s proposals

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The chemical industry represents 10% of the industry GDP in Brazil. However, over the last few years, a series of challenges in the business environment caused production stagnation and investment drop.

**Convergence sector**
The chemical industry produces inputs that are present in almost all consumer goods and in all economic activities. It is possible to state, with no risk of making a mistake, that no manufacturing sector operates without the participation of the chemical industry. Chemicals are found in important segments, such as the automotive and civil construction. Such characteristic turns the sector into a strategic segment in developed and developing economies.

Therefore, the chemical industry is one of the most important and dynamic sectors of the Brazilian economy. In this context, the divestment in the chemical production chain is harmful to Brazil and causes a series of losses to the country’s economy.

**Wealth generation**
The Brazilian chemical industry is the eighth largest chemical industry in the world. In Brazil, it represents 10% of the industrial GDP (Gross Domestic Product of industries), which makes it the third largest manufacturing segment in the country. The sector is responsible for 2 million direct and indirect jobs.

Chemicals is an important step in adding value to the industry. The technological complexity significantly increases beginning on the Exploration and Production, going through refining until consumption.

Studies show that the processing of oil and gas results in a value addition of an average of six to eight times the original value, generating employment, collection of taxes and wealth.

It is important to mention that worker’s compensation in the chemical industry is 100% higher than the industrial average, according to the Brazilian Institute of Geography and Statistics (IBGE).

Other studies show that the chemical industry is the second sector that most promotes the country’s economy. This is precisely due to the high value addition, high technology used and the fact that its products are used in more than 90% of the manufactured products.

**The divestments of the sector**
In 2012, investments in the Brazilian chemical industry reached a peak of US$4.8 billion. The number reflected the sales record achieved in the previous year, of US$150 billion. The exports increased by US$15.8 billion in 2011, a 52% growth since 2009.
A superficial analysis of the numbers made it seem like the chemical industry was unquestionably growing. However, despite the increase in investments and the sales record, the sector was truly being dissolved. Between 1990 and 2011, 289 companies closed or changed their field of activity. A total of 1,710 product lines were discontinued during the period: 904 between 1990 and 2000; and 806 between 2001 and 2011. This results in an average of 78 lines per year.

Except for duplicated lines, 893 products were discontinued and 447 are no longer locally manufactured.

Other factors had an impact on the production. Over the last few years, Brazil faced challenges in developing and producing new products and technologies that could replace the ones that were discontinued as a result of the end of their life cycle, especially in product lines requiring great investments in research and development. The numbers reveal how the market responded to this scenario of stagnation and low investment in research and innovation. During the period between 2003 and 2007, the chemical industry grew 16%, while between 2013 and 2017 the segment grew only 2%. In practice, it is possible to say that the sector is stagnated.

The deficit in the balance of trade progressively increased – despite the growth in exports, which reached

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“73% of executives in the Brazilian chemical industry do not intend to make investments to increase the production capacity in the next two years, according to Deloitte’s survey.”

Marcos De Marchi, chairman of Abiquim’s Board of Directors

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US$14.1 billion in 2013, an 35.6% increase since 2009. The deficit, which was US$15.7 billion in 2009, increased to US$32.0 billion in 2013, that is, it more than doubled in less than five years. In 2016, exports dropped to US$12.1 billion, given the industry’s increasing difficulty in being competitive in both the domestic and foreign markets. In 2017, the deficit of US$23.4 billion in the balance of trade increased once again in comparison with the previous three years. Such result reinforces the importance of resuming the economic growth, as well as strengthening the country’s internal competitiveness, making it possible to have greater participation of the national product in the consumption increment and to obtain a boost for making new productive investments.

As it was expected, revenues dropped – from US$150 billion in 2011 to US$109.2 billion in 2016. It is worth mentioning that this result also reflects the effect of the floating exchange rate.

The investments drop was even more significant: 85% between 2012 and 2015. A Deloitte’s study1 revealed that 73% of interviewed executives of the sector in Brazil do not intend to make investments to increase the production capacity in the next two years, while 38% were already forced to cancel or interrupt projects for increasing the production capacity. In the worst case scenario, investments may drop to US$200 million in 2022.

The lack of investment results in loss of relevance of the chemical industry in the Brazilian economy. In 2004, the sector accounted for 3.6% of the total wealth produced in Brazil. In 2016, its participation dropped to 2.4%. If this number still classifies the sector as one of the most relevant sectors to Brazilian economy, it is certain that such decrease cannot continue. It is also important to consider the potential for wealth generation provided by the chemical industry in Brazilian economy, especially in processing wealth derived from the country’s large oil and gas reserves.

1. Digital Chemicals Survey 2018 (Deloitte)
The chemical industry’s bottlenecks

Understanding the reasons that led to production decrease in the Brazilian chemical industry is essential for the recovery of the sector. Among the main factors, are:

1. Business environment with low competitiveness. Just like other sectors of national production, the chemical industry suffers with issues related to the Brazilian business environment. This can be measured by the Brazilian position in the global competitiveness ranking produced by the World Economic Forum: Brazil is in the 80th position, out of 137 countries. Among the main obstacles pointed out are the complexity of the tax system, restrictive labor laws and regulations, high corruption rate, significant bureaucracy and ineffective logistic infrastructure. One example of difficulty is the tax structure, which, in addition to being expensive, is very confusing. This situation causes an increase in costs and risks, as it allows different interpretations regarding the events of application and collection of undue amounts.

2. High cost of basic raw materials and lack of long-term agreements. The Brazilian chemical industry pays one of the highest prices in the world for petroleum naphtha, a basic input for many products. Another challenge is the terms of supply agreements for raw materials, which are usually short: while, in Brazil, such agreements are effective from two to five years, in other countries agreement terms range from 20 to 30 years. This situation causes uncertainty in investors, since it is not possible to know if there will be raw material for their plants. In practice, short terms discourage long-maturity investments. Another great obstacle to the competitiveness of the Brazilian industry as a whole – and specifically, the chemical industry – is the price of natural gas in the país, an essential input for the sector.

According to a study of the Institute of Economic Researches, the high gas price may take away 0.5 percentage points of the annual growth rate of Brazilian GDP by 2025, reduce the investment rate by 1.4 percentage points and increase inflation by 0.44 percentage points. Even with the enactment of the Gas Law in 2009, the policy for using gas as an industrial raw material has not yet been regulated – as it was done in other countries. Here, the price is close to the price charged in general sales to the market, and it is much higher than the price for the gas used to produce electricity. Another issue that explains the high prices of natural gas in Brazil is the monopoly of Petrobras, which is responsible for producing, importing and distributing the input. On the other hand, in the United States there are around 6,000 small companies competing for consumers.

Naphtha price in Brazil (US$/t and €/t)

Source: Abiquim, based on international publications

3. High cost of electricity. The electrical energy is a strategic input for the chemical industry, as its participation in companies’ production costs may range from 20% to 50%. According to a research of the Institute for Strategic Development of the Energy Sector (Ilumina), the escalation of the electricity price charged from the industry between 2013 and 2017 was of almost 80%, which resulted in many plants closing and production units migrating to countries in which the electricity price is cheaper. The average electricity tariff in Brazil is between the fifth and sixth highest tariffs in the world. In the United States, the electricity price (with taxes) is of about US$69/MWh; in Mexico, US$82/MWh; and in Canada, US$78/MWh. In Brazil, the tariff is US$124/MWh (without taxes), or about US$164/MWh (with taxes). This relative differential brings down the sector competitiveness, which still lacks a long-term policy for assisting the industry in adding value to Brazilian natural resources.

4. Logistics costs. During the last three years, the increase in logistics costs in Brazil was of 7.4% – which represented an expense of R$15.5 billion for companies. Most of the costs (63.5%) are related to transportation. The costs result from a modal matrix very focused on the highway network that, on top of that, does not have good quality. Competitors’ logistics costs, whether from developed or developing countries, are lower. For the chemical industry, logistics costs represent 7% of the revenues. In Europe, for example, the chemical industry’s logistics costs are between 3.4% and 4% of the revenues, according to the study “Chemical Logistics Vision 2020”, carried out by Deloitte with the European Chemical Industry Council (Cefic).
Consolidations concentrate operations in the chemical industry

The capitalist world is living a phase of creation of companies that are promising to become giants, capable of mastering sectors not only in one field, but also in many fields. This movement results from a wave of mergers and acquisitions in almost every segment. According to data from Thomson Reuters, between 2008 and 2018 there were 54 thousand acquisitions in the world – an average of US$49 billion in operations per year. In the telecommunications sector, operations generated US$16 billion; in the electronics sector, US$18.2 billion.

The chemical industry is not different. Between 2001 and 2005, there were 1,278 acquisitions around the world – an average of US$18 billion in operations per year. Only during the last ten years, there were 3,562 – an average of annual US$31 billion.

The impact of these operations for the Brazilian chemical industry cannot be underestimated. Mergers between companies are creating large corporations with access to new markets, new technologies, gains of scale and reduced fixed costs, that is, the new companies are more productive and competitive. Some acquisitions are “vertical”, that is, they move forward in different parts of the production chain through mergers with former suppliers or customers. As a result, they start to dominate the entire chain.

Experts explain that these consolidations are a result of the increasingly competitive environment, which leads companies to integrate activities worldwide. In this new way of operating, the production is divided into different countries, following the comparative advantage logic – places with low costs, skilled labor and a healthy business environment.

According to the World Investment Report, two thirds of the global trade are conducted by large transnational companies. This forces the Brazilian chemical industry to be prepared for the competition, without giving up the foreign trade, by developing strong and competitive industries to deal with this new scenario.

5. High bureaucratic costs. The significant bureaucracy imposes many obligations to Brazilian companies, including those from the chemical industry. According to the Doing Business report, of the World Bank, Brazil is in the 125th position in a ranking with 190 countries that assesses the ease of doing business. The country is next to Iran, which occupies the position above it, and Guyana, which occupies the position below it. Competitors from Latin America, such as Mexico and Chile, occupy much higher positions. The indicator in which the country is worse evaluated measures tax payments: 184th position. A great part of this bad reputation reflects the time spent to fulfill tax obligations: 1,958 hours – against the average of 160.7 of countries in the Organization for Economic Co-operation and Development (OECD). Deloitte’s research carried out with companies from the Brazilian chemical industry showed that 95% of these organizations have teams to monitor changes in the environmental laws and regulations and 76% to monitor changes in the tax laws and regulations.
The vicious cycle of the chemical industry

In practice, the Brazilian chemical industry is in a vicious cycle, which operates as follows: high costs of inputs and infrastructure take the competitiveness away from the Brazilian chemical industry. The competitiveness drop, in its turn, makes room for increasing imports and decreasing profitability. High costs and uneven competition cause an increase in the industry’s idleness level and, therefore, impair investments and cause the closure of units.

Use of the installed capacity in the chemical industry (%)

* Regarding the first four months of 2018
How the chemical industry can increase innovation in Brazil

In 2017, Brazil occupied the 69th position in an innovation ranking with 130 countries, created by Cornell University, in the United States, by Insead, in France, and by the World Intellectual Property Organization (WIPO). In 2011, the country was in the 49th position. Developed countries occupy 24 out of the 25 first positions. China, in the 22th position, is the only developing country in this group. Chile (46th), Costa Rica (53th), Mexico (58th), Panama (63th), Colombia (65th) and Uruguay (67th) are the six Latin American countries before Brazil. As noted, Brazil is not only behind developed countries, but it is also behind its peers in Latin America with smaller economies.

The chemical industry plays an important role in the promotion of advanced solutions, which serve the productive sector and families. The industry contributes to Brazilian agribusiness so that it becomes one of the most relevant agribusiness in the world. The sector also contributes to advanced solutions in energy and environmental terms. More efficient home appliances, less pollutant vehicles and more sustainable houses depend on solutions created by the chemical industry’s technology.

A chemical industry – and the economy as a whole – the low profitability registered by the sector impairs investments in this front. Between 2013 and 2015, companies producing industrial use chemicals in the country slightly increased the percentage of investments in development researches, from 0.63% of the net revenue to 0.8%. However, according to the background, this level has been kept below 1% for almost 20 years. As comparison, in Japan these investments are of about 4.5%. The United States allocates 2.8% of its revenues to research, while in Europe this indicator is of 1.8%. With little investment in innovation, breaking the vicious cycle that weakens the productivity and competitiveness of the Brazilian chemical industry becomes an even greater challenge.

Investments in research and development – Industrial use chemicals sector (% of the net revenue)

Source: Yearbook of the Brazilian Chemical Industry, based on ABIQUIM’s direct research.

Opportunities for the Brazilian chemical industry

Despite all challenges, the scenario offers several opportunities for resuming the growth and investments in the Brazilian chemical industry. The main opportunities are detailed below:

1. **Size of the Brazilian economy.** The 8.6% drop of the GDP between 2014 and 2016 was strong, but the Brazilian economy still appears among the largest (it occupies the eighth position) and most dynamic economies in the world. The productive sector is one of the most diversified: there are industries from several sectors, in addition to strength in services and agribusiness – not to mention the size of the domestic market, which is operated by the more than 200 million Brazilians. All these data demonstrate that the chemical sector will not stop growing due to lack of demand.

2. **Large oil and gas reserves.** In 2017, 12,835 MMbbl of Proven oil reserves (1P) and 23,630 MMbbl of Proven, Probable and Possible (3P) oil reserves were declared. This means, respectively, a 1% and 4% increase in comparison with 2016. Considering the production in 2017, the proven reserve replacement ratio was 109%. Current proven reserves show that there are commercial projects for an additional exploration of about 30% in volumes produced in Brazil by the end of 2022. This situation enables the solution for two challenges: adding value to the oil and gas industry in Brazil and reducing costs of raw material for the chemical industry. The oil and gas industry lives under the pressure of decreasing the use of fossil fuels, due to the development of electrical vehicles. As a result, Brazil may see the wealth in pre-salt reserves being lost at the bottom of the oceans due to lack of demand. The solution to this problem would be to increase the demand of the petrochemical sector – and the chemical industry can help adding value to pre-salt oil reserves, as the need for exporting oil, which is an activity with lower added value, would be reduced.

3. **Use of energy from renewable sources.** It is possible to make use of renewable energy sources, such as sugar cane, wind power and solar energy, among others, to stimulate the chemical industry, as a factor for reducing energy expenses. Brazil is the world’s largest producer of sugar cane, an energy source with very competitive cost in comparison with other carbohydrate sources (such as beetroot sugar). In order to achieve the potential, it is necessary to make investments in the development of technologies, especially those directed to processing biomass.
Opportunities with biomass in Brazil

The growing concern with preservation of the environment opened space, over the last few years, for Brazil to become a worldwide reference in products derived from renewable raw materials that can replace the raw materials for petroleum by-products. It may be said that no other country meets the conditions that stimulate biodiversity like Brazil. However, the good use depends on making production costs cheaper: most markets do not accept paying prices higher than those paid for traditional petrochemical products.

In Brazil, the sugar cane accounts for 74% of the planted biomass. Other prominent crops are soybean, corn, orange, rice, cassava, wheat and banana. All these crops can produce residues that will be used by the chemical industry, through the processing chain of these resources, until they become the raw materials necessary for the chemical industry.

Main technologies for the transformation of biomass into raw material

In the current scenario, oil should continue to be the main source of raw materials for the chemical industry. The growth of renewable sources will depend on a greater engagement of companies with sustainability in their processes.

The transition from petrochemical raw materials to renewable sources, however, depends on the reduction of the cost of such raw materials.

Due to the great amount of biomass necessary to obtain chemicals, the availability and storage will become complex variables to be managed in the value chain – and pointed out as critical for the viability of sustainable solutions.
In addition to helping other sectors become more sustainable, the chemical industry invests to adopt the best practices aiming at causing less environmental impact and less impact on people’s lives. Abiqhim has been coordinating the program Atuação Responsável® for more than 25 years. The program represents the chemical industry’s commitment to sustainability – and being part of the program is a requirement to join the association. For a quarter of a century in Brazil, Atuação Responsável® proposes and encourages the adoption of good practices in the following areas: process security, health, environment, occupational safety, product management and facility security.

In the sustainability area, the Brazilian chemical industry has obtained progresses in reducing the consumption of electrical energy in its production processes. This is a result of investments in systems that monitor and ration consumption through more efficient equipment and processes, including internal generation of the energy consumed or sold to other companies. Indicators show that the consumption of electrical energy per tonne of product presented a 30% reduction during the period from 2006 to 2016. Improvements in processes also resulted in a reduction in water consumption. There has been a 25% reduction in the volume of water abstraction per tonne of product in ten years. In this same period equivalent CO₂ emissions regarding the chemical industry had a reduction of almost 30%.

These results reflect the changes in the energy matrix, with the migration for the use of cleaner fuels, in addition to investments in more efficient heating systems. It is not by chance that the Brazilian chemical industry for industrial use chemicals stands out among its global peers. According to the International Council of Chemical Associations (ICCA), the intensity of CO₂ emissions of the Brazilian chemical industry is 51% lower than the average for 47 countries associated to the entity.

A relevant channel for CO₂ emissions is the transportation of raw materials, inputs and final products. Part of this problem arises from the lack of an extensive and good railroad network and the high cost for short-sea shipping. The result is a great use of the highway network for transportation by truck, a more pollutant vehicle.

Investments in infrastructure would make it possible to change this scenario. According to Abiqhim’s projections, reducing the use of cargo transportation by highways would possibly reduce annual CO₂ emissions by 2.14 million metric tons.

**Indicators obtained by the chemical industry between 2006 and 2016 through the Atuação Responsável® Program**

- **41%** Reduction in waste generation (kg/t)
- **25%** Reduction in water abstraction volume (m³/t)
- **29%** Decrease in CO₂ emission (kg of CO₂eq/t)
- **30%** Reduction in electrical energy per produced tonne (kWh/t)

6. Environment Research 2017 (Tetra Pak and Ipsos)
5. Sectorial opportunities. Many industry sectors are going through deep changes, driven by several factors, such as changes in consumers’ habits, pressures for greater sustainability, technological advances and need for greater efficiency. There are opportunities in the following sectors:

- Water treatment and sanitation: The industry can provide important chemicals or technologies for water and sewage treatment and means for distribution of clean water through a reliable piping system;
- Plastic packages: The most modern packages are manufactured with chemical inputs that make it possible to have packages that are lighter, more resistant and safer when handling, increasing the useful life and reducing waste;
- Mobility: Pressures for reducing emissions of pollutant gases and reducing the use of raw materials are resulting in the creation of lighter and more efficient vehicles – and the chemical industry has an essential role in achieving these goals;
- Buildings: Products of the chemical industry are essential for the construction of sustainable buildings, that its, buildings that enable a rational use of water and energy, for example;
- Agriculture: Development of more resistant and adaptable seeds, more efficient fertilizers and products that reduce the need of using water in agriculture;
- Health: The chemical industry can develop and provide materials that increasingly reduce the risks of contamination, in addition to lighter and more resistant prosthetics and more efficient medicines;
- Cosmetics and toiletries: Opportunities for using the Brazilian biodiversity in the production of ingredients.

6. Chemicals 4.0. Based on the concept of Industry 4.0, the new structure of Chemicals 4.0 brings innovations in important driving forces of the chemical sector, such as the automotive, construction and packaging industries, which will gradually take place. The new reality of the chemical industry is especially related to the continuous process of digitalization of the business models. This new approach is related to topics and concepts of circular economy, renewable raw materials, renewable energy, carbon use and capture, biorefineries and bioplastics. There will be a massive influence in technologies, productive portfolios, and structure for value generation – in addition to new business models in the chemical industry, as well as customers and suppliers. Some examples of disruptive changes in technological processes can be found in the biotechnology and in the use of renewable resources and energy. The progress in the biotechnology industry will result in the increase of more efficient applications of biological raw materials in chemical production processes (the “biological chemistry”). Meanwhile, the production of chemicals from electricity, hydrogen and CO2 will gain importance. The chemical sector shall take over a key role of combining energy and the industrial sector, making use of offer peaks for renewable energy until the production of synthetic raw materials, so that it is able to reduce the use of fossil materials. An example of a fundamental change in the demand structure is the growth of electrical mobility, which causes the decrease in the demand for many chemicals catalysts, oil and gasoline, for example, as well as oil and fuel additives. At the same time, new business segments are opening around electrical engines, such as technologies for recycling batteries. Additionally, the demand for light materials should increase.

7. Industry 4.0 was created in Germany as a strategy for resuming the industrial competitiveness lost to Asian countries that started competing with tax incentives and low labor costs. Since in Germany, a highly developed country, it would not be possible to compete based on costs – which would require an inconceivable impoverishment of the population – the solution was investing in new technologies, such as advanced robotics, the Internet of Things and artificial intelligence.
India and China: examples of industrial policies

India
In 2011, the Indian govern created the National Manufacturing Policy, a policy for industrial development aiming at enhancing participation and increasing the added value for manufacturing in the GDP, by encouraging the technological development, promoting increase in competitiveness and generating jobs, especially for poor persons in urban areas and for the growing rural population migrating to big cities. The plan emerged from debates between the government, businessmen and experts that occurred for two years and listed six goals:

1. Increasing manufacturing growth by 12% to 14% per annum in the medium term, making it the growth engine of Indian economy;
2. Creating jobs;
3. Providing professional qualification to poor urban population and to rural migrants;
4. Promoting the technological development and increasing national added value;
5. Increasing competitiveness in the industry;
6. Ensuring growth sustainability through energy efficiency, optimization of natural resources and recovery of ecosystems.

Some priority sectors were chosen – and it is important to highlight that the chemical industry has a fundamental role in all of them:

- Intensive labor industries: food, textile, clothing, leather, footwear, jewelry and gems;
- Capital goods industries: heavy electrical equipment, machines, heavy transportation and mining equipment;
- Industries that are considered strategic: aerospace industry, shipbuilding, hardware, electronic, telecommunications equipment, defense and solar energy;
- Industries in which India already had a competitive advantage: automobile, pharmaceutical and medical equipment;
- Small and medium-sized industries, which accounted for 45% of the industrial production and 40% of exports;
- Governmental defense and energy entities.

Main measures:
- Simplify business regulations;
- Streamline the process for closing bankrupt companies, ensuring labor rights;
- Use governmental purchases to drive certain sectors, especially infrastructure and technology;
- Create institutional and financial mechanisms to support technological development;
- Establish policies for personnel training and qualification, specialized for the industry;
- Protect exports from fees and barriers imposed by other countries;
- Create the National Investment and Manufacturing Zones (NIMZs), which work as industrial cities with infrastructure, clean energy and centers for personnel qualification;
- Encourage small and medium-sized companies through tax exemption and create a fund to facilitate credit.

In 2014, the National Manufacturing Policy was reinforced by the program Make in India. With the program, between January and July 2015, the net flow of foreign investments had a 73% increase in comparison with the same period in the previous year, reaching US$21.5 billion. Make in India actions include four areas:

1. Improvement of the business environment: Creation of an online platform to centralize, simplify and streamline the relationship between the private sector and public bodies. Services of all departments and ministries of the central government, such as applications for industrial and environmental licenses are centralized in the platform;
2. Attracting direct foreign investments: Reducing or extinguishing the limits to foreign participation in order to attract investments in defense and infrastructure;
3. Creating industrial corridors and smart cities: Creation of industrial areas, focused on information technology, high-technology electronics, automotive and engineering, interconnected by high-speed transportation, creating industrial corridors. The project includes industrial cities, logistics hubs and residential parks throughout these corridors;
4. Uniting efforts from the public and private sectors: Convergence of visions of the government and investors. The role expected from the governments is of issuer of licenses to ensure the development of businesses.

China
In May 2015, the State Council of China launched the strategic plan Made in China, in response to the competitiveness loss that the country’s industry was suffering as a result of the fierce competition from other countries. If, in the previous years, one of China’s competitive advantages were the low labor costs, this time the objective is to provide the country with advanced technology. “The Chinese processing industry is facing a serious challenge of double pressure from industrialized countries and other developing countries”, the official document of the State Council highlighted.

The plan was inspired by the initiative “Industry 4.0” in Germany, with the goal of overcoming the so-called “middle income trap”, when a country, after an initial industrialization outbreak and progress in income, is not able to make progress and truly becomes a developed country. Made in China seeks to turn the Asian country into a global leader in manufacturing high-quality and high technology products.

The idea is to build a production structure similar to that of Germany and Japan, countries with strong and innovative industries, without losing the status of “world’s factory” for low cost products to other countries. The program stipulated goals to be achieved in three stages.

2025 Goals
- Modernize the industrial sectors;
- Reinforce China’s position as a global industrial hub;
- Promote quality production and smart manufacturing technologies;
- Improve energy and material efficiency and labor productivity;
- Put Chinese companies in the leading position in value chains of the processing industry;
- Master key technologies in the main industries – and not import such technologies.
2035 Goals
• Elevate China to a medium-level industrial country;
• Increase internal innovation;
• Increase intellectual property;
• Achieve innovative progresses on a worldwide scale.

Strategic tasks:
1. Strengthening of the innovation capacity;
2. Promotion of the use of integrated and digital production, focusing on smart manufacturing technology;
3. Strengthening of the basic industry, focused on components, processing technologies, basic industrial materials and services;
4. Implementation of green production methods;
5. Internationalization of Chinese companies;
6. Improvement of product quality and building of world Chinese brands;
7. Promotion of technological advances in the ten elected key sectors;
8. Restructuring of the industries for improvement of efficiency and resolution of overcapacity problems;
9. Increase of quality in services for the industry.

Agenda of measures:
• Systematic institutional renovation: Changes in governmental functions to support the implementation of industry strategies, plans, policies and standards and strengthen the sector’s autoregulation;
• Equitable market and business environment: Increase in quality standards of industrial production, avoiding the manufacture and sale of defective or fake products; punishment for monopolies and unfair competition;
• Policy for financial support: Modernization of the capital market, allowing more efficient manners for financing innovation;
• Fiscal policy: Tax incentives primarily focused on research and development, including with credit for small and medium-sized companies. Refund of import taxes for products used in R&D, exemption from value-added taxes for technology transfer and accelerated depreciation of fixed assets in industries and tax incentive for industrial labs and technological centers.
• Talent development and recruitment: Qualification of skilled labor, through the extension of study and training programs abroad and by attracting external labor. Inclusion of courses directed to new technologies, such as the Internet of Things, 3D printing, big data, advanced robotics and cloud computing, in the National Catalog of Courses and Specialties for Vocational and Technical Training, a document that works as guideline for many courses.

According to the global ranking of chemical industries disclosed by Abiquim, India (6th position) and France (7th position) have recently surpassed Brazil, as a result of their industrial policies. Brazil, which previously was in the 6th position, currently occupies the 8th one and may be surpassed by Ireland, which reinforces the need for implementing initiatives that bring the Brazilian chemical industry back to a greater competitiveness level.

France investments in innovation

Just like Brazil, France saw its industry shrink over the last few years. Between 1995 and 2015, the industry participation in the GDP decreased from 16.2% to 10%. As to employment, the drop was from 15% to 10%. The industry’s balance of trade went from a 2% surplus of the GDP to a 2% deficit.

In order to reverse this trend, the government launched in 2013 the New Industrial France (NFI), a plan to modernize and provide competitiveness to the country’s manufacturing sector, focused on three areas: development of offers of new technology, support to diffuse such technologies to companies, aiming at modernizing the production system, and development and adaptation of workers’ competences and skills required by such technologies.

The plan consisted in actions focused on topics related to the new technologies, such as big data, cloud computing, nanoelectronics, augmented reality and robotics. NFI mobilized sectors from the industry, the government and universities aiming at increasing investments, the use of disruptive technologies and the number of jobs. In 2015, the program entered its second phase, which anticipated a financial support of €2.2 billion for companies to finance investments in digital technology.

A tax benefit was also exceptionally granted, in the amount of €5 billion. In this phase, actions were gathered in nine dimensions: new resources, sustainable city, ecological mobility, future transportation, future medicine, data economy, smart objects, digital reliability and intelligent eating. In the item new resources, the purpose is to develop a green chemistry, focused on the rational use of energy and raw materials, with emphasis on renewable resources and biofuels.

The project Future Industry was also established a French equivalent of the German initiative Industry 4.0, which aims at modernizing and transforming the French industrial model through digital technology.
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A leap for development

The chemical industry prepared an agenda with proposals to create conditions for the segment to recover the force, the competitiveness and the growth. The measures do not increase government expenditures.

Over the last few years, Brazil saw the industry lose its participation in the economic development, gradually assigning its importance to the services sector. According to data from The World Factbook (assessment of the Central Intelligence Agency) and of the Brazilian Institute of Geography and Statistics (IBGE), in a group of selected countries, Brazil appears with one of the lowest industry proportions in the GDP, and with one of the lowest per capita income.

This phenomenon is not exclusive to Brazil, but it faces a special challenge. In developed countries, replacing the industry by the services sector is a natural process of development. As a country has a stronger industrial park, the next step is developing services used in all other sectors of the economy and that add value to the national product. In Brazil, however, the growth of the services sector happened before the country could achieve manufacturing maturity. And this early deindustrialization scenario brought serious implications to the development of its economy.

In a context of public deficit and low investment, the response comes in the decrease in productivity, innovation and per capita income. If the price for the strategic error of lack of investment in manufacturing is paid by all, the benefit with the recovery of Brazilian economy’s industrialization is also shared by the society. Due to all these factors, it is evident that Brazil cannot give up its industrial park.
At the end of the second decade of the 21st century, many countries are watching their industries losing prominence once again. The recent experience of countries that developed or recovered their industry shows that the Government’s action as a promoter of the manufacturing development is essential.

There is no doubt that China’s industrial boost in the last decades results from guidelines for an industrial policy established by the Superior Council in the 8th and 9th Five-Year Plans that, on one side, empowered local government entities to promote actions for attracting investments and, on the other side, chose 120 companies from different strategic sectors, among which there were seven chemical companies, to lead the Chinese industrial expansion. In other words, a selective industrial policy directed to sectors that are considered strategic.

Accordingly, India turned into a new industrial power thanks to a strong Government inducing and organizing action in selected sectors and aligned with the country’s needs, such as, for example, the textile, pharmaceutical, heavy equipment and information technology industries. In the chemical industry, the creation of the Ministry of Chemicals and Fertilizers turned the country into the largest manufacturer and exporter of active ingredients for pharmaceutical products and agricultural pesticides in the world. In 2017, the Indian chemical industry became bigger than the Brazilian industry.

In Europe, two recent examples demonstrate the importance of Government’s action: Germany, which always had a leading role in driving the entire American industry. For this reason, in a moment when Brazil becomes one of the world’s richest countries in oil and gas, there is nothing more appropriate than having the Government play its role of inducer, organizer and promoter of the chemical industry’s development. In order to do so, the creation of the Executive Group of Diversification in the Chemical Industry (GEDIQ) is proposed, which would directly report to the Minister of Industry, Foreign Trade, and Services and be composed of:

- Executive secretaries of the ministries of Finance, Science and Technology, Mines and Energy and Planning;
- Executive presidents of CNI and ABIQUIM;
- Three representatives of state governments.

In addition to all these proposals, it is important to establish a strategic positioning of the chemical industry regarding approaching and communicating with the Government. Some of the initiatives that can contribute to this challenge are:

- Creating sectorial chambers that propose solutions or measures that reconcile the development of every part of the chemical production chain, as it is done at the Ministry of Agriculture.

Even the United States, where industrial policies suffer resistance from several sectors of the society, saw its government adopting a new policy for protecting the industry: the country prohibited oil and gas exports, which resulted in recovering the chemical industry and played an important role in driving the entire American industry.

In Brazil, the accelerated development of the chemical industry was also due to a Government positive action for attracting investments through the Executive Group of the Chemical Industry (GEIQUIM), which promoted the so-called tripartite model: State + National investor + International investor holding the technology. The result was the creation of the petrochemical hubs of Camaçari and Triunfo, both carried out in a period when Brazil did not have abundant raw materials, and that currently represent 20% of Bahia’s GDP and 6.1% of Rio Grande do Sul’s GDP, respectively.

The GEDIQ’s purpose is to assess investment opportunities and identify the public policies necessary for making such investments, pursuant to the six dimensions of competitiveness of the chemical industry demonstrated in this document.

GEDIQ can be organized by thematic committees for sectors that are considered strategic, such as, for example, agrochemicals, sanitation chemicals, chemicals for civil construction and structuring projects as refineries and petrochemical hubs.

The Minister of Industry, Foreign Trade and Services should also play the role of ‘Ambassador’, promoting an approach with national and international businessmen, as well as with the States and Cities interested in promoting their own economic development based on the chemical industry.

Although state action is important, it is not enough. The new instruments for industrial policies should present combinations of policies that are aligned with initiatives of the private sector and that assign to the governments the role of encouraging innovations.

In this type of industrial policy, issues that are common to the national economic model, such as discontinuity, little political support and lack of criteria for allowing the entrance and competition of imported products and the accommodation of the private sector end up being reduced. Concrete goals directly increasing social wellness would make it possible to achieve a gain in the communication with the population and a greater involvement of the civil society.
The final purpose of the industrial policy should not only be promoting a certain sector; it should be to help this segment generate the maximum of wealth for the country – as investments, jobs and taxes. Connected to this new way of implementing industrial policies, Abiquim proposes an agenda for resuming investments and growth of the chemical sector. Six driving forces are contemplated, aiming at reducing costs, improving the regulation, encouraging innovation and, finally, increasing productivity.

1. Raw material: The competitiveness challenge of the Brazilian chemical industry starts with the high costs of raw materials that are essential for producing chemicals. It is necessary to create conditions that make it possible to reduce the costs of such inputs, which can currently reach 80% of the production costs in a petrochemical plant;

2. Electricity: For the chemical industry, electricity represents 20% of the industrial costs. The Brazilian chemical industry pays a higher price for electricity than its peers from other countries. The end of such cost discrepancy shall bring a great competitiveness gain to the sector;

3. Logistics: Problems in the waterways and in the railroad and highway networks cause increases in costs and loss of efficiency and, therefore, are an obstacle to the industry's productivity gain;

4. Innovation and Chemicals 4.0: The Brazilian chemical industry needs to follow the trend of using digital technologies, such as the Internet of Things, big data, artificial intelligence and advanced robotics to increase productivity;

5. Foreign trade: Brazil needs to sign agreements ensuring the competitiveness of the Brazilian chemical industry, defending the national production from unfair trading practices. More than that, it is necessary to promote the foreign trade, integrating the industry into global and value chains, causing exports to be part of the businessman's agenda;

6. Regulation: A regulatory framework meeting the diversity and complexity of the chemical industry, promoting production efficiency, compliance, security for investors and Brazilian competitiveness in this segment.

There are 73 proposals that will strengthen the industry and its competitiveness, which is an essential condition to face current challenges. In order to facilitate implementation, the initiatives were divided into short-term (one year for effectiveness), medium-term (two to three years) and long-term (more than four years) measures for facing challenges. With that, the goal is to reach a consensus and focus the efforts on priority and urgent issues for the Brazilian chemical industry.

Short-term actions aim at interrupting the decrease in value-added of the chemical industry and resume growth in production, sales, investments and generation of jobs. In this sense, the chemical industry seeks financing and capitalization alternatives to invest in new industrial plants, modernize chemical parks (including digital solutions of chemical industry 4.0), train personnel and invest in the creation of sustainable products.

It is important to highlight that Abiquim’s proposals do not increase government expenditures. The final major objective is to help Brazil’s development.

**Short-term solutions: one year for implementation**

**Raw-material**
1. Use the Federal Government’s oil and gas as raw material and energetic input in order to promote the industrial chain through structuring auctions;
2. Promote a systematic agenda of auctions for oil and gas exploration areas;
3. Ensure the best use of natural gas liquids and the steady quality of natural gas supplied to the market, through the limitation of a maximum ethane content of 9% and a minimum methane content of 88%, also ensuring the control of greenhouse and pollutant gas emissions;
4. Maximize the creation of value for petroleum by-products, through a policy limiting the incorporation of petroleum naphtha into gasoline;
5. Regulate, as provided by law, the policy for use of natural gas for purposes other than energy or raw material, based on international costs and criteria.

**Electricity**
6. Promote free access to infrastructure for gas and petroleum by-products (offloading, terminals, processing, transportation and distribution) ensuring transparency, isonomy and competitiveness;
7. Establish a regulatory framework for shale gas exploration (unconventional gas);
8. Structurally reduce costs of the energy sector, eliminating sectorial charges and cross subsidization, as well as social policies financed by energy consumers;
9. Accelerate the progressive reduction of the Energy Development Account, financed by the industry;
10. Enhance restructuring of the electricity sector; study proposed in the scope of Public Consultation No. 33, of the Ministry of Mines and Energy (MME).
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Natural Gas Processing Unit (UPGN) and improvement in gas quality

In order to maintain the reliability and security to persons and the environment, the natural gas should be marketed including its composition and quality. The National Agency of Petroleum, Natural Gas and Biofuels (ANP) should establish guidelines that guarantee the quality of the gas to be marketed and ensure the commitments for reduction in greenhouse gas emission, pursuant to international agreements. Through the Natural Gas Processing Unit (UPGN) it is possible to regulate and ensure efficiency in the production process and distribution of this important industrial input.

The ethane content of up to 9% in natural gas allows maximum use of the gas and its liquids as raw material, as well as the regulation of the Brazilian market, matching public policies with producers’ and consumers’ interests. Non-compliance with this specification causes impacts, such as:

- Increase in emissions of controlled pollutants (NOx and CO) and of greenhouse gases, with implications in the environmental permitting of current and future industrial facilities;
- Impact on residential consumers’ safety and on the cost for distribution of natural gas, given the need for adjusting the existing system;
- Loss of energy efficiency of equipment using natural gas;
- Impacts on generation in thermal power plants and, as a result, in electricity cost;

On the other hand, taking advantage of the availability of pre-salt natural gas and separating the ethane from the gas are goals that will bring the following benefits:

- Increase the use of natural gas produced in Brazil - as it is associated with oil, it is rich in ethane;
- Add value to the natural gas produced in the country, using ethane as a raw material for an entire comprehensive chain in the chemical industry, rather than its combustion;
- Help developing a chemical and petrochemical industry, increasing investments and creating jobs.

With the pre-salt, it is possible to add 1.3 million metric tons per year in the annual ethane supply to the domestic market – a 30% increase in the offer for chemical and petrochemical industry. It is important to note that ethane separation does not prevent the producer from selling it as a petrochemical raw material, as its use as energy will always be possible in specific equipment. The destination of ethane as raw material will depend on a trade agreement between the natural gas producer and the chemical and petrochemical industry, and, therefore, there will not be an economic imbalance in the market.

Logistics

11. Invest in the preservation of the Centro-Atlântica railroad. Certain roads under the concession of this railroad present little use and their state of preservation prevents the attraction of new cargo;
12. Establish a system for formalizing, monitoring and inspecting the priorities for berthing ships by berth at the ports of Santos and Aratu;
13. Introduce in National Agency of Land Transportation’s (ANTT) legislation for concession and regulation, incentives for transportation of chemicals, associated to financing or concession renewal;
14. Standardize and formalize risk management associated to accidents by concessionaires in the railroad network through a risk management program, by ANTT, common to all concessionaires, aiming at mitigating the impacts caused by accidents;

Innovation and Chemicals 4.0

18. Preparing a program for financing and promoting startups related to the chemical sector, in order to accelerate the development of technologies in Brazil; use good practices of existing programs, such as Start-Up Brasil, among others;
19. Provide permanent funding to the National Fund for Scientific and Technological Development (FNDCT);
20. Offer credit facilities for installation of pilot plants that promote improvements from the scale of laboratory plants to the commercial scale;
21. Create specific credit facilities for the segment, structured as to promoting the integration between researchers and companies;
22. Review the New Regulatory Framework for Science, Technology and Innovation and streamline the process for regulating the new law;
23. Develop a chemical platform within the National Program of Knowledge Platforms (established by pelo Decree
The importance of the regulation of the chemical industry

The chemical sector is one of the most regulated sectors in the world, because of the nature of production and risks involved. The chemical industry defends the creation of regulations that adopt the principle of risk analysis, based on scientifically provable data. It is necessary to create new regulations for issues that are currently not covered by any law or regulation. Creating regulations for issues that are already regulated will result in increasing the bureaucracy and losing the efficiency of the laws and regulations.

Abiquim actively acts in the development of regulatory models that ensure safe management of substances and products of industrial use – and, with that, reduction in the risks to the environment and to people’s health. Brazil has many regulations that individually approach end products (such as medicines and cosmetics) and specific substances (such as lead and paints). For Abiquim, a new law is necessary, which:

• Does not supersede existing laws and regulations;
• Treats products manufactured in the country and imported products with isonomy;
• Assesses the substances according to the risk of exposure and establish when it is necessary to have risk management plans;
• Respects data confidentiality.

Abiquim is aligned with the principles of the Organization for Economic Co-operation and Development (OECD) and defends carrying out studies on the analysis of regulatory impact as a good practice. With that, Brazilian laws will be improved and will become truly effective.

Medium-term solutions: from two to three years for implementation

Raw material
34. Promote the development of the oil industry by means of investments in the midstream and downstream sectors in order to increase the generation of added value;
35. Encourage the increase of the petroleum naphtha supply in the country, seeking greater competitiveness in comparison with the international market, by increasing the refinery.

Energy
36. Modernize agreements on the transportation and distribution of natural gas, promoting international competitiveness;
37. Encourage processes for increasing natural gas supply and suppliers, through international partnerships and/or financing, through imports, including, in addition to Bolivia, Vaca Muerta in Argentina, GNL, or through the access to gas from other producers in the national territory other than Petrobras;
38. Standardize the regulation of the natural gas market between states, based on the best international practices for promoting an open and competitive market;
39. Encourage the use of alternative energy sources in the chemical industry, giving priority to renewable sources and cogeneration.

Logistics
40. Increase tankage availability in berths in which there are operators handling industrial chemicals in the terminals of the Port of Santos;
41. Increase offer of port terminals dedicated to liquid bulk in the Brazilian coastline;
42. Promote the creation of short-sea shipping navigation routes intended for handling liquid bulk. The ship offer in short-sea shipping routes for liquid bulk is low. The market is centered in two players, and one of them is Transpetro – engaged with Petrobras;
43. Increase the capacity of some RUMO/ALL Malha Paulista roads, which presents parts with a level of use of more than 50% in the connection Santos-Paulínia, among other bottlenecks;
44. Increase the capacity in some sections of RUMO/ALL Malha Norte. Some sections in the states of Mato Grosso do Sul and Mato Grosso present high use, constituting local bottlenecks that make it impossible to use the entire railroad;
45. Improve the preservation of roads connecting the Northeast and Southeast regions;
46. Expand the works of making road pavement, ensuring quality in road transportation and development of affected regions;
47. Establish rules for the use of the infrastructure of common access between organized ports and private use terminals (TUPs), which ensure proper compensation of investments made;
48. Strengthen port management. Maintain port management and administration organized as a duty of the local port authority;
49. Resume the original duties of the Port Authority Council (CAP). The Council currently does not have a well-defined role, and the need for restoring its original duties is pointed out, such as the representative forum for supporting port management;
50. Ensure better conditions for concessionaires to invest in port infrastructure. Establish clear criteria for reversibility of assets invested by concessionaires into port assets;
51. Ensure good operation of Right-of-Way and Mutual Traffic mechanisms between railroad concessionaires for the outflow and distribution of cargo throughout production chains;
52. Create rules in ANTT’s regulation to strengthen the image of the user that depends on the Brazilian railroad transportation, as to establish guarantees in the provision of services for users declared dependents of this network;
53. Improve conditions for investor users to invest in railroad infrastructure. Establish clear criteria to compensate investments made by investor users in the network’s infrastructure. Possibility of indemnification in the process of handing over the concessionaire’s assets to the Government;
54. Create alternative regimes, without owner preference, in order to increase access to the country’s transportation routes;
55. Establish rules for shared use of the excess idle capacity of transportation routes;
56. Develop and implement a plan for preservation and preventive maintenance of the country’s roads;
57. Create a plan for identifying and expanding roads that are currently used in excess, in order to make it possible to develop expansion works in these routes;
58. Create training and professional qualification centers (technical level and higher education) and, in the short term, facilitate specialized labor flow from abroad, specialized in synthetic biology, aiming at ensuring the resources necessary for research, development and innovation and for industrial operation of renewable chemicals plants;
59. Encourage the development of startup incubators in order to identify solutions in the chemical industry and share some successful results of the development and implementation of new technologies in other Brazilian manufacturing industries.

### Foreign trade
60. Promote trade liberalization through international trade agreements with strategic partners. The initiative plays a key role in resuming the sustainable economic development, and it should result from a comprehensive discussion between the government and the private sector, in a structured manner and with the legal protection required to ensure a fair trade that eliminates predatory practices;
61. Establish a fast track model for increasing the Common External Tariff (CET) for cases in which the regional production is beginning and for reduction in case of interruption of the production, for any of the member countries;
62. Implementing an agenda with institutional improvements in Mercosur that is a part of commerce administrative and legal proceedings and seeks the debureaucratization of such proceedings.

### Regulation
63. Establish an International Regulatory Cooperation Agreement in the scope of the Chemical Substances Laws and Regulations with countries that invest in science and research, facilitating the free trade;
64. Implementing a single electronic platform for publishing environmental permitting processes, facilitating the access, the search and making the process more transparent, eliminating the need for publishing them in the State Official Gazette;
65. Publish a decree incorporating the Globally Harmonized System (GHS) for classifying and labeling chemicals, an important tool for the process of safely handling chemicals.

### Innovation and Chemicals 4.0
54. Establish rules for the use of the infrastructure of common access between organized ports and private use terminals (TUPs), which ensure proper compensation of investments made;
Long-term solutions: four years or more for implementation

Raw material
66. Encourage the installation of new Natural Gas Processing Units (UPGNs) next to pre-salt’s gas pipelines, with free access to any gas producer in order to fully treat the resource, including separation of liquids contained in the gas (ethane, propane, butane and C5+ components).

Electricity
67. Encourage cogeneration, which is strongly related to processes of the chemical industry, with result optimization, and a more competitive natural gas.

Logistics
68. Make the existing infrastructure of different railroad networks consistent, ensuring the passage of cargo by railroad gauges and other different specifications;
69. Invest in the preservation of current networks for the transportation of hazardous products. The transportation of liquid bulks in the railroad, in many cases, is prevented due to the state of preservation of the installed railroad network;
70. Perform road expansion works in current two-lane roads, aiming at ensuring greater safety to users;
71. Improve the laws and regulations addressing the process for circulation and blocking of the Chartering Systems (SAMA). Need for a clearer criteria in blocking process, avoiding the existence of gaps that enable misuse of the laws and regulations;
72. Proceed with the plan for road concession. Resume the concessions model in order to make it possible to obtain investments and improvements in road transportation operations.

Innovation and Chemicals 4.0
73. Create innovation hubs – companies and ICTs that carry out researches in thematic areas in the interest of and approved by the Ministry of Science, Technology, and Innovation (MCTI), subject to tax benefits for equipment and material imports.

Investment and diversification opportunities
The Brazilian chemical industry’s search for greater competitiveness corresponds to its disposition in contributing to recover the national economy. This means actively participating in the generation of jobs, income and wealth to the society as a whole, as well as taking advantage of investment and diversification opportunities offered by the sector.

According to IBGE data, disclosed in the “Study on the Diversification Potential of the Brazilian Chemical Industry”, among the segments with the best competitiveness conditions, attention is called to those to which the size of the Brazilian market is attractive for investments in local production. These segments are: cosmetics and toiletries, agricultural pesticides, animal food additives and chemicals for oil production and exploration. Segments of the chemical industry that add value to local raw materials can also attract investments, such as petroleum by-products, pulp, aromatics and renewable energy sources, like biomass.

According to the study, investment opportunities identified in some of the chemical industry’s primary sectors can add up to US$47 billion by 2030, with a strong impact on the deficit reduction in the balance of trade.

Some proposals for driving diversification in the chemical industry are:
1. Creation of the Executive Group of Diversification in the Chemical Industry (GEDIQ) to assess and prioritize investment and diversification opportunities for the Brazilian chemical industry, with emphasis on chemicals with higher added value, on the strengthening and expansion of production chains and on the development and implementation of new technologies;
2. Promote the creation of production hubs, in order to take advantage of the synergy between the location of the new plants of the sector and the availability of its inputs. With that, it is possible to increase competitiveness of products locally manufactured through the integration of a greater portion of the production chain. Some examples are the regulation of the special regime for investments in the fertilizer industry and the creation of a regulatory framework for use of rare-earth elements and minerals for the chemical industry;
3. Promote the organization of competitiveness clusters and hubs in renewable chemicals, taking into account the possibility of making public-private partnerships for financing a shared infrastructure (utilities, logistics, etc.) and construction of a multipurpose pilot plant (sharing machines and specialized labor);
4. Construction of a biorefinery integrating a traditional sugarcane mill and an ethanol plant, using biomass as input in an agricultural region.
The two possible futures

The adoption of proposals for the chemical industry presented in this report will increase the sector’s GDP by US$231.2 billion by 2030 – and this additional wealth will be divided between companies, workers and governments.

Going straight to the point, the proposals previously presented are worth US$231.2 billion. This is the accumulated increment in the chemical industry’s GDP – and, therefore, in the country – by 2030, with the adoption of the agenda suggested by Abiquim.

Below, the projections of several indicators for two scenarios can be compared: one scenario contemplating Abiquim’s proposals, and another one, in which the proposals are not adopted.

**Added value**

The presented proposals, if implemented, will reduce costs of the chemical sector and encourage investments in productivity. The result is the recovery of margins and financial results. Ultimately, this means an increase in the added value, that is, the production of more wealth for Brazil, as the added value is distributed between profit, salaries, taxes and payment of interest or rents. In this scenario, there is a virtuous cycle: good financial results attract more investments and increase in the production, which results in the generation of more wealth. With the adoption of these proposals, the added value will go from US$42.68 billion in 2018 to US$83.51 in 2030.

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**Added value of the chemical sector (US$ billion)**

Sources: Abiquim, The Economist and Deloitte’s projection
Salaries
The compensation for work, especially through salaries, can present an accumulated growth of US$53.1 billion by 2030 with the adoption of the presented proposals – another indication that the strengthening of the chemical industry benefits both the sector and the society as a whole.

Taxes and fees
As it has already been explained previously, the adoption of proposals – which include the reassessment of tax impacts on the sector – subsequently results in an increase in the collection of taxes by public entities. It is expected that, with the adoption of the solutions, the chemical industry should increase its annual collection of taxes from US$14 billion in 2018 to 27.4 billion in 2030.

Compensation for work in the chemical industry (US$ billion)

Remuneration of the chemical industry to the government (US$ billion)

Sources: Abiquim, The Economist and Deloitte’s projection, based on data on the added value
**Results**

With the presented proposals, the profit of the sector’s companies may increase almost four times, from US$3.3 billion in 2018 to 12.8 billion in 2030.

**Profits and losses retained by the chemical industry (US$ billion)**

Sources: Abiquim, The Economist and Deloitte’s projection, based on data on the added value
**Interest and rents**
In a scenario in which the proposals are adopted, payment of interest and rents by the chemical sector gradually decreases, from 29.6% of the added value in 2018 to 21.8% in 2030. This arises from a decrease in general indebtedness of companies and indicates an improvement in the financial situation of these organizations.

**Price of the national natural gas**
One of the main challenges of the chemical industry is the high cost of natural gas. There is an inverse correlation between the added value and the differences in the gas price. In other words, when the gas price increases in comparison with international prices, there is a tendency of decreasing the added value. According to the calculations, the variable presenting greater influence in the results of the added value was the gas price.
Chemical industry’s GDP

An increment of US$26 billion in the 2030 chemical industry’s GDP is expected should the proposals be adopted. The accumulated increment in the GDP of the sector between 2019 and 2030 may reach US$231.2 billion with the adoption of proposals. The scenario is based on a projection of the average growth of 3.43% per annum of the Brazilian GDP by 2030, made by the British magazine The Economist. The estimate also considers the growth in chemical activity in other countries, the number of operating companies in the Brazilian chemical industry according to the General Employed and Unemployed Register (CAGED) and the indebtedness level of Brazilian companies. Adopting the proposals will also allow jobs in the chemical industry to increase from 400 thousand in 2018 to 763 thousand in 2030 – 225.2 more positions than the number of positions generated without the measures suggested by Abiquim.

Average annual growth of the chemical industry’s GDP by 2030

- **5.75%** with the proposals
- **3.11%** sem propostas

By adopting the proposals, by 2030, Brazil will obtain an increase of...

- **US$ 231.2 billion** in the chemical industry’s GDP
- **US$ 193.9 billion** in added value
- **US$ 53.1 billion** in compensation for work
- **US$ 63.6 billion** in tax collection
- **225.2 thousand** jobs in the chemical industry

Sources: Abiquim, The Economist and Deloitte’s projection, based on data on the added value
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