

Power / Oil and Gas



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 km², 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/m².

Moreover, it has great potential for mining development due to its over 705,000 km² 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 Index¹ ranking for Data Science.

¹ 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.

8	EXECUTIVE SUMMARY
9	FIVE REASONS TO INVEST IN OIL AND GAS IN ARGENTINA
10	MAIN CHARACTERISTICS OF THE SECTOR
23	REASONS TO INVEST IN THE SECTOR
28	INVESTMENT OPPORTUNITIES
29	APPENDICES

API	American Petroleum Institute
BOE	Barrel oil equivalent
CAMMESA	Argentine Wholesale Electricity Market Management Company
CNG	Compressed natural gas
EIA	Energy Information Administration, Official Energy Statistics from the US
FDI	Foreign Direct Investment
GAPP	Argentine Group of Oil Suppliers
GHI	Global horizontal irradiance
IAPG	Government Argentine Oil and Gas Institute
INTI	National Institute of Industrial Technology
ITBA	Buenos Aires Institute of Technology
KBD	Thousands of barrels per day
LATAM	Latin America
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MERCOSUR	Southern Common Market
MTPA	Million of metric tons per year
OECD	Organization for Economic Cooperation and Development
RDI	Research, Development and Innovation
UBA	University of Buenos Aires
UNAJ	University Arturo Jauretche
UNCOMA	University of Comahue
UNCUYO	University of Cuyo
UNP	University of Patagonia San Juan Bosco
USD	United States dollars

Conversions

1 BOE = 0,15898761 m³ of oil

1 BOE = 158,98731 m³ of natural gasal

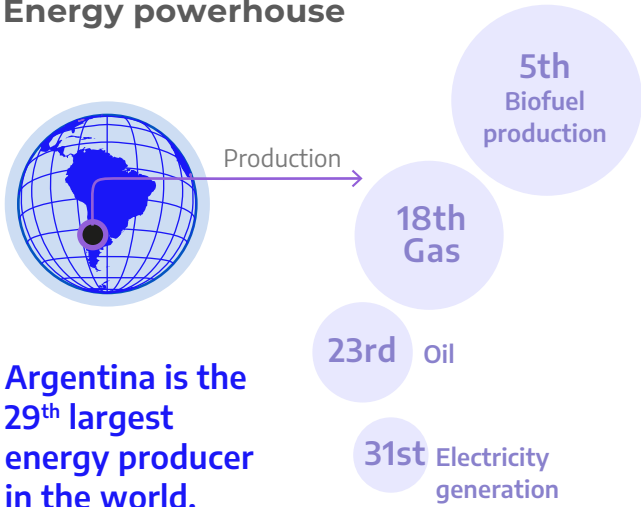
(at a 5,614.6 cubic feet ratio of natural gas per barrel of crude oil)

Thanks to the growth of Vaca Muerta production, Argentina (a major global energy player) has a strong momentum for the extraction of unconventional oil and gas.

Argentina is a global energy power that ranks among the top 30 energy producing and consuming countries: 18th in gas production, 23rd in oil production, 5th in biofuel production and 31st in electricity generation.

- Investment opportunities in the hydrocarbon sector exceed USD 150 billion in the upstream, midstream, and downstream segments.
- Vaca Muerta is, after Eagle Ford, the formation with the largest amount of unconventional gas resources in the world.
- The future of Vaca Muerta is even more promising; hydraulic fracturing is at the forefront of technology and well drilling costs are at a highly competitive level.
- The country has a developed transportation infrastructure and an interconnected regional market with high export growth expectations. In 2021, gas exports to Brazil were reactivated after six years, and in 2018 to Chile after fourteen years.
- The regional market, within Mercosur and together with the Pacific Alliance, constitutes a market of over 500 million consumers. At the global level, the Netherlands and the U.S. are the main destinations for crude oil exports.
- The domestic market provides a steady demand. The primary energy matrix is 84% dependent on hydrocarbons. At the same time, the seasonal nature of the demand leads to an exportable energy surplus.
- The Argentine offshore platform is one of the most extensive and unexplored in the world and has enormous potential for offshore exploration.
- Six of the ten Big Oil Supermajors already operate in the country: Chevron, Royal Dutch Shell, BP, Exxon Mobil, Eni and Total.

Energy powerhouse

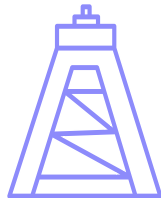


Argentina is the 29th largest energy producer in the world.

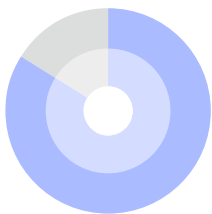
Source: US Energy Information Administration <https://www.eia.gov/international/data/world>

Fracking

At the forefront of global technology. Well drilling costs are highly competitive.



Power matrix

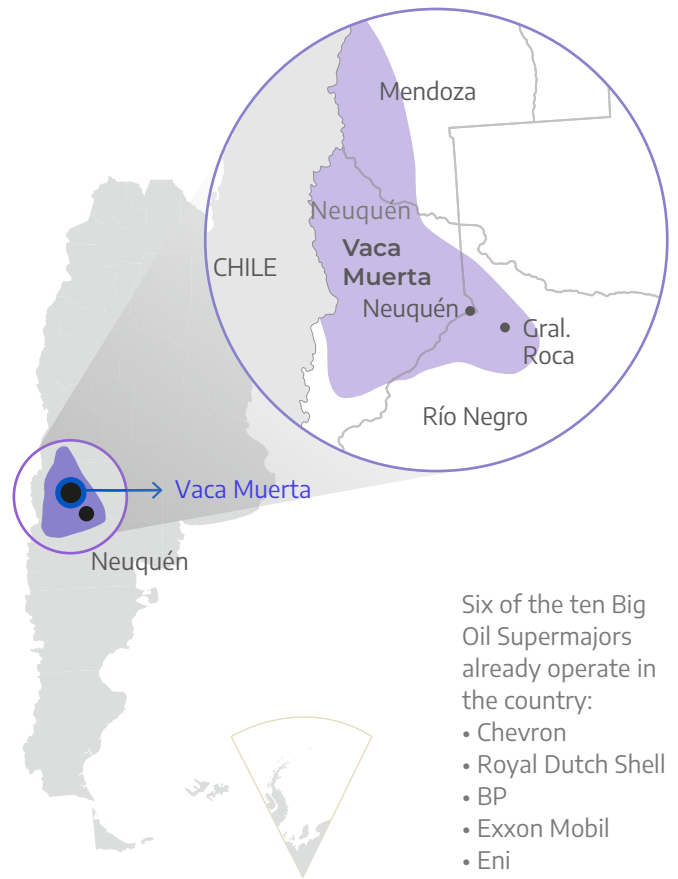


84% of the primary power matrix is dependent on hydrocarbons.

Account for 59% of power generation.

Vaca Muerta

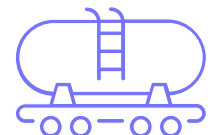
Argentina has 802 trillion cubic feet of shale gas and 27 billion barrels of shale oil. It is second only to China in gas and to the US, Russia and China in oil.



- Six of the ten Big Oil Supermajors already operate in the country:
- Chevron
 - Royal Dutch Shell
 - BP
 - Exxon Mobil
 - Eni
 - Total

Infrastructure

Large gas transportation infrastructure accounts for over 50% of power generation.



Overview

Argentina is a global energy powerhouse, ranking among the top 30 countries in total energy production: 18th in gas production, 23rd in oil production, 5th in biofuels production and 31st in electricity generation, according to EIA 2021 data. Exploration and exploitation investments of USD 31,152 million in the five-year period 2018-2022 reflect the investment opportunities in the hydrocarbon sector.

In 2022, oil production reached 33,791 Mm³ and gas production reached 48 MMm³. Production is concentrated in five productive basins, but the Neuquina, Austral and San Jorge Gulf basins account for the largest percentage. The growth in the exploitation of unconventional resources stands out: the extraction of shale gas has grown by 122% in the last 5 years, and oil from the same source by 439%. In 2017, shale gas accounted for 17% of national gas production—in 2022, it accounted for 55%. In terms of oil, unconventional oil went from 9% to 42% in the same 2017-2022 period.

Vaca Muerta is the mega formation of unconventional resources in the Neuquen Basin, is a magnet for global investment. In the last few years, over 30 big companies have been involved in its development: YPF, Chevron, DowDuPont, Petronas, Shell, Equinor, Schlumberger, Vista Oil & Gas, Tecpetrol, Pan American Energy, Pluspetrol, Wintershall Dea, ConocoPhillips, and Total, among others.

The country has very high potential for the development of unconventional hydrocarbons. It is ranked 2nd in unconventional gas resources (802 trillion cubic feet) and 4th in unconventional oil resources (27 billion barrels) on a global scale. Los Molles and Mulichinco shale formations, which are in the same basin, have great potential as well. The productivity of Vaca Muerta was recently highlighted by the renowned consulting firm McKinsey & Company, which has indicated that Vaca Muerta exceeds in the first 90 days the production of a similar well in the Permian formation, the main shale oil play in the United States, located in Delaware. In 2021, the Vaca Muerta wells reached a peak production of 82,000 barrels of oil,

compared to 76,000 barrels in Delaware. In the last three annual campaigns, they have even produced a cumulative 23% more.

The competitiveness of resources is complemented by a sound educational and R&D&I system for energy development. There are universities in the main productive provinces that offer undergraduate degrees, technical courses, and specializations in oil as well as other complementary programs: UBA, ITBA, UNP, UNCOMA, UNAJ, UNCUYO. In the field of research, the main company is Y-TEC (YPF+CONICET), which develops technological initiatives together with universities and production companies.

On the other hand, as it is an activity with over 100 years of development in the country, there is a wide range of specialized local goods and services with a high standard of quality.

MAIN CHARACTERISTICS OF THE SECTOR

The Argentine territory has a total of twenty-four sedimentary basins, both onshore and offshore, which extend over an area of over 3,000,000 km². Through a legal system of concessions of the original domain kind, 850 areas are delimited in these basins.

At present, five of the twenty-four basins mentioned above comprise 230 hydrocarbon areas under production.

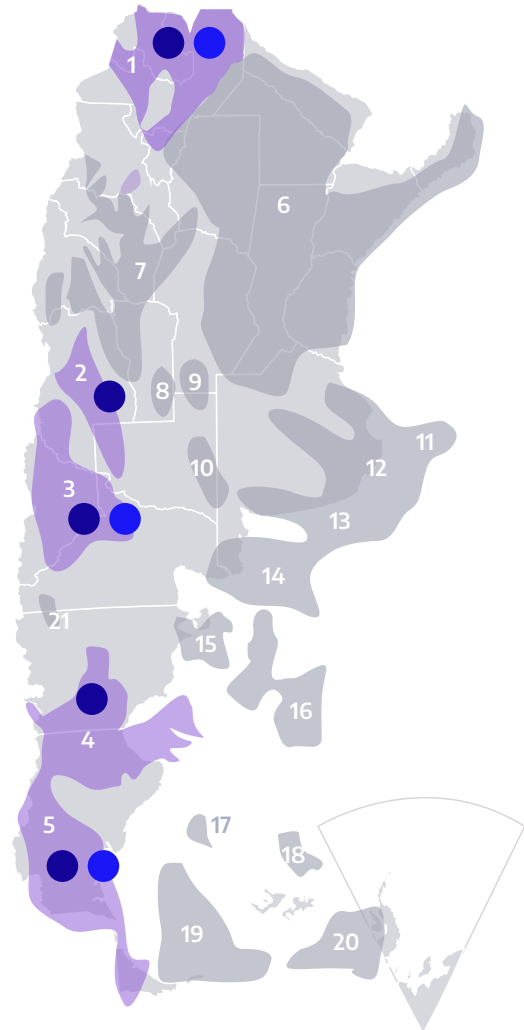
- San Jorge Gulf, oil was found in 13/12/1907.
- Neuquina was added in 1918 and comprises Vaca Muerta.
- Noroeste was added in 1926.
- Cuyana, in 1932.
- Austral, operational since 1949, the last one to start production.

The Neuquina Basin concentrated 68% of gas production and 59% of oil production in 2022, as well as the largest proportion of reserves (considering unconventional resources). Together with 20% of the Austral Basin and 8% of the San Jorge Gulf Basin, the three of them accounted for 96% of gas production in 2022. Regarding oil, the Neuquina Basin—along with the San Jorge Gulf Basin (35%)—together accounted for 94% in 2022. The information on concession areas can be freely accessed in the Geographic Information System (GIS Viewer) of the National Secretariat of Energy or through the Oil and Gas Geographic System (GEO-PG) developed by the IAPG.

<https://sig.se.gob.ar/visor/visorsig.php>
https://www.iapg.org.ar/web_iapg/estadisticas/estadisticas-interactivas/geo-pg-sistema-geografico-de-petroleo-y-gas

Map of Argentina's basins

■ Productive basin ■ Non-productive basin ● Oil ● Gas



- | | | |
|------------------|-------------------|----------------------|
| 1 Northwest | 8 San Luis | 15 Valdés Peninsula |
| 2 Cuyana | 9 Mercedes | 16 Rawson |
| 3 Neuquina | 10 Macachín | 17 San Julián |
| 4 San Jorge Gulf | 11 Punta del Este | 18 Northern Malvinas |
| 5 Austral | 12 Salado | 19 Malvinas |
| 6 Chaco Pampeana | 13 Claromecó | 20 Eastern Malvinas |
| 7 Bolsones | 14 Colorado | 21 Ñirihuau |

Source: Adapted from IAPG.

Vaca Muerta

Vaca Muerta, located in the Neuquina Basin, is the main unconventional hydrocarbon formation in the country. Although its potential was confirmed at the beginning of the last decade due to technological advances in unconventional recovery, its discovery dates to 1927.

It occupies an area of 35,000 km² (8.65 million acres) and its resources are estimated at 16.2 billion barrels of oil and 302 trillion cubic feet of gas. Los Molles and Mulichinco shale formations, in the same basin, have been less explored but have similar potential. The attraction of capital will be fundamental for the development of the resources in Vaca Muerta. To reach its full potential, an estimated USD 90 billion investment will be required from 2021 to 2030.

To this end, YPF has signed partnership agreements with Chevron in Loma Campana, with Dow in El Orejano, with Petrolera Pampa in Rincón del Mangrullo and Mulichino, with Bidas in Bajada de Añelo (all in 2013), with Petronas in La Amarga Chica (2014), with Shell, Equinor and Schlumberger (2017). It also signed cooperation and strategic agreements with PDVSA, YPFB, ANCAP, Statoil and Gazprom, among others. Moreover, new players have incorporated in the last few years through agreements or mergers and acquisitions, such as Vista Oil & Gas, Tecpetrol, Pan American Energy, Pluspetrol, Wintershall Dea, and Xto Energy, among others.

The attraction of Vaca Muerta, both for domestic and international investments, lies in the exceptional characteristics that place it as one of the best positioned formations in the world. In terms of productivity and well development costs, the productivity per meter of horizontal drilling shows a convergence towards Permian values, in the US.

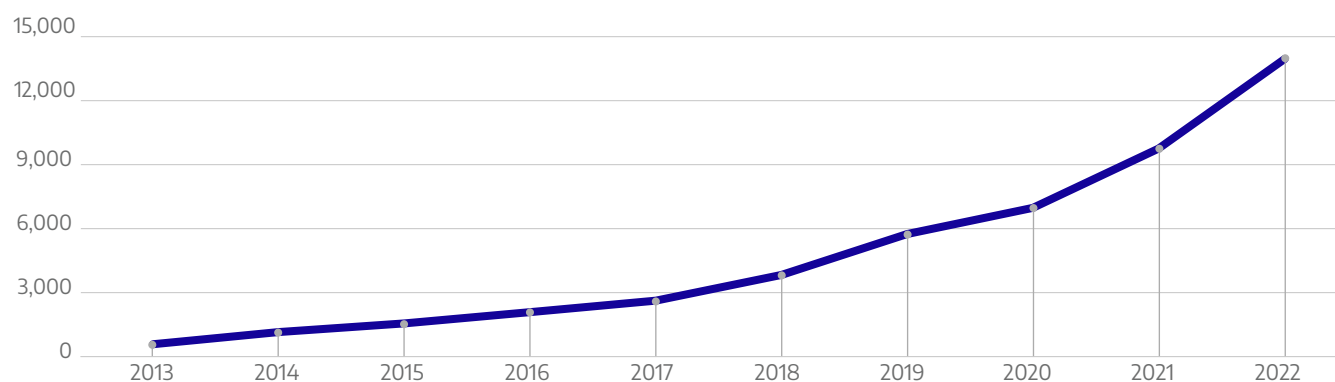
In terms of development costs, investment requirements per barrel produced were decreasing in Argentina compared to the Permian Basin, located in the US. In 2022, the cost of wells operated by YPF in Vaca Muerta was below the average of different companies operating in the Permian Basin.

Moreover, production has recovered its pre-pandemic levels, and the time taken for well completion and pumping of hydraulic fracturing sands are as efficient as the best US practices.

* ConocoPhillips, Diamondback Energy, ExxonMobil, Occidental Petroleum and Pioneer Natural Resources.

Evolution of unconventional oil production in Argentina

Figures in Mm³. 2013-2022 period.



Source: Secretariat of Energy.

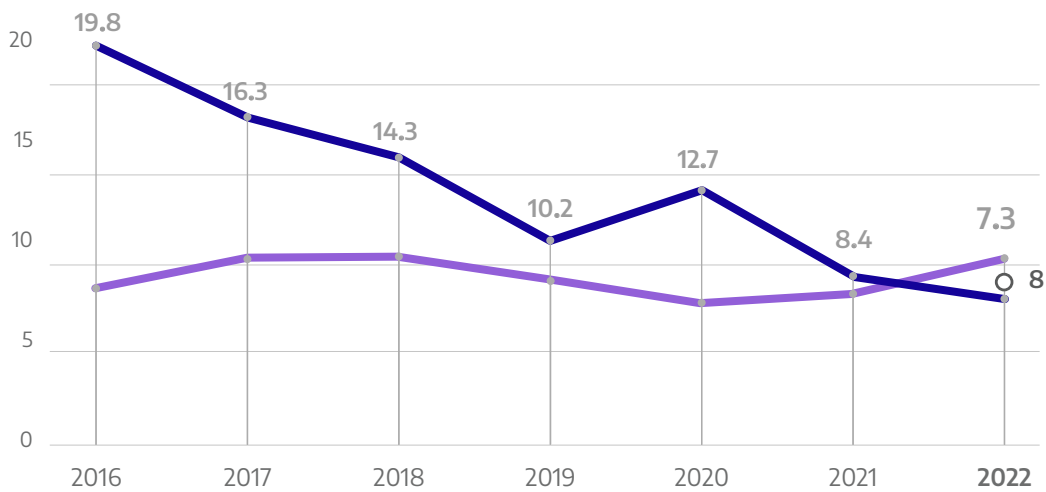
Comparison Vaca Muerta versus Permian in the USA

2016-2022 period.

— YPF — Average Permian ○ Best in Class

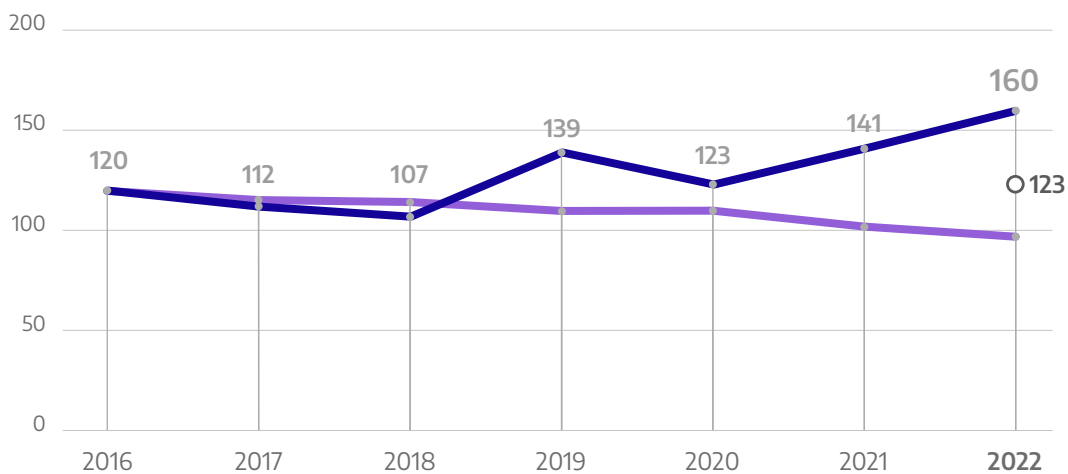
DEVELOPMENT COST

Figures in USD/BOE.



PRODUCTION (EUR)

Figures in BOE/FT.



Source: YPF.

<https://www.ypf.com/inversoresaccionistas/Lists/Presentaciones/YPF%20-%20JPM%20%20Conference%20-%20Sep%202022.pdf>

Crude oil production has gone through a downward process since the peak reached in 2001. The maturity of productive fields, together with the low replenishment of reserves, has resulted in this decline, which started to reverse with the larger scale production in Vaca Muerta. In 2019, even with a 13% lower conventional oil production, the total production reached the same level as in 2016.

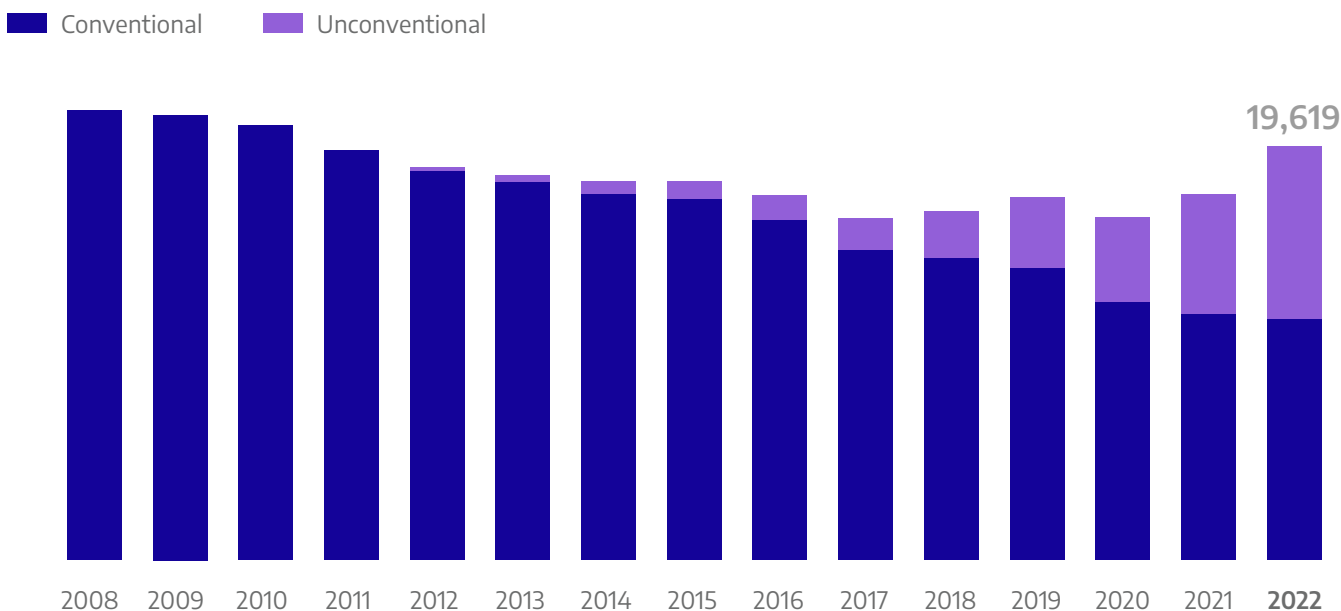
Regarding shale activity in the Neuquina Basin, the monthly evolution of oil production increased exponentially by 439% in five years, from 2017 to 2022. In October and November 2022, an all-time production record was reached and two additional records were broken: the level of unconventional production and the share of unconventional in total production. Unconventional oil production reached approximately 274,000 barrels per day and accounted for 42% of the country's total production.

Natural gas production, on the other hand, began to slow down in 2007. It reached its lowest point in 2014, and then began a rapid recovery process based on unconventional resources, especially those of Vaca Muerta in the Neuquen Basin. Production in 2022 reached 48 MMm³.

With respect to shale gas, the relative growth is even more significant, with an increase of about 122% in the five-year period 2017/2022. The evolution of supply is variable due to the seasonal nature of domestic demand, which increases substantially in the cold season. This results in a considerable exportable surplus that provides an opportunity for the sector.

Total oil production, differentiated between conventional and unconventional

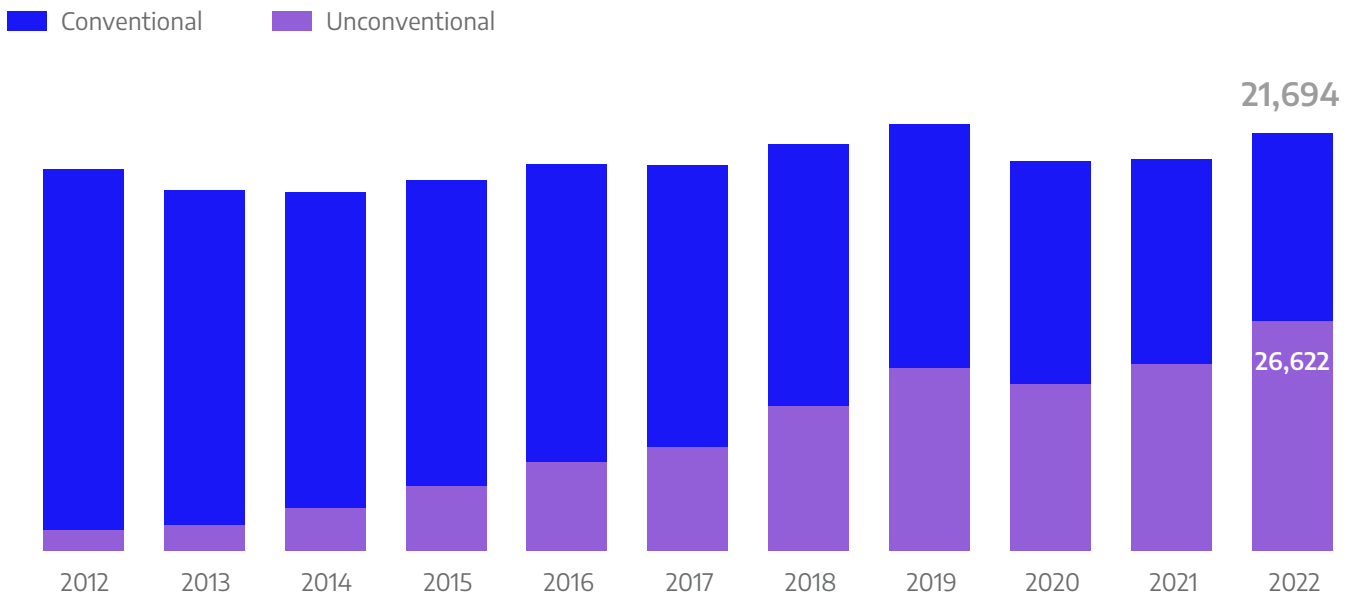
Figures in mm³.



Source: Secretariat of Energy.

Total gas production, differentiated between conventional and unconventional

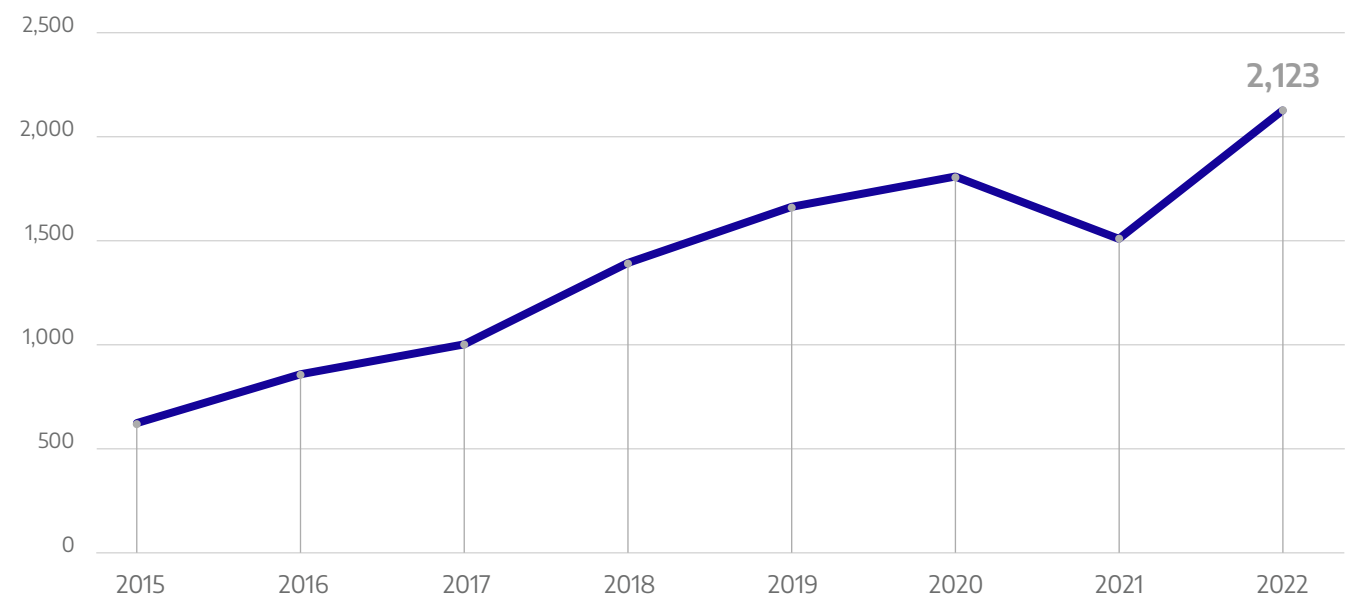
Figures in mm³.



Source: Secretariat of Energy.

Unconventional gas production

January of each year. Figures in mm³.



Source: Secretariat of Energy.

Offshore

The Argentine offshore platform is one of the largest and most unexplored in the world. At present, there are only five offshore fields in operation, which provide 15% of the local gas supply.

In 2018, the National Secretariat of Energy published the terms and conditions of the Offshore International Public Tender No. 1 to award exploration permits for offshore areas outside the Argentine continental shelf. It was implemented by Resolution No. 65/2018, which defines the areas, the applicable royalty scheme, and the conditions for conflict resolution through arbitration.

The 38 areas comprised are:

14 areas in the argentina norte basin

- 7 deep-water areas (depth from 200 to 1,300 meters) from 6,000 to 9,000 km².
- 7 very deep-water areas (depth from 1,200 to 4,000 meters) from 3,000 to 9,000 km².

6 areas of the austral marina basin

- In shallow waters (depth of less than 100 meters) from 2,000 to 2,700 km².

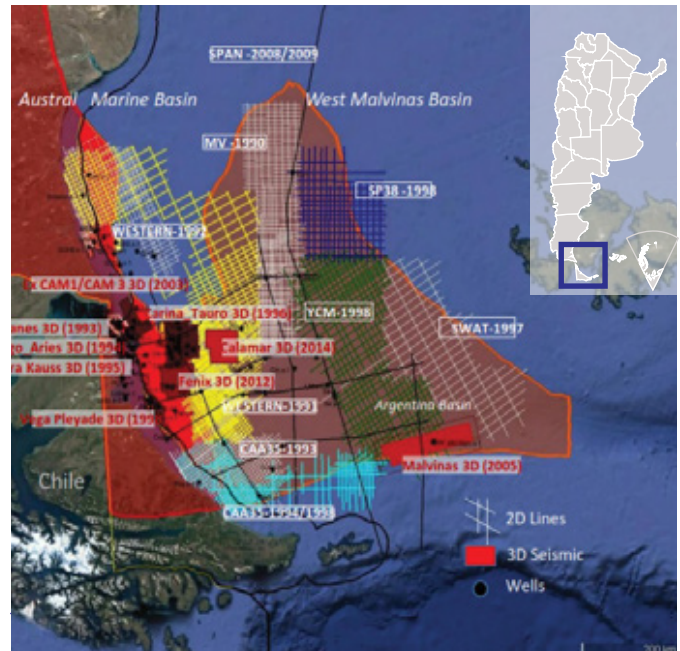
18 areas of the malvinas oeste basin

- Deep waters (depth from 100 to 700 meters) from 3,600 to 6,300 km².

Eighteen exploratory areas were awarded to nine consortia of companies, including Qatar Petroleum, Equinor, ExxonMobil, Total, Shell, Wintershall, British Petroleum, Mitsui, ENI, YPF, Pluspetrol, Tecpetrol and Tullow, which committed investments totalling USD 724 million to cover an area of around 95,000 km². Some of the successful bidders have already acquired part of the 2D and 3D seismic planned (Searcher Seismic and Spectrum) and are working on actions to mitigate geological risk.

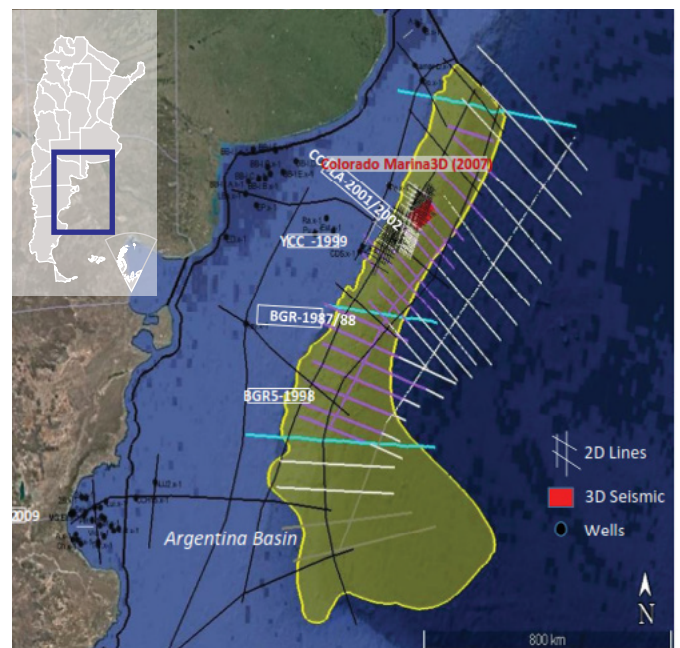
A new international tender is planned for the award of additional areas or areas not awarded in the first stage.

Austral Sea offshore basin



Source: Argentine Secretariat of Energy.

Northern Argentina offshore basin



Source: Argentine Secretariat of Energy.

Foreign trade

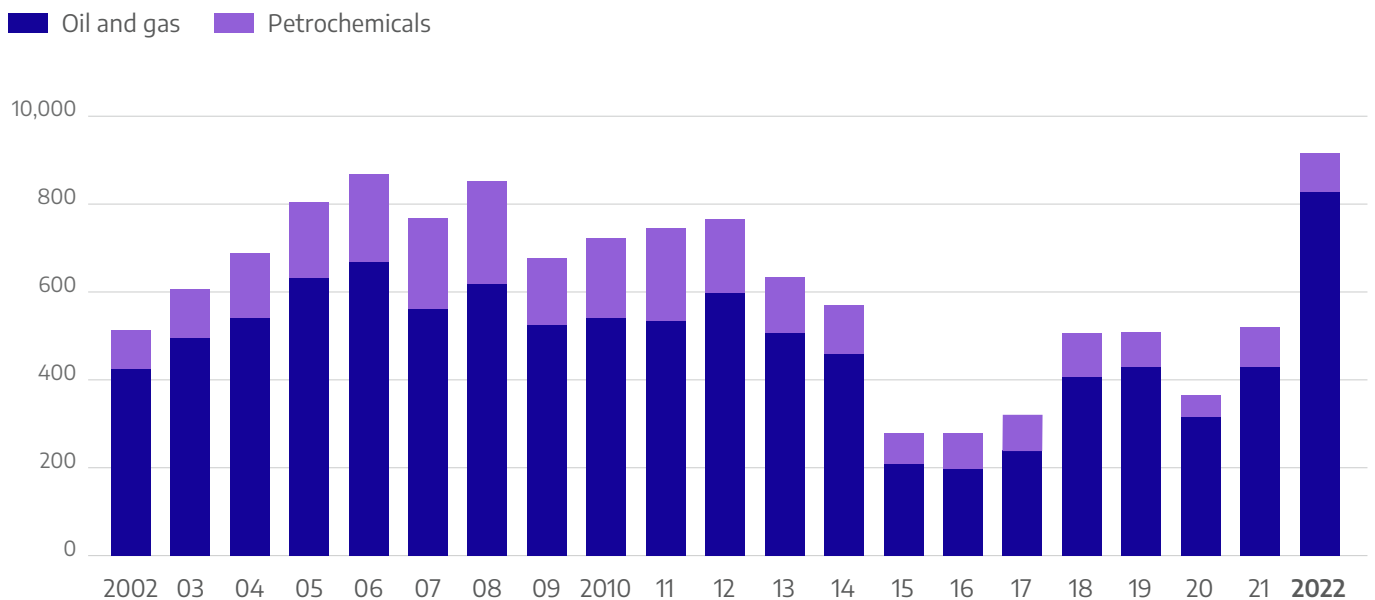
Exports from the oil-petrochemical complex reached a record USD 9,172 million in 2022. The start-up of production at Vaca Muerta has made it possible to recover export dynamism, given that it has managed to increase exports from the complex by an annual average of 23% between 2018 and 2022, despite the contraction that occurred in 2020 as a result of the COVID-19 outbreak.

The expansion of infrastructure to enable Argentina’s export outlet is part of the logistical challenge posed by the development of Vaca Muerta. Some examples of this process are the pipelines expansion projects of Sistema de Oleoductos del Valle (Oldelval) and the reactivation of Oleoducto Transandino (Otasa), which will increase trade flows to Chile.

The main crude oil exports correspond to the basins with the highest activity. As mentioned above, the Neuquina and San Jorge Gulf basins accounted for 94% of crude oil production in 2022. The reference crude oil of the first one is Medanito, with an API grade of around 35°. In general, the grade of the Neuquen basin is usually higher than 31°, and Vaca Muerta has reported API grades as high as 65°, which place them in the range of light crude oils. On the other hand, the reference crude oil of the San Jorge Gulf basin is Escalante, considered a heavy oil, with an average API of 24°.

Oil-petrochemical complex exports

Figures in USD millions.



Source: INDEC.

Actors

YPF is 51% owned by the National Government and the producing provinces and 49% by the public sector. It has been listed on the Buenos Aires (BCBA) and New York (NYSE) stock exchanges since 1993. It is also the first producer in the upstream segment. In 2022, it had a 47% share in oil production and 27% in gas production. YPF also has an important share in the downstream sector, with more than 50% of the refinery capacity and 59% of the diesel and gasoline sales volume (YPF, 2022).

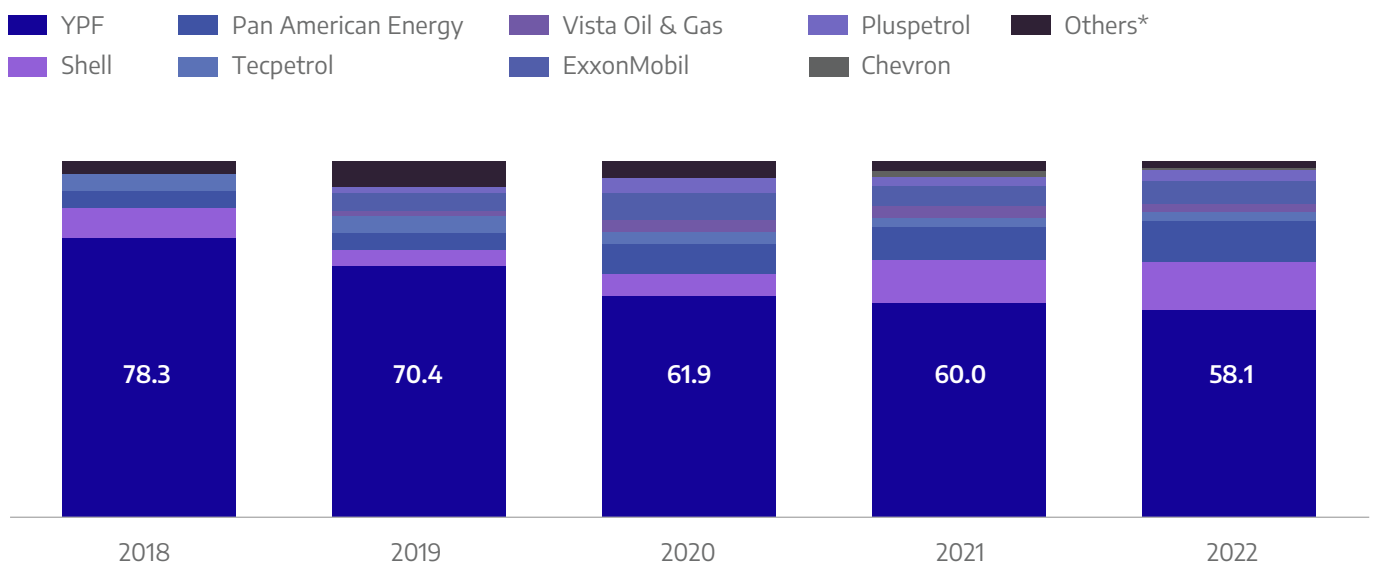
With 100 years' experience, YPF is one of Latin America's largest energy companies and leader in hydrocarbon in Argentina.

Six of the ten big oil supermajors operate or own areas under development in the country: Chevron, Eni, BP (which owns 50% of Pan American Energy), Exxon Mobil, Shell and Total.

In addition, there are several companies with a vast experience and involvement in the national hydrocarbon sector: Pan American Energy (a joint venture between the Bidas group and BP), Tecpetrol, Pluspetrol, Capex, Enap, Vista Oil & Gas, Pampa Energía, and CGC, among others.

Share of shale oil production in the Neuquina Basin

Share percentage, differentiated by company.



*includes Total, Wintershall, Capex, Kilwer and other companies.

Source: Own elaboration based on data from the Secretariat of Energy.

Oil production in 2022 has been led by YPF (47.4%), followed by Pan American Energy (17.9%), which also operates the Axion network of stations. The rest of the production is shared between: Vista Oil & Gas (7.3%), Shell (5.0%), Pluspetrol (4.7%), Tecpetrol (2.3%), Sinopec (2.0%) and Capex (2.0%), with the remaining 38 companies together accounting for 11.4%.

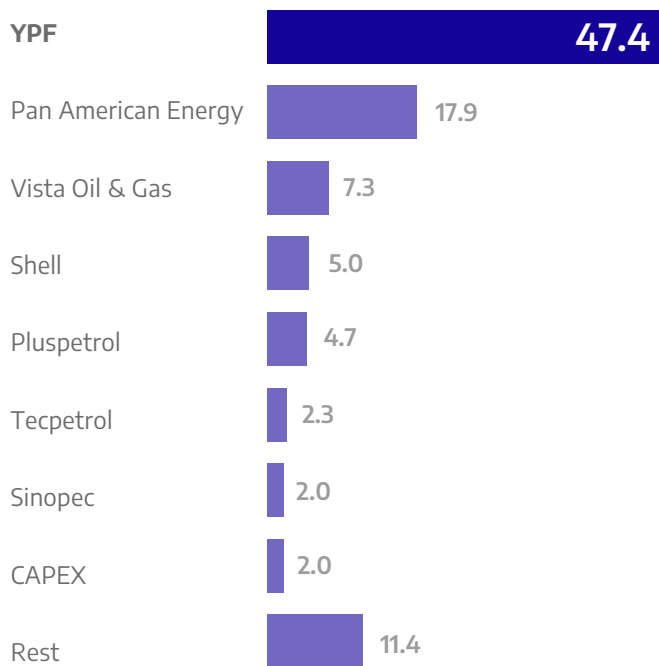
It is also worth mentioning the increasing number of companies participating in Vaca Muerta, which currently has more than 30 independent active operators. The share of new shale oil producers increased from less than 5% in 2016 to almost 42% in 2022.

Regarding gas production in the country, in 2022 YPF leads production with 27.5%, followed by Total with 22.6%. Since 1989, Total has been the only offshore operator with activity in the Argentinean Sea in the Austral Basin, where around 15% of the local gas supply comes from.

In addition to the participation of YPF and Total, the following companies are: Tecpetrol (13.4%), Pan American Energy (12.2%), Pampa Energía (6.8%), Pluspetrol (4.2%), CGC (3.3%), ENAP (2.2%) and 35 other companies (7.8%).

Oil producers 2022

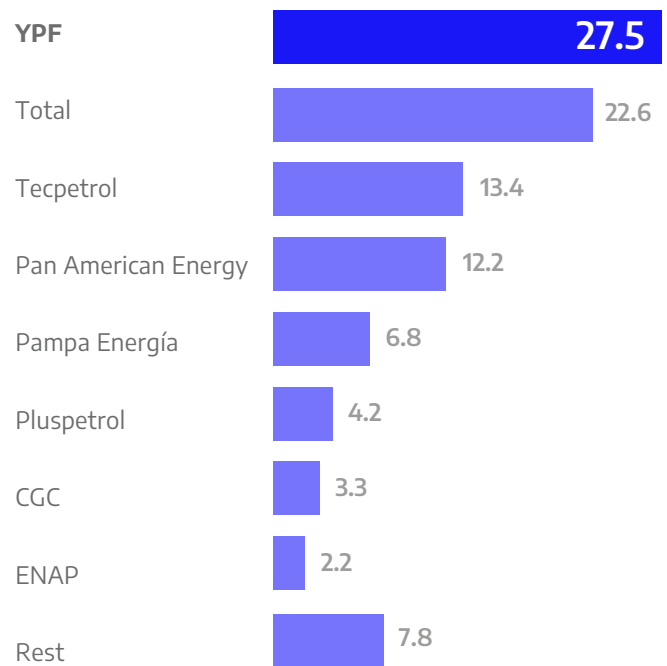
Figures in share percentage.



Source: Based on data from the Secretariat of Energy.

Gas producers 2022

Figures in share percentage.



Source: Based on data from the Secretariat of Energy.

Employment

Many jobs have been created in Argentina due to the exploitation of the different basins in the oil sector; Vaca Muerta, in Neuquen, has given a new boost in this regard. Not only local workers are hired, but also workers from other provinces with oil experience which contribute to the drilling, production, exploration, planning, supply, and administration processes.

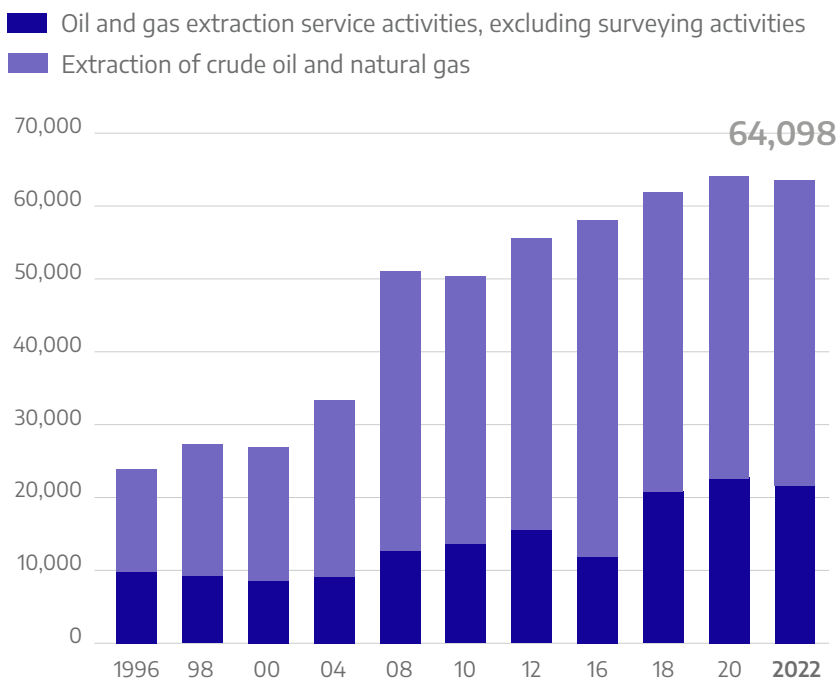
The sector’s impact on the labor market, with a total of over 63,000 workers in 2022, is considerable. This figure accounts for 1% of the private employment registered in the country, not considering the services of areas other than the hydrocarbon industry and other positions resulting from the economic development of the areas surrounding the activity. Growth from 2000 to 2022 accounted for 137%, counting two workers in service for each direct worker of the operating companies. According to data from the Ministry of Labor,

Employment and Social Security for 2019, the female rate of registered salaried employment, which grew 43% compared to the previous decade, reached 11.9% in one of the most male-dominated sectors in the country.

There are also logistic facilities of Aerolíneas Argentinas’ domestic air transportation, such as the “Oil Corridor”, with strategic routes connecting the main cities and productive basins of the country. Regarding the relationship of the sector with the workers’ associations, the productivity agreement signed in 2017 in Vaca Muerta—and the new one in 2021, led by YPF and Neuquén—enabled to maintain activity levels and jobs, while improving labor costs.

Registered employment: oil and gas

Number of jobs.



Source: Own elaboration based on OECD and the Ministry of Labour, Employment and Social Security.

Domestic flights: oil corridor



Source: Own elaboration based on Aerolíneas Argentinas.

Midstream - Downstream

Argentina has a developed network of oil pipelines, polyducts and gas pipelines throughout the country. The gas transportation systems operated by Transportadora de Gas del Norte (TGN) and Transportadora de Gas del Sur (TGS) have eight interconnections with systems in neighboring countries: two with the Oriental Republic of Uruguay, one with Brazil, four with the Republic of Chile and one with Bolivia. The latter has historically been used for imports, supplying gas to the northwestern region of Argentina and to the Refinor plant located in Salta, while the remaining gas pipelines were intended for the export of the Argentine market surplus. The connection with Bolivia is also interconnected with the Brazilian system and covers the central, southern, and south-eastern regions of that country.

The trunk pipeline network is nearly 3,000 km long and the trunk gas pipelines total 16,037 km, with a natural gas transport capacity of 149 MMm3/day.

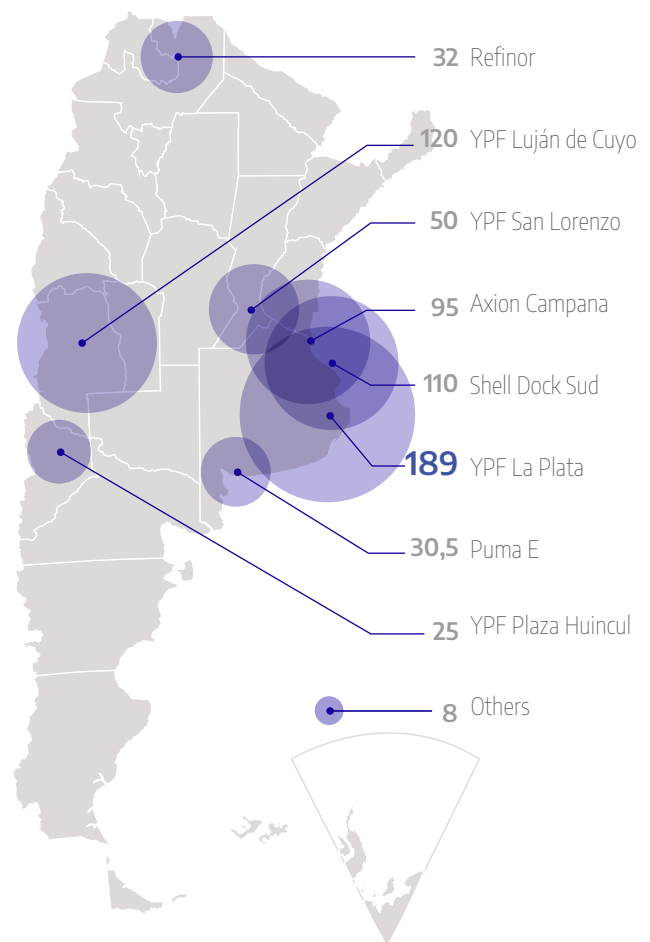
The refining industry in Argentina is almost as old as oil production. This industry, with over a hundred years, has been led by three major companies for the last eight decades: YPF, Shell and Axion Energy, which have been progressively adapting their processing capacity to the growth in demand. Historically, YPF—owner of La Plata, Luján de Cuyo, Plaza Huincul and San Lorenzo refineries (since its acquisition from the Oil group)—has covered more than 50% of the total production of oil derivatives. Shell’s refinery in Dock Sud and Axion Energy’s refinery in Campana contribute between 30% and 35% of by-product production, while the remaining percentages are produced by other 18 processing plants. Current refining capacity is estimated at around 645 kbd, with the San Lorenzo refinery in operation.

In this area, the investment for the expansion and modernisation of the Axion Campana refinery—completed in 2020 after five years since the start of the project—, which involved the disbursement of USD 1.5 billion, stands out. The refinery was the largest investment in the refining sector in the last three decades, making it one of the most modern refineries in South America. YPF also started the modernisation and expansion of the Luján de Cuyo refinery, which will require an investment of USD 500 million over three years.

Natural gas is fundamental in the Argentine energy matrix—it provides 50% of the primary energy supply and it is the source of 60% of electrical power. Argentina has one of the largest CNG propulsion vehicle fleets in the world, with a total of 1,717,525 vehicles authorized by ENARGAS in 2022. The availability of affordable gas, resulting from the expansion of the transportation network and the development of Vaca Muerta, is expected to further boost the adoption of CNG in vehicle transportation.

Refineries and daily capacity

Daily capacity in kbd.



Source: Elaborated by AAICI based on data from MINEM.

MAIN CHARACTERISTICS OF THE SECTOR

The privatization of the state-owned company Gas del Estado in 1992 resulted in the creation of eight natural gas distributors covering almost the country's entire territory. With the incorporation of the ninth distributor, Gas Nea, in 1997, the whole Argentine territory was covered.

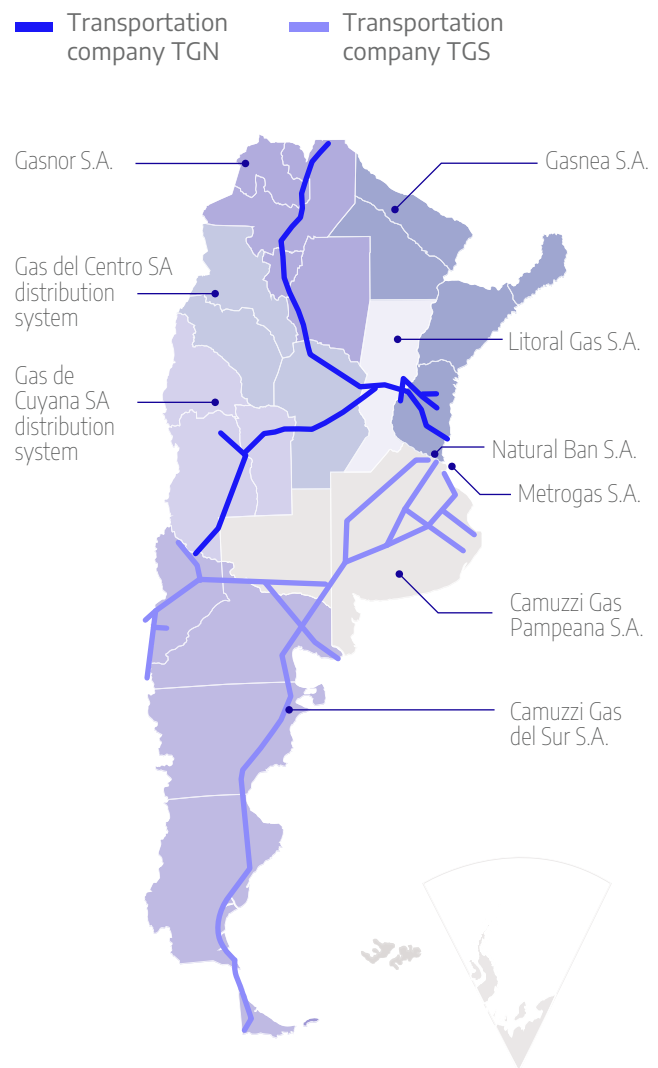
Natural gas is transported through just over 16,000 km of trunk gas pipelines, which have increased their capacity by 110% in the last 25 years. During this period, four gas pipelines that cross the Andes to Chile and other four to Brazil and Uruguay were built. In addition, several sections of pipelines were laid across Tierra del Fuego to transport gas to southern Chile. The operation of the trunk pipelines has been entrusted to the two transportation companies (TGS and TGN) and the distribution to

Natural gas transportation and distribution population centers through medium and low-pressure networks is operated by nine regional distributors with a broad presence in the metropolitan centers.

To this network is added the construction of pipelines that transport liquefied natural gas (LNG), which reaches the ports of Escobar and Bahía Blanca. Currently, the gas pipeline network continues to expand. On this note, it is worth mentioning the completion of the construction of the pipelines Gasoducto del Noreste Argentino, which will reach the only region of the country that does not yet have gas through networks, and of Gasoducto

Presidente Néstor Kirchner, which will expand the capacity of the current transport system and will allow gas from Vaca Muerta to reach the major consumption centres in Argentina. In mid-2022, Energía Argentina SA signed the contracts for the construction of the civil and complementary works of its first 583-kilometre section, which will connect the cities of Tratatayén (Neuquén) with Salliqueló (Buenos Aires).

Natural gas transportation and distribution



By Resolution 67/2022, the Secretariat of Energy declared the construction of the Néstor Kirchner gas pipeline to be of National Public Interest, in order to promote the development and growth of natural gas production and supply to guarantee domestic supply. This new gas pipeline, together with the construction of the Mercedes-Cardales gas pipeline, will consolidate the interconnection of the existing transport systems and will enable the development of numerous investments in petrochemical activity

Source: Adapted from IAPG.

Legal framework and promotional

Oil and gas exploration, exploitation, industrialization, transportation, and commercialization activities depend on the Secretariat of Energy of the National Ministry of Economy. These activities are regulated by Law No. 17319 of 1967, which was amended in subsequent regulations, especially through Law No. 27007 of October 2014.

Law No. 27007/14 establishes precise and unified regulations for conventional, unconventional, and offshore hydrocarbon tenders. It sets new terms for concessions by type of exploitation: 25 years for conventional fields, 35 years for unconventional fields and 30 years for the offshore developments in the Argentine offshore platform, granting the provinces the power to extend them for 10 years to the companies that comply with the strategic investment plan.

Moreover, it incorporates into the Investment Promotion Regime for the Exploitation of Hydrocarbons—created by Decree 929/13—projects that involve direct investment in foreign currency of not less than USD 250 million calculated at the time of the presentation of an “Investment Project for the Exploitation of Hydrocarbons” and to be invested during the first three years of the project. The percentage of hydrocarbons for which royalty reductions of up to 50% will be applied is as follows:

- a) Conventional exploitation: 20%.
- b) Unconventional exploitation: 20%.
- c) Offshore exploitation: 60% when the drilling of wells is carried out in locations where the distance between the seabed and the surface, measured at the location of the well, exceeds 90 metres on average between high and low tide.

Natural gas contributed 50% of primary energy and was the source of 60% of power generation in 2019.

Argentina has one of the largest vehicle fleets with NGV propulsion in the world.

Natural gas treatment, transportation and distribution operations are controlled by the National Gas Regulatory Agency (ENARGAS). The regulatory framework, as well as the technical standards corresponding to these operations can be consulted on the entity's website. The production and commercialization of liquefied petroleum gas (LPG) is regulated by Law No. 26020 of 2005 and Decree No. 297/2005. All national legislation related to the oil and gas industries can be consulted on the webpage of the Secretariat of Energy. The natural gas exploration and exploitation stages are also governed by Law No. 17319; whereas the subsequent stages of the value chain are regulated by Law No. 24076.

It should be noted that both natural gas transportation and distribution are activities included in the utility regime. The performance and will of the licensees under such regulation are determined by the regulatory agencies and the rate administration.

On May 19th, 2020, Decree 488/2020 was published in the Official Gazette, setting the base price for the commercialization of a barrel of crude oil in the local market at USD 45. The industry refers to it as the "criollo barrel" and takes the crude oil of the Medanito type. This price is adjusted by quality and loading port for each type of crude oil, which is the price applicable to the payment of royalties. This decree was issued against the background of a decline in the price of oil in the international market, caused by two main factors: the sharp drop in global demand caused by the COVID-19 pandemic and the conflict within OPEC between Russia and Saudi Arabia.

Although the main purpose of the decree is to regulate the support price of a barrel of oil for the domestic market, it also regulates Law No. 27541 by setting a ceiling of 8% on hydrocarbon export duties. The tax rate starts to be applied on a variable basis taking the international price of the "ICE Brent first line", above USD 45 and up to USD 60 per barrel, based on the average of the last five price information published by the Platts Crude Marketwire under the heading Future Settlements. Below the base price of USD 45 per barrel, exports are not subject to export duties, and above the reference value of USD 60 per barrel, the 8% tax cap should be applied.

Through Decree 892/2020, the national government launched the "Gas.Ar Plan"—with Decree 730/2022, it extended its validity until 2028. The Gas.Ar Plan is an initiative to promote natural gas production. As part of the plan, National Public Tenders are held where producers make offers to cover the volumes required by the priority demand of the full natural gas service and CAMMESA, from which the most economical offers are selected. In return, participating producers commit to supply those volumes and comply with injection and local content requirements.

It is expected that, until 2028, this plan will allow foreign exchange savings of USD 27 billion by replacing LNG imports and the consumption of liquid fuels for the electricity system, while at the same time generating fiscal savings of USD 18 billion by reducing spending on subsidies.

Suppliers of goods and services

Argentina has a broad network of world-class suppliers of goods and services with a vast experience in exporting to the main global basins. They satisfy both domestic and foreign needs. In addition, renowned international suppliers have subsidiaries in Argentina and provide services to the main operating companies in the country.

In Vaca Muerta, the annual demand for goods and services is estimated at over USD 3 billion. Moreover, the 270

wells drilled per year generate over 5,000 direct and indirect jobs. Given the trend and projected growth of investment in the field, these values could increase tenfold.

One of the main entities that brings local suppliers of goods and services together is GAPP (the Argentine Group of Oil Industry Suppliers), with over 170 registered companies and a wide range of over 1,200 goods and services.

MAIN GOODS AND SERVICES PROVIDED BY THE LOCAL VALUE CHAIN
Corrosion control and cathodic protection
Offshore equipment and material
Mechanical equipment, materials, tools, supplies and accessories
Production equipment, materials and supplies
Equipment and accessories for instrumentation and control
Process equipment and accessories
Equipment and software for telemetry, communication and geopositioning
Rotating equipment, pumps, compressors and accessories
Personal protection clothing and elements
Equipment, materials and supplies for exploration, drilling, completion and reparation of wells
Chemical products
Refrigeration and heating of fluids
Engineering and consulting services
Renovation works
Facility management and maintenance services
Onshore and offshore oil services
Storage tanks and accessories
Other equipment, supplies and accessories

Source: GAPP.

Education system

The need for qualified professionals in a wide range of technologies to work in the oil industry has been a concern in the sector from the start. In Argentina there are six undergraduate programmes, four technical courses, four specializations, two master’s degrees and several courses focused exclusively on the oil industry. Within the field of engineering, there are universities all over the country that offer a major in oil engineering. In CABA, the Arturo Jauretche National University (UNAJ) and the University of Buenos Aires (UBA) have been added to the Buenos Aires Technological Institute (ITBA). At the national level, courses can (UNCOMA), the National University of Cuyo (UNCuyo) and the National University of Patagonia San Juan Bosco (UNP).

There are also many different technical courses, such as Petroleum Technician (Escuela Argentina de Estudios Superiores), Drilling Engineering (National University of Salta - UNSa), University Technician in Earth Sciences oriented to Petroleum (Universidad Nacional de Jujuy), Technician in drilling and completion of oil wells (Universidad Tecnológica Nacional Regional Neuquén - UTN FRN) and University Technician in Petroleum (Universidad Nacional de la Patagonia Austral - UNPA).

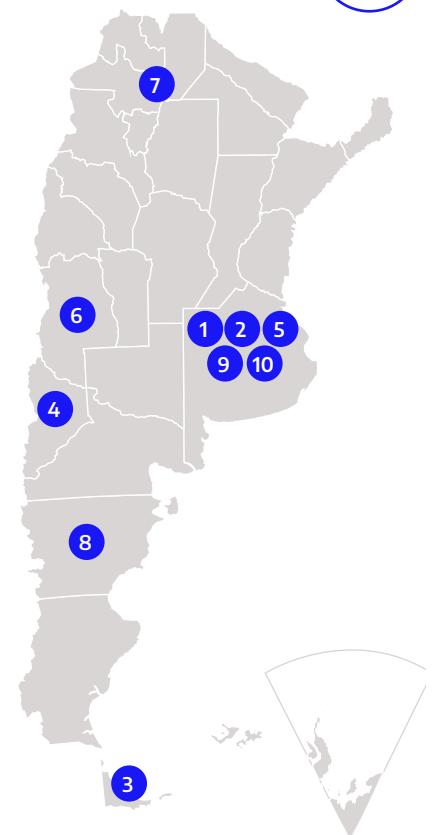
In addition, there are graduate specialized courses in Oil and Derivatives Engineering (UBA), Oil and Natural Gas Production (ITBA), Oil and Natural Gas Economics (ITBA) and Oilfield Exploitation (UBA); and Master’s Degrees in Oil and Natural Gas Engineering (UBA) and in Petrochemical Process Engineering (National University of the South UNS).

Argentina also offers shorter courses such as Oil and Gas (National Technological University in Buenos Aires UTN BA), Assistant Technician in Engineering, Mining, Metallurgy and Petroleum (Instituto Superior de Enseñanza ISE) and the Certificate in Basic Principles of Petroleum Systems Analysis (UTN BA).

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

Main universities

- 1 UBA
University of Buenos Aires
- 2 ITBA
Buenos Aires Technological Institute
- 3 UNP
National University of Patagonia San Juan Bosco
- 4 UNCOMA
National University of Comahue
- 5 UNAJ
Arturo Jauretche National University
- 6 UNCuyo
National University of Cuyo
- 7 UNSa
National University of Salta
- 8 UNPA
National University of Patagonia Austral
- 9 UNS
National University of the South
- 10 UTNBA
National Technological University in Buenos Aires



RDI institutions

Y-TEC is the most important research and development company for the energy industry in Argentina. It was created in 2013 with 51% of its shares owned by YPF and 49% by CONICET, the country’s main agency for the promotion of science and technology, with the mission of providing technological solutions to the energy sector and train specialists for the development of the industry in the region. With 265 professionals and over 100 indirect project collaborators from other institutions, Y-TEC is in full expansion and consolidation of its research and development capabilities. It has a modern 13,000 m2 building in the town of Berisso, province of Buenos Aires, entirely dedicated to RDI activities—its applied research centre is one of the most modern and best equipped in the industry in the region.

Although one of Y-TEC’s main objectives is to generate and provide technologies for a fast and efficient exploitation of the country’s unconventional oilfields, it also works on the generation of technologies to obtain a higher production in mature fields, the optimization of petrochemical processes, the generation of new high value by-products and the development of technologies for a better use and protection of renewable energies and the environment.

Y-TEC also provides training, courses and other services for SMEs in the sector. These are key initiatives for the successful development and consolidation of a technological network to support and sustain the profound transformation of the Argentine energy industry. Y-TEC develops multi-client R&D consortiums, collaborative environments that facilitate the collective implementation and exploitation of frontier technologies.

The National Institute of Industrial Technology (INTI) is also a leading player in the oil and gas sector. It coordinates assistance within the Supplier Development

INTI MAIN SERVICES

Technical assistance and certification.
Metrology for all physical and chemical quantities such as pressure, temperature, electrical energy, volume of liquids, flow rate and composition of natural gas, etc.
Legal methodology: model approval and verification of oil meters and gas meters, calibration of vertical cylindrical tanks.
Non-destructive testing inspections and characterisation of frac sands.
Management technology. Programmes for the Supplier Development.
Institutional connection.

Programme (PRODEPRO) and the Competitiveness Support Programme (PAC), particularly regarding management technologies through the Kaizen methodology. It also carries out relevant initiatives for the National Quality System. In addition to technical assistance and professional training, INTI has a network of laboratories, both owned (Miguelete in Buenos Aires, Mobile Laboratory in Neuquén) or under supervision, for analysis and certification. As the National Metrology Institute, it is responsible for the realisation of national standards and their international recognition in all quantities of interest to the industry, such as liquid and gas volume, and natural gas composition.

Other fields of study with developed local capabilities are related to gas transportation, distribution and storage, operational safety, thermal efficiency, virtual LNG, remote operation of plants, gas pumps, vehicle use, among others. In this respect, ENARGAS created a Technological Innovation Office in October 2020, and launched the “Innovation Committees” to establish the foundations for the technological renovation of the sector.

There are investment opportunities in the country in all stages of the hydrocarbon chain, ranging from the provision of goods and services for exploration to the final stages for the commercialization of by-products.




The upstream segment has the greatest opportunities, as the big oil supermajors are already operating in the sector. Only less than 10% of Vaca Muerta’s potential has been developed and the offshore platform, except for the Austral Basin, is in the initial stages of exploration. This results in a potential investment prospect of over USD 120 billion. As for the midstream sector, there are structural bottlenecks in the country’s current transportation and distribution chain, especially in the supply for the Buenos Aires metropolitan area (AMBA). Investments in gas pipelines for primary connection to NGV and industrial complexes for gas conditioning are fundamental. New trunk gas lines are also required to improve the transportation capacity in AMBA, exports to Brazil, and LNG plants to enter the global markets.

In the downstream segment, in the medium term local refining will present a gap of around 200 kbd in demand. As a result, there will be a need for investments in the segment’s expansion, modernisation and new fuel refining capacity. Petrochemicals and industrial products derived from natural gas in particular present a significant opportunity. It should be noted that Argentina is a major producer of agricultural goods and is highly dependent on fertilizer imports since local production covers only 40% of the demand for nitrogen products. The region is also a major importer, and can competitively reach the Brazilian maize area, for instance, from the port of Bahía Blanca.

Finally, gas liquefaction port terminals for the international market, mainly Asia-Pacific, will be the sector’s biggest challenge. An LNG export industrial complex of 5 MTPA would mean an investment of USD 3 billion.

Investment opportunities by stage in the productive chain

Main data.

 <p>Upstream USD 120 billion</p>	<p>Exploration & production</p>	<ul style="list-style-type: none"> • Vaca Muerta • Offshore • Secondary recovery • Goods and services
 <p>Midstream USD 30 billion</p>	<p>Processing plants and trunk transportation</p>	<ul style="list-style-type: none"> • NEA Gas Pipeline • Vaca Muerta-Brazil Pipeline • AMBA capacity increase • Distribution networks
 <p>Downstream USD 20 billion</p>	<p>Chemical Petrochemical Plastic Refinery</p>	<ul style="list-style-type: none"> • Ethylene, polyethylene, polypropylene, and methanol • Fertilizers and urea • LNG • Refining of derivatives, fuels

**Argentine Secretariat of Energy
Undersecretariat of Hydrocarbons**

Av. Hipólito Yrigoyen 250
C1086AAB, CABA
+54 11 43491468

Argentine Institute of Oil and Gas

Maipú 639
C1006ACG, Buenos Aires
+54 11 5277 4274

**National Institute of Industrial
Technology - INTI**

Parque Tecnológico Miguelete:
Av. Gral. Paz 5454 (colectora),
San Martín. Provincia de Buenos Aires
Sede Retiro:
Av. Leandro N. Alem 1067, Floor 7
C1001AAF, CABA
consultas@inti.gob.ar

Argentine Group of Oil Suppliers - IAPG

Lima 287, 5th floor, office A
C1073AAE, Buenos Aires
info@gapp-oil.com.ar



Power / Oil and Gas

–
**Argentine Investment
and Trade Promotion Agency**

+54 11 5199 2263

consultas@inversionycomercio.org.ar

inversionycomercio.ar

@promocionarg

–
Our services

Opportunity and location identification

Networking

Support in due diligence process

Institutional facilitation

Post-operation follow up

**We promote the
internationalization of
Argentine companies
and facilitate private
investment in Argentina**

