

# Industry / Chemicals



## Why invest in Argentina?

Argentina is the third largest economy in Latin America, with a GDP of USD 445 billion, and the third largest recipient of Foreign Direct Investment (FDI) in the region. With a population of 45 million people, 60% of which is under 35 years old, it has preferential access to the main South American markets, which altogether have about 295 million inhabitants.

At the global level, it is the eighth largest country, with over 50% of arable land. It has the second largest unconventional gas reserve and the fourth largest unconventional oil reserve in the world, as well as an extensive maritime platform of over 1.78 million km<sup>2</sup>, which is rich in energy and fishing resources.

In terms of renewable resources, it is among the six countries with the highest wind consistency, with an annual average capacity factor of 20%. It also has great potential for the development of solar energy, especially in the Andean and sub-Andean regions, where global horizontal irradiation (GHI) ranges between 2,400 and 2,700 kWh/m<sup>2</sup>.

Moreover, it has great potential for mining development due to its over 705,000 km<sup>2</sup> of promising mining areas, its long tradition in the production of gold, silver, lead, aluminium and copper, and its positioning as a new global leader in the exploitation of lithium—the country has the third largest global lithium reserve and is the fourth largest global producer.

Argentina is characterised by a diversified economy that produces and exports agrifood, manufactured products, minerals and energy, knowledge-based services, culture and art, among others. Throughout the country, multiple activities with a high potential for investment and growth have been developed.

The country is internationally renowned for its leadership in the production and export of products such as soybean oil, yerba mate, utility vehicles, maize and wheat grains, raw peanuts, insecticides, powdered milk, beef, lemon essential oils, black tea, shrimp, pears, sunflower oil and combed wool.

Argentina does not only stand out for its natural resources. With a dynamic scientific community, its human talent has shown its capacity in a wide range of sectors. Among Latin American countries, it ranks third in the number of academic articles published, third in patent applications and first in the Global Skills Index<sup>1</sup> ranking for Data Science.

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<sup>1</sup> The Global Skills Index (GSI) 2019 is the first index conducted by Coursera, an online education platform with a large skills database of 38 million students and over 3,000 courses, specialisations and undergraduate courses of the main universities available. For each country, Coursera calculates a GSI that measures the average skills expertise of the platform's students.

## Economic activities by region

### NOA •

- Sugar
- Tobacco
- Viticulture
- Bovine meat
- Mining
- Petroleum and refinery
- Textile and metal-mechanic industry
- Automotive and trucks industry
- Inbound tourism

### NEW CUYO •

- Viticulture
- Stone fruits peach, plum and, to a lower extent, pome fruits
- Olive
- Mining
- Manufacturing
- University education
- Inbound tourism
- Domestic tourism

### PATAGONIA •

- Pome fruit, apples, and pears
- Viticulture, Alto Valle del Río Negro
- Fine fruits
- Ovine, wool, and meat
- Mining
- Textile, aluminum, and other industries
- Oil and gas, mainly
- Alternative energies
- Inbound tourism

### NEA •

- Yerba mate and tea
- Citrus fruit
- Bovine meat
- Forestry and paper industry
- Oil and gas (weak)
- Inbound and domestic

### AMBA

- Food industry
- Textile industry
- Automotive, metalworking
- Refinery
- Petrochemical, chemical and plastic
- Financial services
- Business services
- Logistics trading
- Software
- University education
- Inbound and domestic tourism

### CENTRO •

- Cereals and oilseeds
- Beef, poultry, and pork
- Citrus fruit
- Iron and steel, automotive, metal-mechanic industries
- Refinery, petrochemical, chemical and plastic industries
- Software
- University education
- Biotechnology
- Business services
- Logistics trading

## Infrastructure

 Railway network	 Maritime container traffic	 Flight departures	 Airports and ports	 National and provincial routes	 Ducts
17,866 km N.º 2 in LATAM N.º 13 in the world	~2 M TEU N.º 6 in LATAM	163,000 flights all over the world . N.º 4 in LATAM	Airports: 55 Ports: 101	500,000 km National routes: 37,500 km	Gas pipeline: 16,000 km Oil pipeline: 1,200 km

With longstanding policies of universal access to education and local scientific development, Argentina is the second country in the region with the highest public spending on Education (6% of GDP) and Science & Technology (0.6%). It should also be noted that Argentina is the second country in Latin America with the most unicorns (a total of 11) and the region's leading software exporter (50% of the sector's exports are destined to the USA).

The country offers benefits in terms of human resources and cultural and gender diversity policies for investors:

- The Knowledge Economy Act promotes activity in the sector through income tax reliefs (60% for micro and small companies, 40% for medium-sized companies and 20% for large companies).
- Every year, more than 150,000 professionals graduate from college.
- It is the Latin American country with the highest English language proficiency, which represents a comparative advantage in terms of service exports.
- It ranks ninth in the World Economic Forum's global ranking for leading efforts to encourage inclusiveness, equity and creativity in firms.
- It has the lowest gender gap in South America, and it ranks fifth in Latin America and the Caribbean.

Moreover, Argentina is a member of the selected group of countries that harness atomic energy for peaceful ends, building small and medium-sized modular reactors.

Thanks to these developments, Argentina can export to 170 countries around the world, achieving strong brand recognition for the quality of its products (meat, wine, oil, etc.), technology (satellites, turbines, reactors, etc.) and services (software, professionals, etc.). The country is also the main tourist destination in South America, with 7.4 million international arrivals in 2019.

Lastly, the development of maritime, aerial, rail and road infrastructure offer advantages that allow the country to access any part of the world as a competitive economy.

**The AAICI has prepared these sectoral reports in order to facilitate access to essential information as well as to advantages, benefits and opportunities for those investing in Argentina—one of the countries with the greatest potential to attract FDI in the world.**

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<b>AEC</b>	Common External Tariff of Mercosur
<b>ALADI</b>	Latin American Integration Association
<b>ANSES</b>	National Social Security Administration
<b>Bbl</b>	Oil barrels
<b>CAIP</b>	Argentine Chamber of the Plastics Industry
<b>CIQyP</b>	Chamber of the Chemical and Petrochemical Industry
<b>DFC</b>	Development Finance Corporation
<b>EIA</b>	Energy Information Administration
<b>FDI</b>	Foreign Direct Investment
<b>FGS</b>	Sustainability Guarantee Fund
<b>GHI</b>	Global Horizontal Irradiance
<b>INDEC</b>	National Institute of Statistics and Census
<b>INTEC</b>	Institute of Technological Development for the Chemical Industry
<b>IPA</b>	Argentine Petrochemical Institute
<b>LATAM</b>	Latin America
<b>OPIC</b>	Overseas Private Investment Corporation
<b>PE</b>	Polyethylene
<b>PEAD</b>	High-density polyethylene
<b>PEBD</b>	Low-density polyethylene
<b>PET</b>	Polyethylene terephthalate
<b>PP</b>	Polypropylene
<b>PS</b>	Polystyrene
<b>PVC</b>	Polyvinyl chloride
<b>PyMIQ</b>	Chemical SMEs
<b>TCF</b>	Trillion cubic feet
<b>USD</b>	United States dollars
<b>VA</b>	Value-added
<b>YPF</b>	Yacimientos Petrolíferos Fiscales

The Argentine petrochemical industry is expected to enter a new phase of development, which means leveraging Vaca Muerta's momentum and making the products needed at the regional global markets.

The chemical and petrochemical industries use gas, oil cuts, coal and other minerals—which provide a wide range of products that increase as production moves downstream—as basic inputs, with positive linkages to advanced stages in the production chain and with the consequent incorporation of added value in each of them.

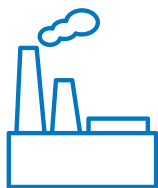
In Argentina, the vast availability of resources that supply this industry, the presence of a consolidated institutional framework, the high standard of clustering, and the presence of large global firms and competitive SMEs are some of the factors that help maintain a thriving environment for the activity. The highly qualified human capital and the solid network of educational institutions with a wide range of programmes ensure that operational standards surpass the regional average.

The development of the chemical and petrochemical sector in the country is evident and has shown signs of autonomy in the face of negative external impacts. It is the activity leading the rebound in installed capacity use after the economic recovery following the outbreak of the 2020 pandemic. The country's great advantage is due to its positioning as a global energy powerhouse. Vaca Muerta has experienced a remarkable growth in the last few years, becoming the largest shale exploitation area outside the USA. The future of this geological formation is even more promising, as hydraulic fracturing is at the technological forefront and well drilling costs are at an extremely competitive level.

The country's outlook is promising. Investment opportunities, in the present or for the future, show great growth expectations. Favourable opportunities aim at progress in the productive chain, since there is an unsatisfied demand for chemical and petrochemical by-products.



### Investment in ethylene exploitation



A new ethylene cracking plant is needed to maximise the country's resources and meet the growing demand for petrochemical products.

#### Adding value

According to the Chamber of the Chemical and Petrochemical Industry, further progress is required to add value to ethylene by-products.

### Competitive chemical SMEs

Argentine intermediate-use chemical products and substances have a higher comparative advantage compared to Brazil.



### Infrastructure under expansion

Large port, railway and river transportation (Paraná-Paraguay waterway), and raw material transportation (Vaca Muerta gas pipelines) projects in the medium term.

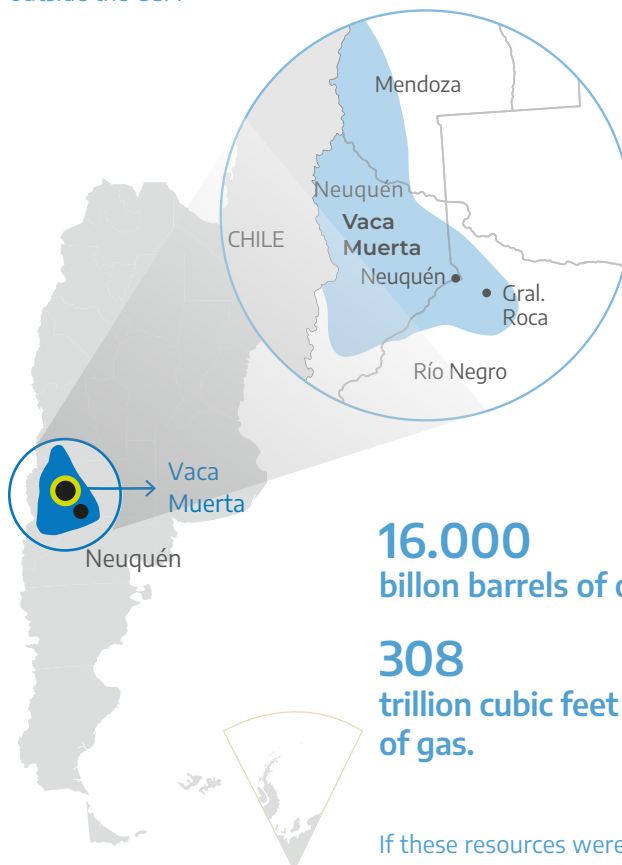


Total investment in infrastructure:  
**USD 15 billion.**

### Energy powerhouse

Argentina has one of the largest unconventional gas and oil reserves in the world.

Vaca Muerta is the largest area of shale exploitation outside the USA



**16.000**  
billion barrels of oil.

**308**  
trillion cubic feet  
of gas.

If these resources were exploited, the country could guarantee 150 years of gas consumption and 85 years of oil consumption.

### Steady polyethylene demand

Unmet PE demand represents a great investment opportunity.

In Argentina, the installation of new PE production units with a capacity of

**1.25 million** tonnes/year is an opportunity to meet the growing demand in the region over the next 10 to 15 years.

**Productive conditions**

Argentina has traditionally had the highest consumption of petrochemical products per capita in Latin America. A clear example is the consumption of processed plastic products, with an average of over 42 kg of plastic consumed per capita per year. However, the petrochemical industry remains relatively modest in international terms, so there is still room for expansion.

The country has a high degree of intrinsic competitiveness, compared to other countries in Latin America and the rest of the world, as its natural resources make it one of the largest global reserves. According to the US Energy Information Administration (EIA), Argentina has world-class non-conventional shale oil and gas potential, which is possibly the most prospective outside the USA, mainly within the Neuquén basin and in three other sedimentary basins.

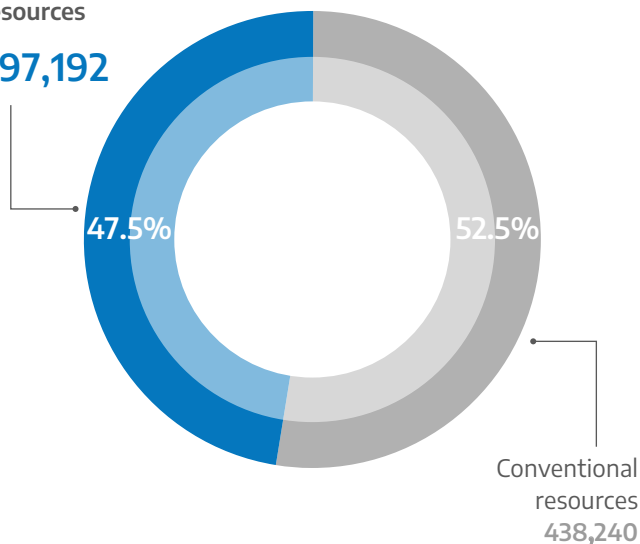
**Reserves and resources**

**OIL**

Figures in Mm<sup>3</sup>.

Unconventional resources

**397,192**

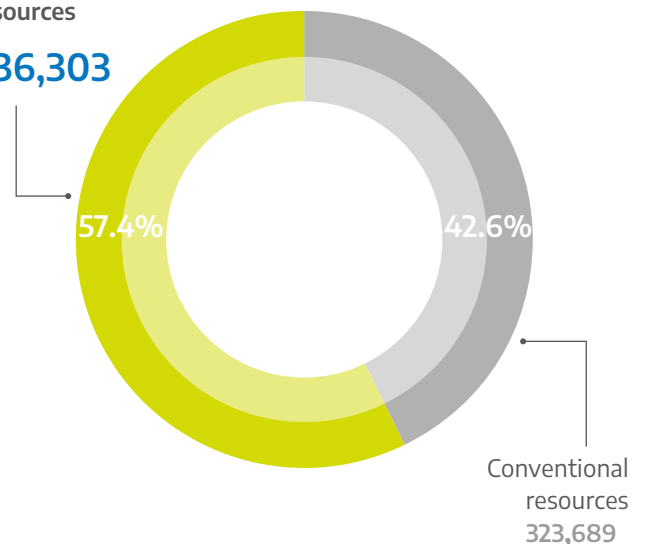


**NATURAL GAS**

Figures in Mmm<sup>3</sup>.

Unconventional resources

**436,303**



Source: Energy Information Administration (EIA) and Secretariat of Energy.

## MAIN CHARACTERISTICS OF THE SECTOR

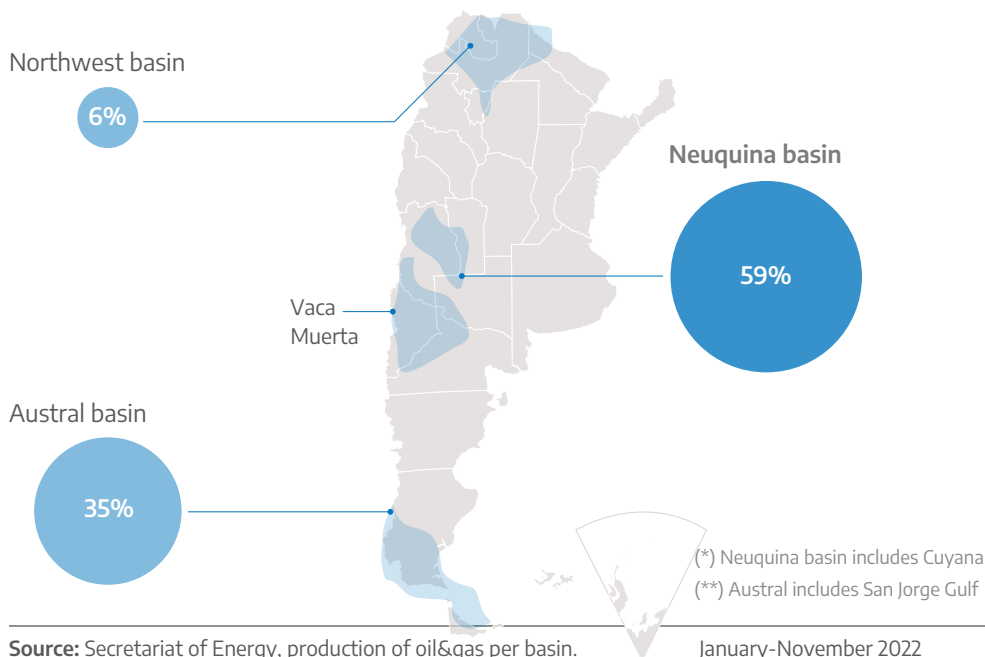
The country's main basin is the Neuquina basin, responsible for 53% of the country's oil production and 68% of gas production. In terms of oil, the second largest basin is the San Jorge Gulf, with 40% of production, while the Austral basin is the second largest gas producer, with 20%.

Vaca Muerta is the mega formation of unconventional resources in the Neuquén Basin. It was discovered in 1927, but its great potential was only confirmed in 2011. Its resources are estimated at 16 billion barrels of oil and 308 trillion cubic feet of gas, which means that, if exploited, they would increase the country's proven reserves over eight times, which would ensure gas consumption for the next 150 years and oil consumption for the next 85 years.

The future of Vaca Muerta is even more promising. Hydraulic fracturing is at the forefront of technology, well drilling costs are at a highly competitive level and attracting capital is fundamental to develop its resources. To reach its full potential, Vaca Muerta will require an estimated investment of USD 120 billion until 2030. It is a global investment attraction pole. In the last few years, over 30 companies have taken part in its development, such as YPF, Chevron, DowDuPont, Petronas, Shell, Equinor, Schlumberger, Vista Oil & Gas, Tecpetrol, Pan American Energy, Pluspetrol, Wintershall Dea, ConocoPhillips, and Total, among others.

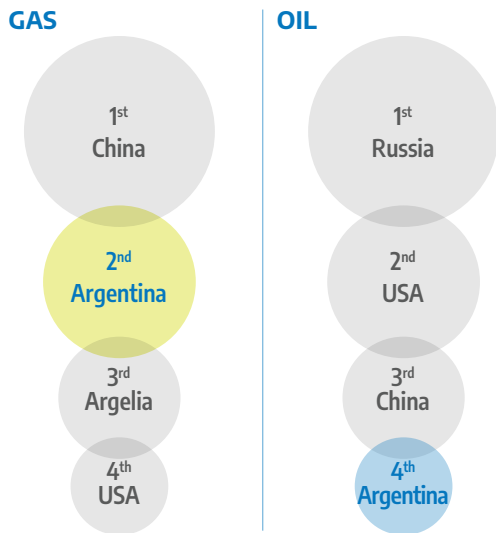
**Argentina possesses vast reserves that may act as a major game changer and change its role at the regional and global levels.**

### Main Argentine basins



**42 countries have potential for unconventional resources**

Global ranking positioning.



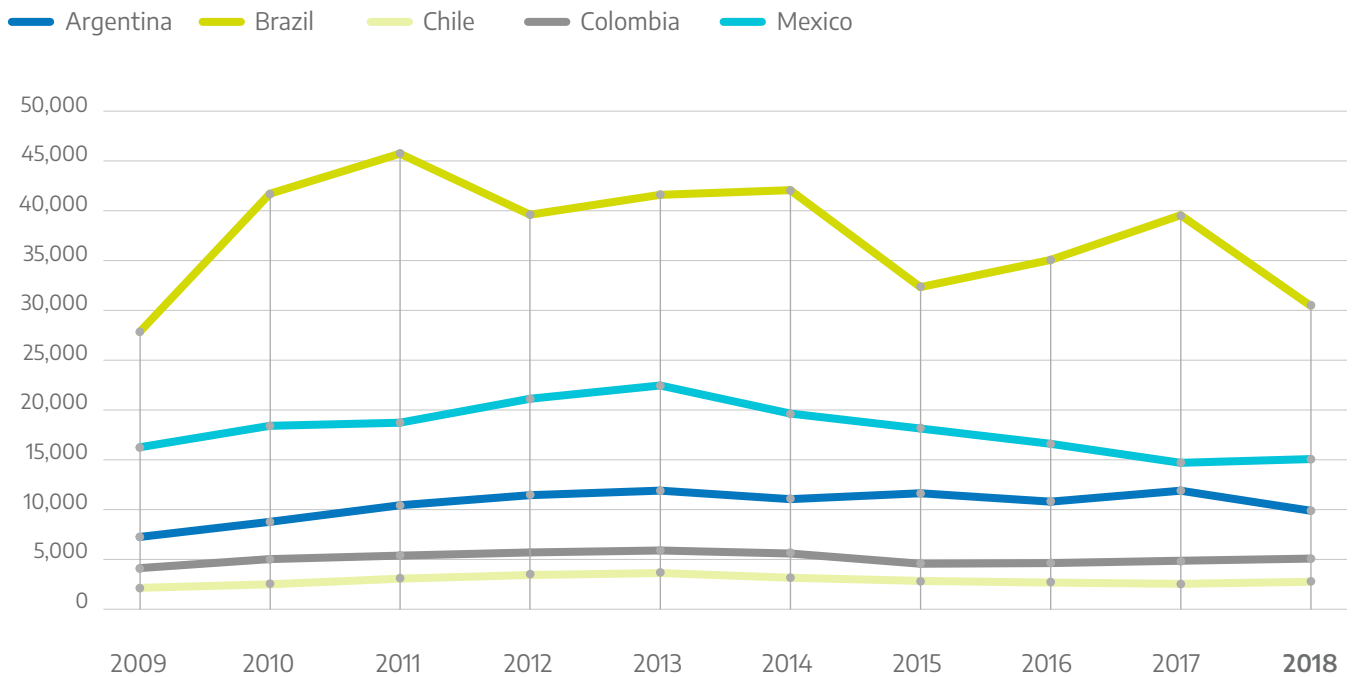
The enormous potential of Vaca Muerta to obtain large hydrocarbon reserves from unconventional resources, together with the improvement in production costs, led to the intensive use of gas in the Argentine energy matrix. The national petrochemical industry is getting ready to grow as fast as the development of the formation.

Unlike the Brazilian industry, which has petrol as its main input, the national petrochemical industry is based on natural gas. According to OECD data, Argentina was third among Latin American countries in the index of chemical products in 2018.

Source: Secretariat of Energy.

**Chemicals**

Figures in added value in USD millions.



Source: OECD.

## MAIN CHARACTERISTICS OF THE SECTOR

In this regard, the country's potential for the development of unconventional resources, mainly shale oil and shale gas, presents an opportunity to increase hydrocarbon production levels and reserves. In this way, the bottleneck related to the natural gas supply issue affecting the petrochemical industry might be solved.

Based on a scenario of security and predictability in the supply of raw materials, those materials that show the greatest growth in consumption levels, such as polyethylene and polypropylene, are expected to generate investment opportunities. The most promising petrochemical investments in Argentina come from the industrialisation of natural gas and from components rich in natural gas (ethane and propane). The growing demand for these products, both in the domestic and foreign markets, together with the abundance of resources for their production, make them highly efficient and justify the investments.

The demand for petrochemical products, with higher value added, produces an increase in profitability. Petrochemicals increase the value added several times. For instance, from methane, the value of gas is multiplied threefold; from ethane and propane, it is multiplied eightfold and, finally, a piece of plastic is 16 times the value of natural gas.

**One of the main opportunities in Argentina is based on the exploitation of unconventional resources.**

## Work conditions

Over 91.5% of the chemical industry is made up of SMEs and, in total, they employ almost 100,000 highly qualified staff. Over 50% of the productive facilities employ less than nine workers.

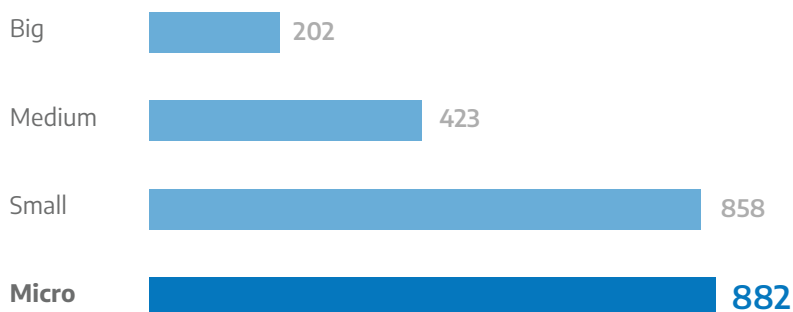
The industry produces and commercialises several hundred thousand products through a group of industrial companies with highly diverse profiles, ranging from large companies to SMEs. Some of them are specialised in a single product or a single line of products, while others have a highly diversified production, which often consists of several industrial segments.

**SMEs, which account for 91.5% of chemical companies, generate 41% of the sector's total employment.**

## Private companies in the chemical sector\*

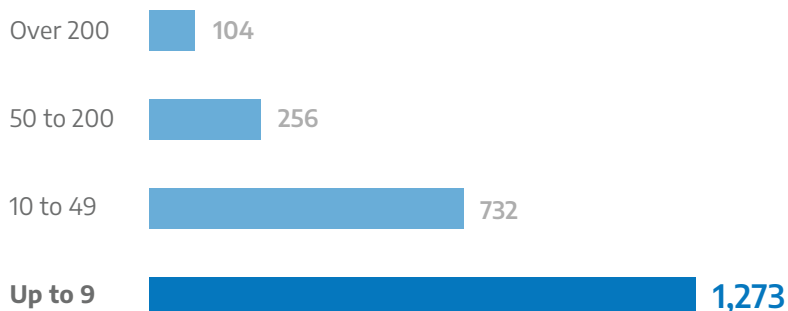
### PER COMPANY SIZE

2020 data.



### PER NUMBER OF EMPLOYEES IN THE COMPANY

2020 data.



\*CIU code 24, "Chemicals"

Source: OEDE, Ministry of Labour.

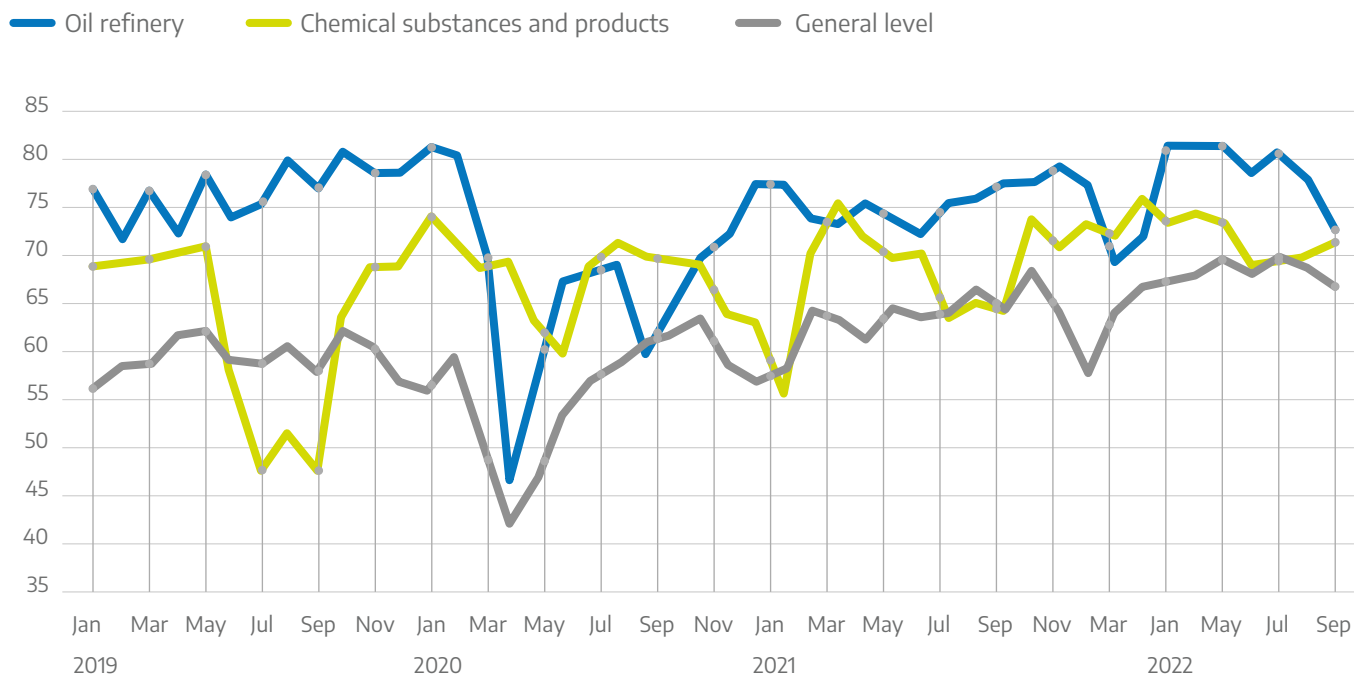
## Sectoral situation

In Argentina, there are new chemical and petrochemical areas and clusters: Río Tercero, San Lorenzo (Santa Fe), Campana-San Nicolás, Dock Sud, Ensenada, Plaza Huincul, San Luis, Bahía Blanca and Luján de Cuyo.

The "chemical substances and products" block shows, in the first 10 months of 2022, an average utilisation of 72.1% of its installed capacity, the highest value for that period of the series started in 2016, and higher than the 66.6% average of the industry. This block was the second least affected by the pandemic, behind food and beverages. Meanwhile, the upstream industry of the sector—oil refining—has been recovering after the impact of the pandemic, but has not yet returned to previous levels.

## Installed capacity utilization in the industry

Figures in percentages.



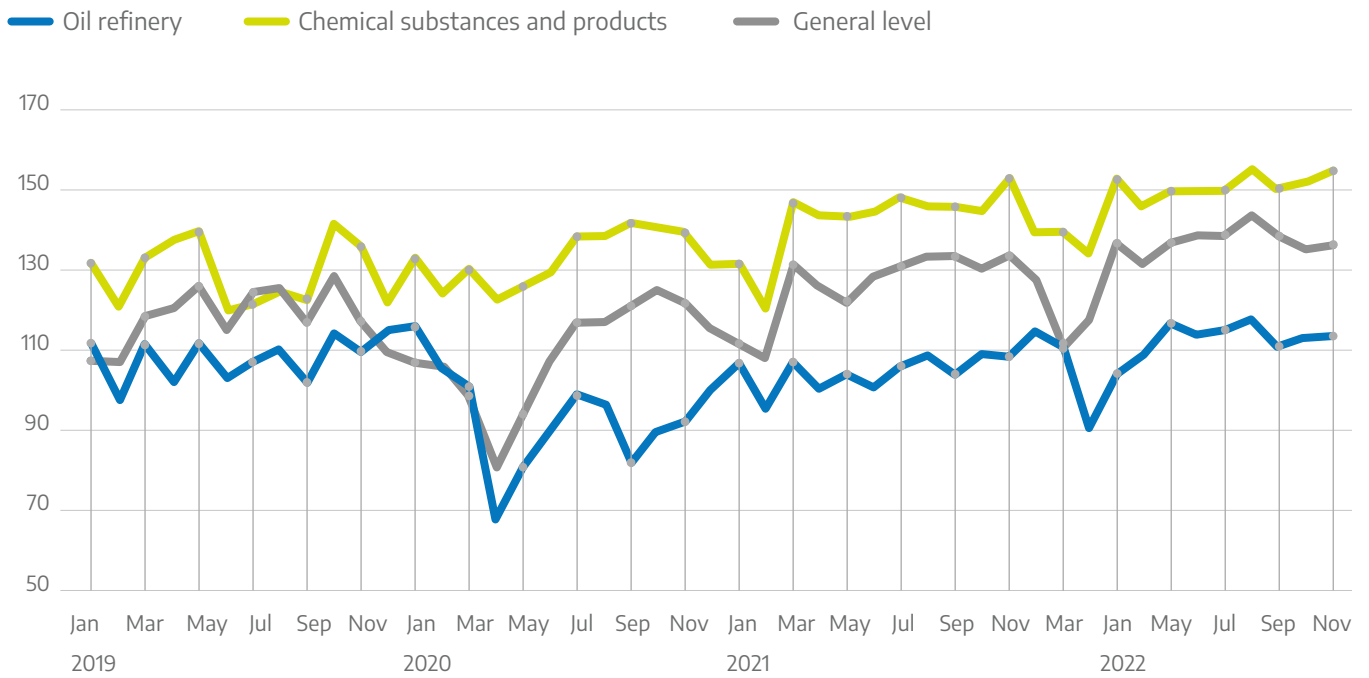
Source: INDEC.

# MAIN CHARACTERISTICS OF THE SECTOR

According to INDEC's Manufacturing Industrial Production Index (IPI), in the period January-November 2022 chemical substances and products, as well as petroleum refining, experienced a 4.2% and 5.6% growth, respectively, compared to the same period in 2021—conversely, the industry average grew 5.2%. The level of activity in the former sector is seen higher than in the pre-pandemic years, as is the industry average, while oil refining is catching up with 2019, but is still below previous years.

## Manufacturing Industrial Production Index

Index values.



Source: INDEC.

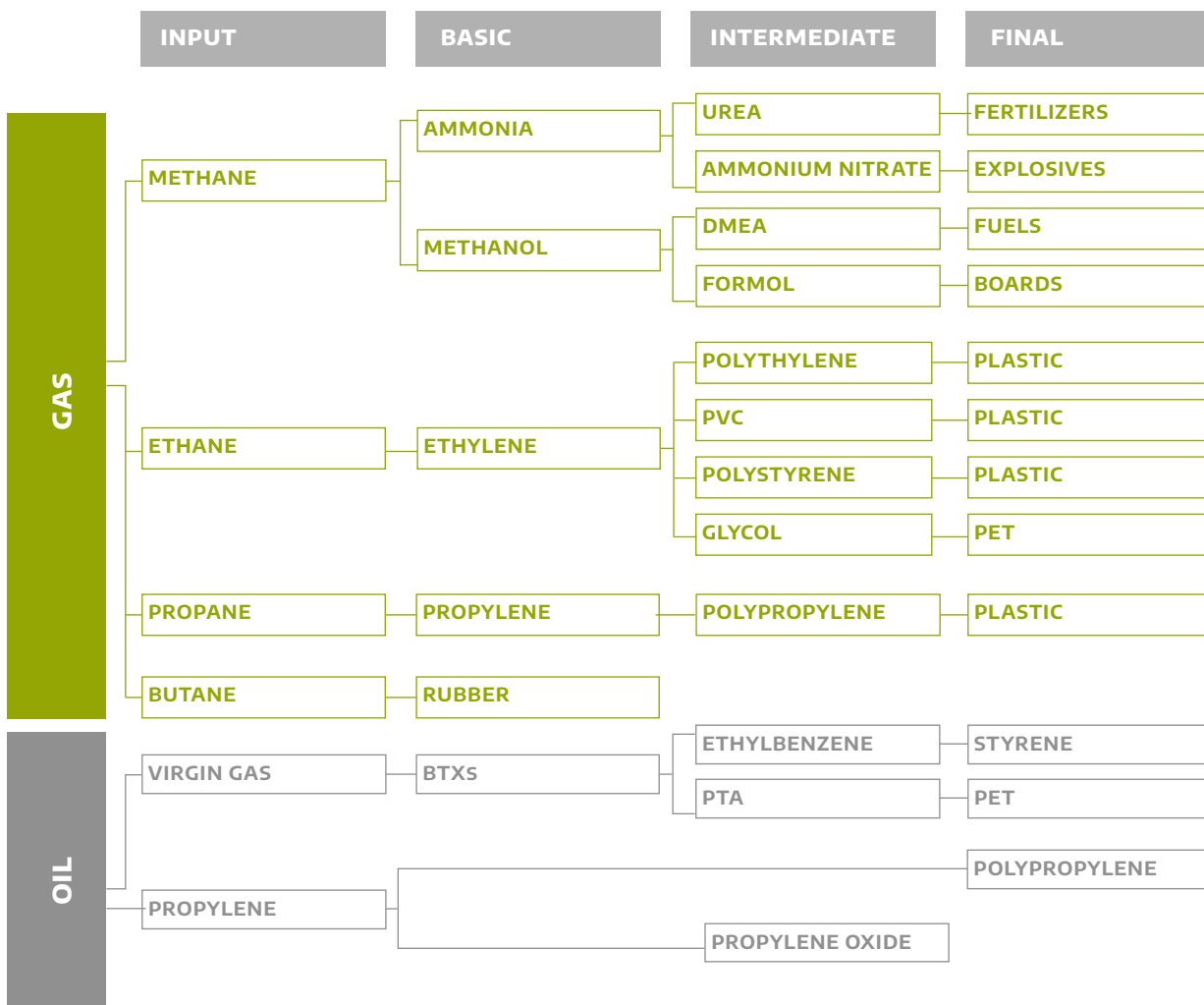


**Value chain**

The industry forms a large value chain. The task begins with exploration, exploitation and production; this is converted into raw materials for the chemical and petrochemical industries, which are then transformed into intermediate substances and chemical products to be used in other industries and to find their way into people's daily lives.

The economic importance of this chain is mainly due to its role as a producer of widely used inputs, as plastic products are usually demanded by a large number of industries (food, automotive, electrical and electronics, textile, construction and furniture, among others).

**Value chain**



Source: CIQyP.

### **Value chain: opportunity for productive investment**

One of the main investment opportunities in the country is a new ethylene plant. According to industry estimates, the Argentine market requires this investment in the medium term to meet the petrochemical products demand and add value as a result. The investment for an ethylene cracker of 1.25 million tonnes is estimated at USD 1.5 billion if it is greenfield. If it is brownfield, which means it shares a petrochemical pole, a 15% reduction in the investment is projected.

### **Opportunity: value-added polyethylene**

The country is a major player in the region in terms of polyethylene (PE) supply. It has broad competitive advantages compared to other Latin American countries, as Argentina's tariff policy offers a better interregional trade position.

Global demand for PE is increasing due to the growing use of by-products (films and packaging). According to estimates by the Chamber of Chemical and Petrochemical Industry, there is a bottleneck in the local polyethylene supply, since demand exceeds supply due to a production deficit. The opportunity lies in the construction of one or two new PE production units with a capacity of 1.25 million tonnes per year to meet the growing demand in the region over the next 10 to 15 years.

Argentina has a well-developed petrochemical hub in Bahía Blanca, where all ethane and ethylene are produced. Ethane is the most important basic input in the plastic production chain.

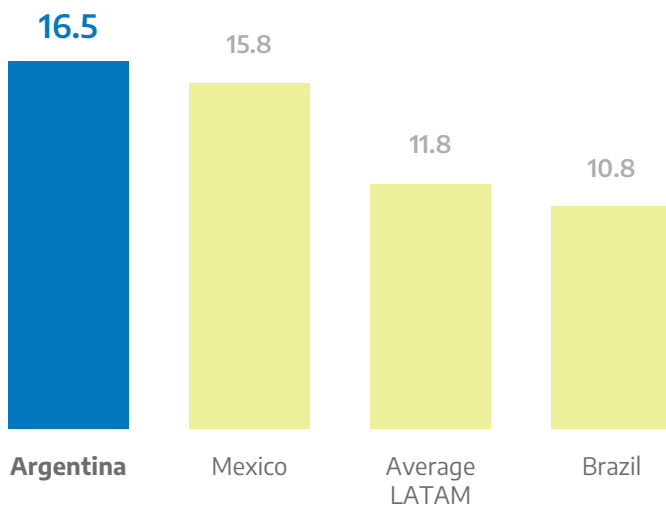
Moving up the production chain, PE is one of the most important plastic resins in the world. The growth in the global demand for polyethylene is associated with better social and economic conditions. In this sense, those regions with greater social mobility increase their demand considerably. Global demand for PE is led by the Asia-Pacific region with 52%—mainly by China.

The Argentine domestic market offers a steady and sustained demand for polyethylene. Since Argentina is positioned as the main PE supplier in Latin America, there is a great investment opportunity in this segment.

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### Apparent consumption of PE in LATAM

Figures in Kg per capita.



Source: CIQyP.

## MAIN CHARACTERISTICS OF THE SECTOR

The consumption of thermoplastics in Argentina is primarily based on PE (47%), followed by PP (24%), PET (13%), PVC (11%) and finally PS (5%).

In Latin America, polyethylene production is concentrated in three countries: Brazil, Mexico and Argentina. However, it should be noted that Venezuela has an installed capacity of 450,000 tonnes of PE per year and Colombia has a polyethylene line in a single company, Polietilenos de Colombia (Policolsa), of 55,000 tonnes per year.

### Productive data of polyethylene in LATAM

VALUES EXPRESSED IN TONNES. INCLUDES HIGH DENSITY POLYETHYLENE (HDPE), LOW DENSITY (LDPE) AND LINEAR LOW DENSITY (LLDPE).

COUNTRY	INSTALLED CAPACITY	PRODUCTION	IMPORT	EXPORT	APPARENT DEMAND
Brazil (2016)	3,505,000	2,708,467	776,255	1,036,967	2,447,755
Mexico (2021) *	840,000	518,384	1,305,351	312,874	1,710,861
<b>Argentina (2021)</b>	<b>1,285,000</b>	<b>549,776</b>	<b>320,680</b>	<b>230,279</b>	<b>640,177</b>

Source: Latin American Petrochemical and Chemical Association (APLA).

\*Does not include LLDPE.

In Argentina, the global company Dow Chemical is the main producer of PE. In 2021, its polyethylene production, in its three types (LDPE, HDPE and LLDPE), reached 550,000 tonnes—42% of it was exported, while the remaining 58% was sold in the domestic market and accounted for 50% of the Argentine polyethylene demand.

**Foreign trade**

The country has a consolidated presence in the foreign market. In 2021, it became the third largest exporter in Latin America with exports over USD 6 billion.

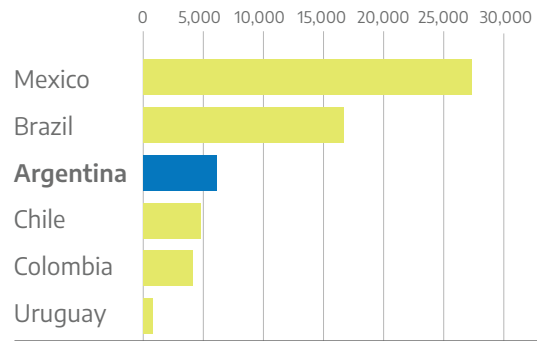
**Investment conditions**

In the 2013-20 period, Argentina received 3.9% of foreign direct investment in the Latin American region, which totaled USD 390 million and generated 1,700 jobs. Brazil, with 35.3%, and Mexico, with 29.1%, were the largest beneficiaries.

During 2019 and 2020, four projects were announced for a total of USD 123 million, which will generate about 600 jobs.

**Chemicals exports**

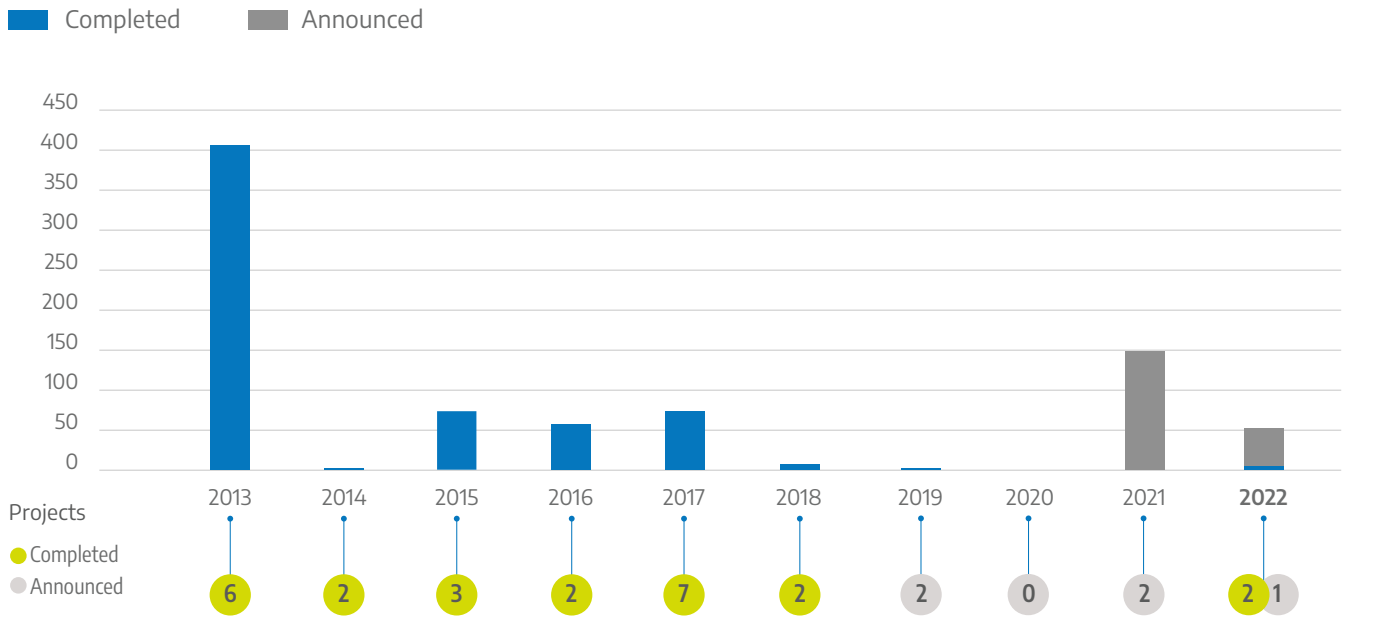
Figures in USD millions. 2021 data.



Source: Comtrade.

**Announced and completed FDI in Argentina**

Amount of the projects, in USD millions.



Source: Orbis.

## Qualified workforce and education system

The need for qualified professionals in a wide range of technologies to work in the chemical and oil industry has been a concern in the sector since the beginning and over its 100 years of development in the country. Consequently, there is a vast academic offer (undergraduate, graduate, and technical courses) in the country's main universities.

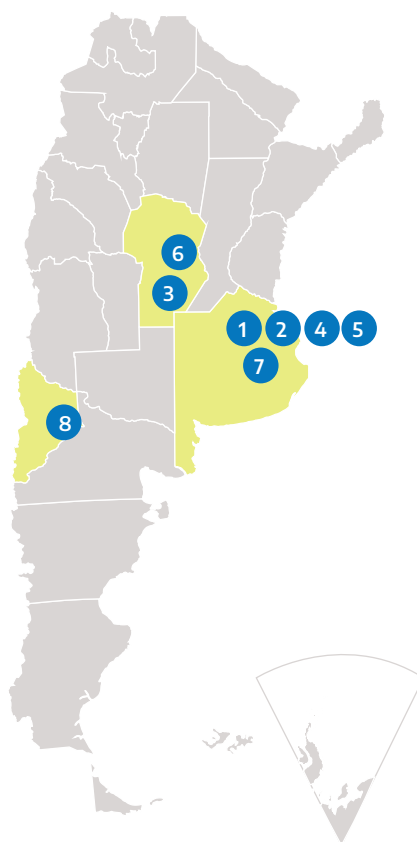
Within the field of engineering, there are universities all over the country that offer a bachelor's degree in Chemical Engineering.

In addition to the courses directly related to Chemistry, there are other relevant training programmes for professionals in the industry. For instance, various engineering degrees (Oil, Environmental, Aeronautics, Electrical, Electromechanical, Electronics, Energy, Geodesy, Materials, Mechanics, Mechatronics, Renewable Natural Resources, among others) and bachelor's degrees in Environmental Sciences, Energy, Renewable Energies, Physics, Geophysics, Geology, Geochemistry, Environmental Management, among others.

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## Universities offering Chemical Engineering

- |   |   |
|---|---|
| 1. University of Buenos Aires (UBA)         | 5. Technological Institute of Buenos Aires (ITBA) |
| 2. National Technological University (UTN)  | 6. National University of Córdoba (UNC)           |
| 3. National University of Río Cuarto (UNRC) | 7. National University of La Plata (UNLP)         |
| 4. Catholic University of Argentina (UCA)   | 8. National University of Comahue (UNComa)        |



Source: Own elaboration based on Revista Petroquímica.

## Research, development and innovation institutions

The participation of RDI institutions is a crucial factor for the growth of the petrochemical sector and the development of innovations. The sector has a high degree of clustering in Argentina. Both the large concentration of industries and specialised human resources, and the interaction with public and mixed organisations benefit all the parties involved to such an extent that there are petrochemical hubs in the country that constitute actual industrial clusters. They provide broad incentives and support to firms that foster their competitiveness through the promotion of innovation, technological development and internationalisation.

The Synthetic Indicator of Innovative Capacity (ISCI) aims to reflect the degree of technological innovation potential, research and development in areas related to the production processes and principal technologies involved in the petrochemical chain. This indicator covers the following dimensions: Institutional, Educational, Research and Incentives.

In the 2016 innovative capabilities mapping, the province of Buenos Aires was in first place, as most production chains. This province has a large concentration of researchers and institutional resources for developing activities, such as the INTI plastics centre in the San Martín district. Regarding the educational offer, there are specific graduate programs regarding related issues at the National University of the South (UNS) and the National University of San Martín.

Moreover, most petrochemical production is concentrated in the Bahía Blanca petrochemical hub, which resulted in the development of specific lines of research in this area through PLAPIQUI (Chemical Engineering Pilot Plant)—an RDI institute in process and product engineering that belongs to the National University of the South (UNS) and the National Council for Scientific and Technical Research (CONICET).

## Synthetic Indicator of Innovative Capacity in the petrochemical

### CATEGORIES OF SYNTHETIC INDICATOR OF INNOVATIVE

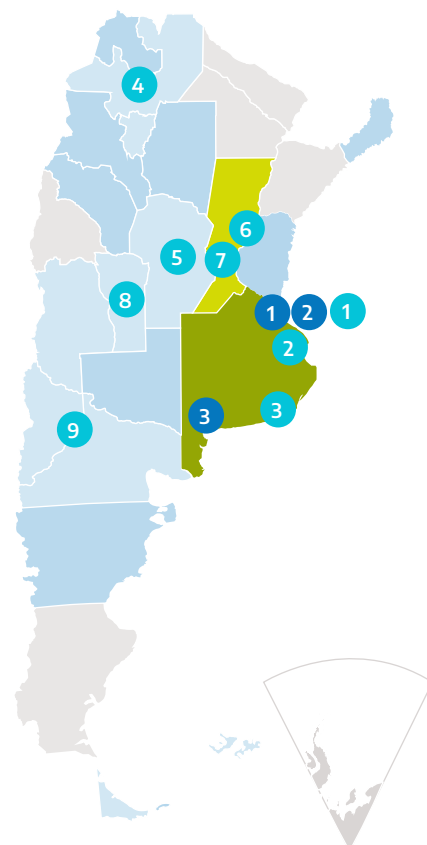


### UNIVERSITIES SPECIALISED IN PETROCHEMISTRY AND/OR PLASTIC

1. Autonomous City of Buenos Aires
2. San Martín
3. Bahía Blanca

### CONICET EXECUTING UNITS

- |   |                     |
|---|---------------------|
| 1. Autonomous City of Buenos Aires: UCA-CAIP, INQUIMAE, ITPN, INTECIN | 4. Salta INIQUI     |
| 2. La Plata CINDECA   | 5. Córdoba CITEQ    |
| 3. Mar del Plata INTEMA   | 6. Santa Fe INTEQUI |
|   | 7. Rosario IQUIR    |
|   | 8. San Luis INTEQUI |
|   | 9. Neuquén PROBIEN  |



Source: Secretariat of Economic Policy  
Ministry of Economy.

## Infrastructure, transportation and logistics

A transportation network between the regions of extraction of the industry's basic resources, the petrochemical hubs and the export markets is crucial for the development of this industry. There are several projects in different stages, as detailed by Fitch Argentina Petrochemicals Key View:

### Project 1

The pipeline connecting Vaca Muerta with the Buenos Aires region and the Litoral is a project scheduled for completion by mid-2023. The total work will cost approximately USD 2.54 billion. The first stage, scheduled for 2021 and 2022, involved an investment of USD 965 million, while the second stage, for USD 1,575 million, is scheduled for 2023.

### New gas pipeline Neuquén-Litoral

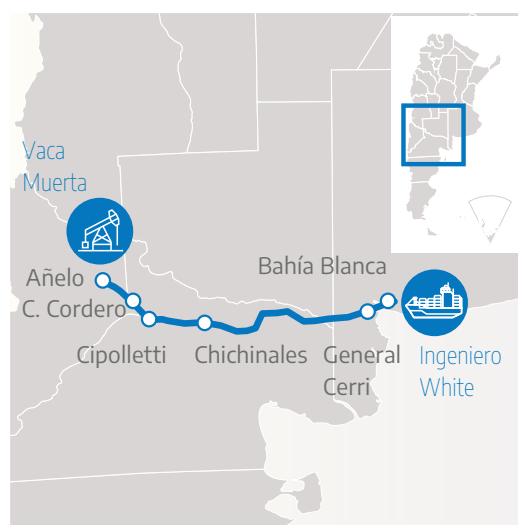


Source: [www.argentina.gob.ar](http://www.argentina.gob.ar)

### Project 2

Power China is expected to invest USD 1 billion for the expansion of the railway connection between Vaca Muerta and Bahía Blanca, which transports energy and refinery products. The project contemplates the revamping of about 700 km of the Roca Railway tracks, Bahía Blanca-Neuquén- Zapala section; improvement or renewal of tracks, if necessary, between Ingeniero White/Bahía Blanca and Contraalmirante Cordero; and the construction of 83 km of new tracks between the latter and Añelo in the surroundings of Vaca Muerta.

### Bahía Blanca-Añelo expansion



Source: [www.energianeuquen.gob.ar](http://www.energianeuquen.gob.ar)



**Project 3**

The Argentine government began talks with its Brazilian counterpart to invest in a natural gas pipeline between Vaca Muerta and the southern part of Brazil.

The project would involve the construction of a 1,430 km pipeline to southern Brazil and another 600 km from there to Porto Alegre, to connect the shale gas from the Neuquén Basin to the distribution system in southern Brazil. The first section from Tratayén to San Jerónimo would involve USD 1.9 billion, while the total investment in the three sections accounts for USD 5 billion.

**Gas pipeline between Vaca Muerta and the south of Brazil**

- Regulated system of transport
- Entre Ríos gas pipeline
- - - - GNEA gas pipeline
- TGM gas pipeline

**NEW LAYING OF GAS PIPELINE**

<p><span style="color: blue;">■</span> SECTION 1 Tratayén to San Jerónimo 980 km 40 million m3/day USD 1.9 billion</p>	<p><span style="color: blue;">▤▤▤▤</span> SECTION 2 San Jerónimo to Uruguayana 450 km 30 million m3/day USD 1.8 billion</p>	<p><span style="color: blue;">▤▤▤</span> SECTION 3 Uruguayana to Porto Alegre 625 km 30 million m3/day USD 1.2 billion</p>
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Source: [www.argenports.com.ar](http://www.argenports.com.ar)

**Project 4**

The development of the Paraná-Paraguay waterway would expand river trade in northern Argentina. This waterway, which is the most important one in the country, has the largest concentration of industries on its banks, ranging from chemicals to iron and steel, including metallurgy, meat processing and the soybean complex. It is the sea outlet for 70% of Argentina’s agro-export trade.

A new concession is planned for the short term, and its first challenge will be revamping the waterway to increase the current shipment of 120 million tonnes to 200 million tonnes. To achieve this goal, the depth of the dredging between the Río de la Plata and the port terminals of Gran Rosario must be expanded so that larger ships can enter the waterway.

In addition, the new concession would generate incentives for systematic dredging and beaconing in the north of Santa Fe to increase the depth to 12 feet, which would allow the navigation of vessels of up to 40 barges. This is the equivalent of over 1,000 rail cars or over 2,000 cargo trucks. A larger river transportation system along the entire waterway would also encompass the secondary channels of the Río de la Plata basin.

**Project 5**

The liquefaction plant in Bahía Blanca, one of the international departure ports, is another fundamental work for the exploitation of Vaca Muerta to enter the foreign market. In this way, the gas would be transported to Bahía Blanca to be liquefied, transformed into LNG, and sent for export without the need to use the current liquefying vessel. There are two projects:

- The first one, planned by YPF, consists of a large-scale liquefaction plant. It is estimated to have a USD 5 billion investment and a 5-year construction period.
- The second project, also in Bahía Blanca, belongs to Exceleerate Energy and TGS. This plant, which could be in operation by 2023, is estimated to require a USD 1.6 billion investment.

**Paraguay-Paraná waterway**

**POWER AND GAS PLANTS**

- |                           |   |
|---------------------------|---|
| 1. Pto. Quijarro          | ● Plantas con acceso directo y soberano al Océano Atlántico |
| 2. Pto. Aguirre           |   |
| 3. Pto. Busch             |   |
| 4. Pto. Murtino           |   |
| 5. Pto. Concepción        |   |
| 6. Villeta                |   |
| 7. Corrientes             |   |
| 8. Reconquista            |   |
| 9. Santa Fe               |   |
| 10. Pto. Gral. San Martín |   |
| 11. San Lorenzo           |   |
| 12. Rosario               |   |
| 13. Escobar               |   |
| 14. Nueva Palmira         |   |
| 15. Rocha                 |   |



Source: Aire de Sante Fe.

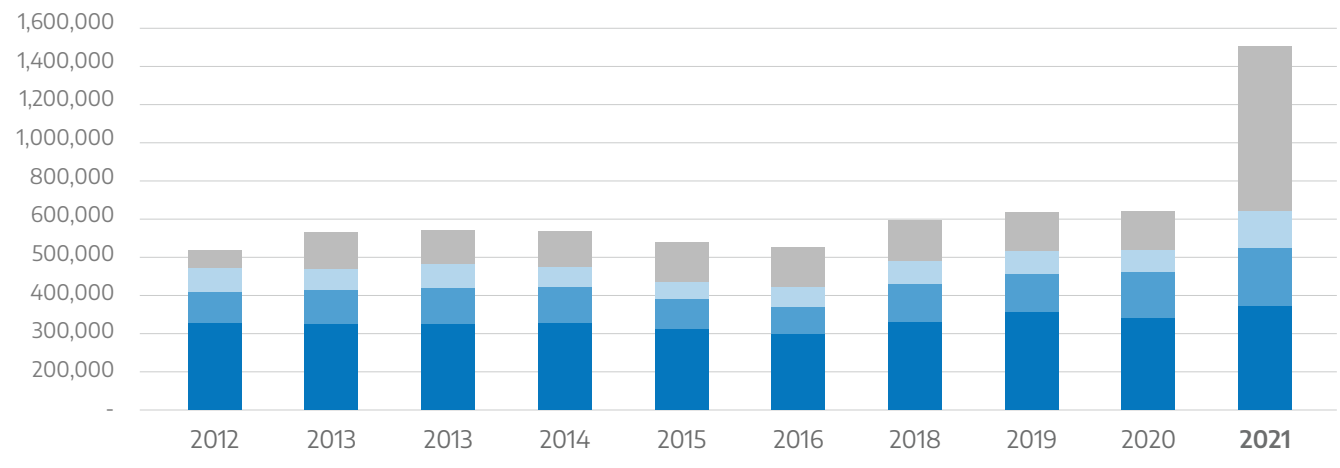
**Abundance and availability of strategic resources**

As already mentioned, Argentina is a world energy powerhouse. According to the Ministry of Energy, it has estimated reserves of 1.9 billion barrels of crude oil (bbl) and 0.33 trillion cubic meters (tcm) of gas. The country also holds substantial unconventional resources, with an estimated 22.7 tcm of technical recoverable shale gas resources and 27 billion barrels of recoverable shale oil.

**Evolution of reserves per category**

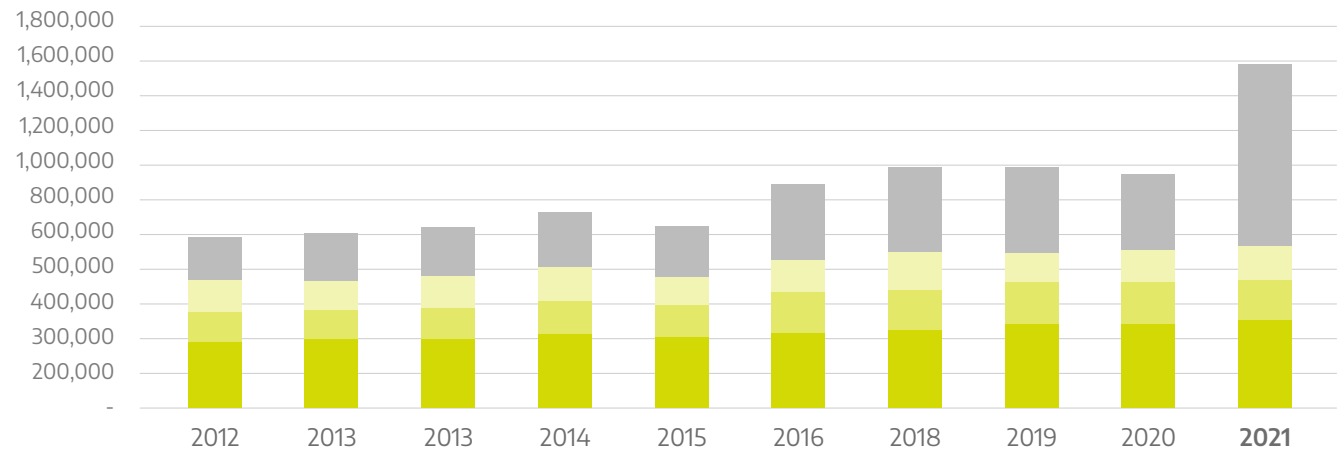
**OIL** Figures in thousand m<sup>3</sup>.

■ Proven reserves ■ Probable reserves ■ Possible reserves ■ Contingent resources



**NATURAL GAS** Figures in million m<sup>3</sup>.

■ Proven reserves ■ Probable reserves ■ Possible reserves ■ Contingent resources



Source: Secretariat of Energy.

**Technology, research and development that foster growth and innovation**

The country has a sound and consolidated business network with state-of-the-art technology. A survey conducted by the Chamber of the Chemical and Petrochemical Industry to 251 companies engaged in the manufacture of intermediate-use chemical substances and products revealed the following results regarding technology:

- 74% consider their technology to be appropriate and 11% even consider it advanced. Only 15% consider it to suffer from a technological delay.
- 69% have their own technology, 23% use licensed technology and 8% use public domain technology.

Regarding research and development:

- Most people (over 80%) believe they have a suitable research and development capacity, even 16% consider they even have advanced capacities, while only 4% present deficit in this regard.
- 81% of the answers indicate that research and development is carried out in-company, while 15% outsource these resources and only 4% do R&D with third parties.

## **Benefits**

### **Tax benefits**

#### **Import regime for goods included in “Large Investment Projects”**

A complete production line can be imported and its spare parts can be brought in for up to 5% of the total value of the line, without paying customs duties.

#### **Import regime for consumption of used capital goods**

A Certificate of Importation of Used Goods (CIBU) is required to enter used equipment and machinery into the country. Import duty is twice as that of new equipment, from 7% up to 35%.

#### **Temporary import regime for capital goods**

Capital goods that are not available in the country because they are not manufactured or because they are not available in the market can be temporarily imported with an exemption on import duties. Such goods need to have a specific purpose and a determined period of permanence to enter the country, and they must be reexported for consumption before the expiration of such period.

#### **Authorise the overseas shipping of goods to make improvements or transformations**

It is possible to export, on a temporary basis, goods that require a process of elaboration or improvement not carried out in the country.

### **Industrial parks**

The country has over 400 industrial parks which, according to experts, are expected to grow. A total 60% of these parks are in the outskirts of the Greater Buenos Aires and in the metropolitan area of the city of Buenos Aires.

Some of the reasons for being established in these areas are based on the following:

1. Tax and service exemptions.
2. Legal security and capitalisation of investment.
3. Bank financing at preferential rates.
4. Adequate infrastructure and security for the industry.
5. Efficient investment in industrial services.
6. Network economy.
7. Promotion of sustainable development and a higher quality of life for staff.
8. Access to articulated training.
9. Organised industrial community.

An emblematic case is the Bahía Blanca Industrial Park, close to the region’s petrochemical hub. It has 136 hectares strategically located near the Port of Bahía Blanca, the petrochemical hub and the Bahía Blanca-Coronel Rosales free trade zone. It has a public-private administration, where the municipality distributes the plots of land and the park manages infrastructure works.

<b>BAHIA BLANCA INDUSTRIAL PARK: EXEMPTIONS AND BENEFITS</b>	
<b>PROVINCIAL</b>	<b>MUNICIPAL</b>
Exemption from provincial, real estate, gross income, stamps and vehicles tax.	Exemption from inspection on security and hygiene; lighting, sweeping and cleaning; preservation of public roads; and marketing and advertising taxes for eight years to the companies operating in the industrial park.
Benefits with the Guarantees Fund of the Province of Buenos Aires (FOGABA).	Exemption from the payment of construction rights and authorisation taxes for companies established in the industrial park.
	Exemption from payment of municipal taxes for one year for SMEs that have acquired land plots in the industrial park and are in the process of establishing operations there.

## **Institution network**

The Argentine chemical and petrochemical sectors have a sound network of institutions which constitutes an advantage for the industry's players in these areas. The legal framework and the permanence of certain institutions with specific purposes over time are decisive factors for the growth of the sector and the development of innovations. The principal representatives of the sector in the region are listed below:

### **Institute of Technological Development for the Chemical Industry - INTEC**

It is a research and technology development institute in the city of Santa Fe, under the National University of Litoral (UNL) and the National Council of Scientific and Technical Research (CONICET).

### **Chemical Engineering Pilot Plant**

It is an RDI institute in process and product engineering, dependent on the National University of the South (UNS) and National Council of Scientific and Technical Research (CONICET) in Bahía Blanca. It currently has 57 researchers, 53 professionals and technicians, and 65 PhD and post-doctorate fellows.

### **National Institute of Industrial Technology**

The Institute's objective is to improve industrial quality through measurement capabilities, the construction of traceability chains, product certifications and the development of technologies for the different-production chains. It also carries out research, development, analysis and testing, technical assistance and training for third parties.

### **National Agency for the Promotion of Research, Technological Development and Innovation**

It is a decentralised national agency within the Ministry of Science, Technology and Innovation. Its objective is to promote scientific research, knowledge generation and productive innovation to improve Argentina's productive profile and the population's quality of life. It has promotional tools through three financing funds oriented to different topics, sectors and beneficiaries.

- Fund for Scientific and Technological Research (FONCyT).
- Argentine Technological Fund (FONTAR).
- Argentine Sectoral Fund (FONARSEC).

**Chemical SMEs in the advanced segment of the value chain**

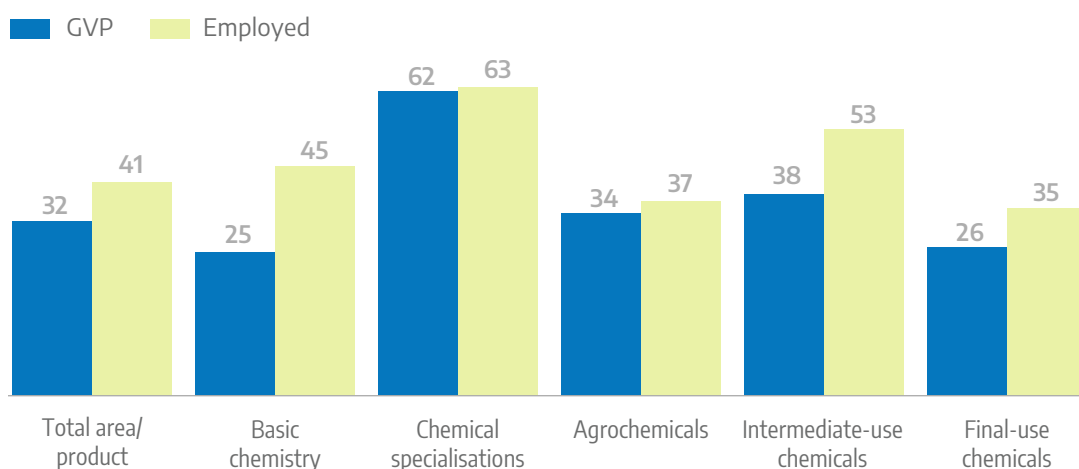
According to data from the Ministry of Labour, 90% of the chemical sector is made up of SMEs. In terms of contribution to employment, the CIQ&P estimates that SMEs represent 32% of total employment in the sector.

Regarding the activities carried out by chemical SMEs, the graph indicates that they are mainly concentrated in “chemical specialties”, “intermediate use chemicals” and “fertilizers and agrochemicals”, with a relatively low participation in “basic chemicals”.

In 2010, exporting chemical SMEs accounted for 28% of the total number of exporting SMEs, with an average percentage of exports of about 13.3% of their total turnover. A high percentage are certified by ISO 9000 standards and most of them have a quality management system that serves for subsequent certification. Many of them adhere to the “Responsible Care of the Environment Program”, recognised by FORD as equivalent to ISO 14000 standards. The Chamber that brings together companies in the chemical and petrochemical sector has carried out a study to analyse the possibility of having the Brazilian chemical industry as a complement for the segment of intermediate-use chemical substances and products, in which SMEs have a significant participation.

**Share of chemical SMEs in gross value of production and employment**

2010 data, figures in percentages.



Source: CIQyP.



According to estimates of the Index of Revealed Comparative Advantages (IVCR), using the trade statistics of Argentina and Brazil, it is possible to identify the Argentine products that have a greater comparative advantage compared to Brazilian products which, as a result, shows the competitiveness levels in the Brazilian and global markets.

The results of the IVCR calculation between Argentina and Brazil—by tariff position of the Mercosur Common Nomenclature (NCM)—reveal that, out of a total of 1,659 tariff positions corresponding to the chemical products in the sample, 705 positions present a comparative advantage of Argentina over Brazil.

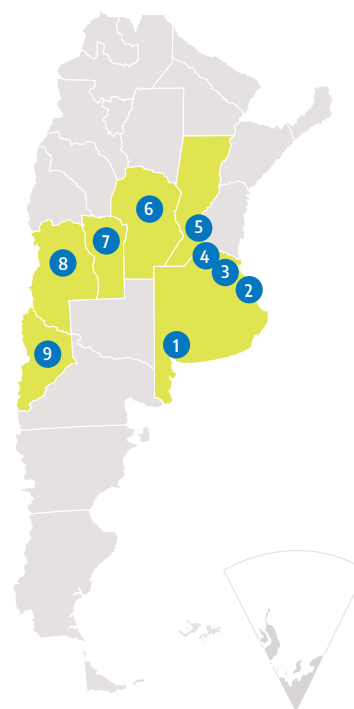
Number of positions	Argentina total exports Thousand USD	Argentina total imports Thousand USD	Argentina commercial balance Thousand USD	Brazil total exports Thousand USD	Brazil total imports Thousand USD	Brazil commercial balance Thousand USD
705	2,232,720	2,085,867	14,853	1,023,599	9,854,565	-8,830,966

### Specialised clusters and productive complexes

The country has nine petrochemical hubs, but the most important one is certainly Bahía Blanca, in the south of the province of Buenos Aires, with 60% of national petrochemical production and 50% of petrochemical exports. Its location is due to the existence of an important deep-water port infrastructure with three ports (Galván, Ingeniero White and Rosales); the availability of salt flats to extract sodium chloride, which is necessary to obtain the chlorine used in the last stage of petrochemical processing; and a large road and railroad network. A consolidated cluster has been formed there over the years, with the intensive coordination of research institutes, the National University of the South, the National Technological University (UTN), the CONICET’s research institutes and the Chemical Engineering Pilot Plant.

### Petrochemical hubs

- |  |                               |
|--|-------------------------------|
| 1. Bahía Blanca - Buenos Aires         | 6. Área Río Tercero - Córdoba |
| 2. Campana, San Nicolás - Buenos Aires | 7. Área San Luis - San Luis   |
| 3. Dock Sud - Buenos Aires             | 8. Luján de Cuyo - Mendoza    |
| 4. Area Ensenada - Buenos Aires        | 9. Plaza Huincul - Neuquén    |
| 5. San Lorenzo - Santa Fe              |                               |



Fuente: Elaborac. propia en base a la Revista Petroquímica.

**General Environmental Act (No. 25,675/2002)**

Determines the minimum requirements for the achievement of a sustainable and appropriate environmental management, the preservation and protection of biological diversity and the implementation of sustainable development.

**Environmental insurance**

This is the financial guarantee required of any individual or legal entity, public or private, that carries out activities that pose a risk to the environment, ecosystems, and their constituent elements, pursuant to Article 22 of the General Environment Act.

**Household Waste Management Act  
(No. 25,916/2004)**

It establishes the minimum environmental protection requirements for the integral management of waste (whether of residential, urban, commercial, health care, sanitary, industrial or institutional origin).

The national regulatory framework for environmental and waste management is complemented by the legal systems of the provinces and municipalities.

The Superintendence of Labor Risks (SRT) established through Resolution No. 801/2015 the full implementation of the Globally Harmonized System of classification and labeling of chemicals (GHS), which establishes harmonised criteria for classifying hazardous substances. It obliges employers to apply the GHS at their facilities in training, labeling and signaling.

**Methodology used to calculate the IVCR:**

VCE = Export Comparative Advantages Index

VCI = Import Comparative Advantages Index

IVCR = Revealed Comparative Advantages Index = (VCE – VCI)

A relation between Argentina's and Brazil's VCE is established:

$$VCE^{Ar/Br} = \frac{VCE^{Ar}}{VCE^{Br}} \quad (1)$$

Each VCE is also defined as:

$$VCE^{Ar} = \frac{X_i^{Ar} / X_i^m}{X_t^{Ar} / X_t^m} \quad (2) \quad y \quad VCE^{Br} = \frac{X_i^{Br} / X_i^m}{X_t^{Br} / X_t^m} \quad (3)$$

where:

$X_i^{Ar}$  = Argentina's exports of product (i)

$X_i^m$  = global exports of product (i)

$X_t^{Ar}$  = total exports of chemicals from Argentina's sample

$X_t^m$  = total exports of chemicals from the world's sample

Analogous definitions for Brazil are applied in formula (3)..

When introducing formulas (2) and (3) in (1) you obtain:

$$VCE^{Ar/Br} = \frac{X_i^{Ar} / X_i^{Br}}{X_t^{Ar} / X_t^{Br}} \quad (4)$$

Similarly, the import comparative advantage index (VCI) is calculated as follows:

$$VCI^{Ar/Br} = \frac{M_i^{Ar} / M_i^{Br}}{M_t^{Ar} / M_t^{Br}} \quad (5)$$

To establish the IVCR, the following final formula is used:

$$IVCR^{Ar/Br} = VCE^{Ar/Br} - VCI^{Ar/Br}$$

The incorporation of the VCI enables to obtain the net balance of comparative advantages, since a country can be competitive at the level of product exports, but it is essential to include imports to obtain the real net balance and, therefore, its real competitiveness.

The results of the calculation of the IVCR between Argentina and Brazil—by the NCM tariff position—show that, out of a total of 1659 tariff positions corresponding to the chemicals in the sample, 705 positions show a comparative advantage of Argentina over Brazil.

**Bahía Blanca**

Mega SA  
Posta de Inflamables  
Proferil SA  
Dow

**Ensenada Area**

Mafisa  
Petroken-Petroquímica de Ensenada SA  
YPF  
Shiafa SAICF Dow  
Air Liquid Argentina

**Dock Sud, Buenos Aires**

Atanor  
BASF Poliuretanos SA  
Induspol Aislaciones SRL  
Ind. Química Crabinol SACIFIA  
Invista Argentina SRL  
Petroquímica Argentina SA  
Plast SAICIF  
Dapsa  
Shell  
EG3 SA  
Sea Tank Coastal Petroleum Arg.  
Sol Petroleo SA  
YPF  
Meranol  
Antivari SA  
Distribuidoras Químicas SA  
Exolgan  
Indupa  
Productora Argentina de Maleza  
TAGSA  
Union Cardibe Argentina  
Valentin Balcarce SA  
Mecocarga  
Maruba

**Campana, San Nicolás**

Atanor  
Cabor Arg. SA  
Carbochlor SA  
Carboquímica del Paraná SA  
Petrobras Energía SA  
Voridian Energía SA  
Paraná SA  
Bunge Arg SA  
Moviport SA

**San Lorenzo, Santa Fe**

BASF Argentina SA  
Dow Química Arg.  
ICI Arg. SAIC  
LD Manufacturing SA  
Petrobras Energía  
Petrobras Bermúdez  
Akzo Nobel  
Varteco Química Puntana  
Arzinc SA

**Río Tercero Area**

Atanor  
Petroquímica Río Tercero  
Fábrica Militar Río Tercero

**San Luis**

Resignum SA

**Luján de Cuyo, Mendoza**

Aislantes de Cuyo SA  
Petroquímica Cuyo SAIC  
YPF

**Plaza Huincul, Neuquén**

YPF  
Neuform SA



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