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GLOBAL BUSINESS REPORTS

Argentina Oil and Gas 2015



PRE-RELEASE
EDITION

A COMPANY WITH ITS FEET, HANDS AND HEART ON THE GROUND

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Dear Readers,

Well N-1, Argentina's first oil well, was drilled in the windy city of Comodoro Rivadavia 108 years ago in 1907. Over the last century, companies like YPF, Argentina's national oil company, and Shell have led the development of a mature oil and gas industry that has attracted the industry's majors. Many Argentine oilmen stress that Argentina is a country with oil, but not a petrostate. Nevertheless, Argentina had been proudly energy independent since the 1980s, but became a net importer once again in 2011, to the dismay of the country's industry and political leaders. Yet shale oil and gas discoveries in recent years may make Argentina energy independent once again.

Meat-lovers' mouths have always watered at the thought of an Argentine steak. But another kind of Argentine dead cow has been tantalizing oil and gas investors since 2013, when the US Energy Information Administration announced that the world's second largest shale gas reserves and fourth largest shale oil reserves lie beneath Argentina's subsurface, mostly at Vaca Muerta.

Argentina's newest and massive shale discoveries complement the country's existing conventional and offshore opportunities. International players have already arrived, but Argentina will need more if the country is to develop its full hydrocarbon potential. Argentina's presidential elections now place the country at a crossroads: either support the oil and gas industry, or face the consequences of ever-dwindling oil and gas production.

Alice Pascoletti
Project Director

Juan Ramirez
Journalist

Global Business Reports



Special Welcome

Dear Readers,

Please allow me to extend a warm welcome to anyone interested in investing in Argentina's oil and gas industry.

Since 1907, local and foreign oil and gas companies have contributed to the construction of Argentina's world-class oil and gas industry. Over a century of experience has honed Argentina's expertise in conventional exploration and production of oil and especially gas. Yet the discovery of Vaca Muerta, home to the world's second largest shale gas reserves and fourth largest oil reserves, prompts me to renew my invitation to foreign investors and experts.

Fully developing all of Argentina's hydrocarbon resources will require many players. Dozens of oil and gas companies are already looking for and producing oil and gas, but the sheer abundance of Argentina's hydrocarbon resources—both conventional and unconventional—will require many dozens more, if not hundreds. I especially look forward to welcoming the kinds of small and medium-sized companies that have helped the United States ignite its own shale revolution.

In recent years, the most important companies in the world have decided to invest in the future of Argentina's oil and gas industry. Yet Argentina and I look forward to welcoming many more partners.

With appreciation and best regards, I am

Sincerely yours,

Jorge Sapag
Governor of the Province of Neuquén

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New opportunities place Argentina at a crossroad

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The Revival of a Century-Old Industry

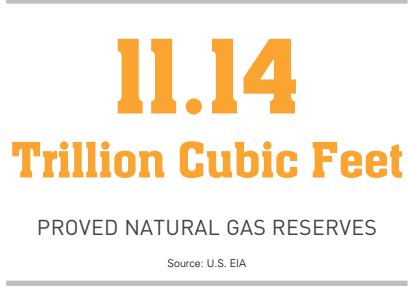
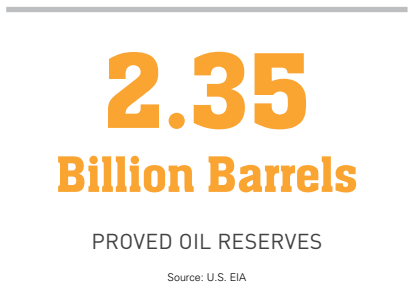
2015: A Time of Transition

OVERVIEW

Meat-lovers' mouths water at the thought of an Argentine steak. But another kind of Argentine dead cow has been tantalizing oil and gas investors in recent years. In 2013, the U.S. Energy Information Administration (EIA) announced that the world's second largest shale gas reserves and fourth largest shale oil reserves lie beneath Argentina's subsurface, mostly at Vaca Muerta.

Yet Argentina has been drilling for oil and gas for over a century. When walking through Comodoro Rivadavia's streets, the dust blown up by the city's infamous gales could easily distract a passerby from noting a bronze plaque on a nondescript building that reads: "In this place were raised: a tower and installation with which Well N-1 was drilled, which preceded the discovery of oil in the region—YPF's golden anniversary, 1907-1957". Whether Argentina's newest and most massive hydrocarbon discovery will sustain the country's oil and gas industry for another 108 years remains to be seen, but the find complements what Jorge C. Bacher, a partner at PricewaterhouseCoopers (PwC), considers are three other competitive advantages of the Argentine economy: "agribusiness, which is highly productive compared to other countries; its infrastructure; and the country's financial industry, which is developed but smaller than in countries like Brazil and Chile."

Bacher continued: "Management of oil and gas companies in Argentina is very talented,



and it is particularly interesting that some companies have grown when production trends of oil and gas have gone down. Argentine management has been forced to be creative and innovative when confronted with adversities like inflation, devaluation, and social unrest. However, as an industry, oil and gas is regarded as conservative. Other industries, such as technology, retail, and banking, have more modern ways of management and administration. Oil and gas in Argentina is catching up". Oilmen and investors are now well aware of Argentina's abundant resources and favorable geology. Vaca Muerta may hold about

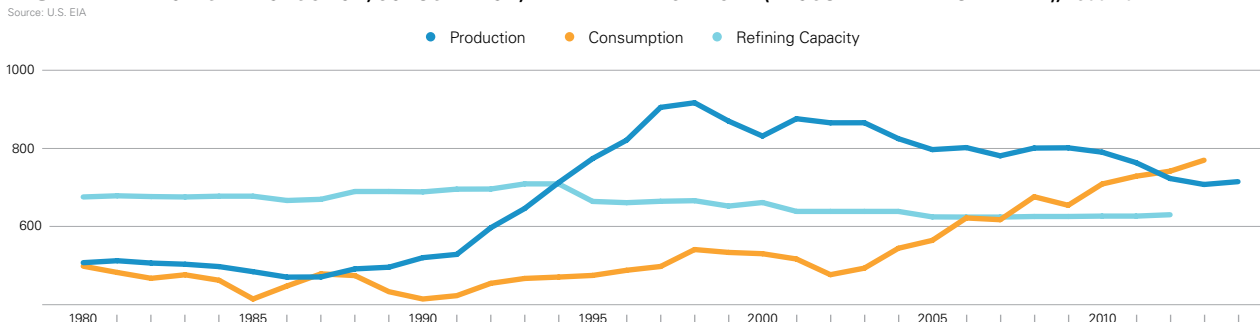
16.2 billion barrels of shale oil and 308 trillion cubic feet (TCF) of shale gas according to the EIA, and its shale is exceptionally thick. The abundance of shale resources is good news for a country hooked on oil and gas. While hydrocarbons normally supply about 60% of a countries' energy needs, Argentina relies on hydrocarbons for almost 90% of its energy supply—54% coming from gas 33% from oil.

Argentina has a long and rich history with natural gas, as Osvaldo del Campo, CEO of GNC Galileo Technologies, explained: "Argentina has been developing its natural gas industry for more than 80 years, making it one of the countries with the longest history in this field. Buenos Aires has received natural gas from Patagonia since the 1940s, with a pipeline that was the longest in the world at the time. The industry grew significantly so that by the end of the 1970s natural gas was approximately 20% of the energy matrix in the country. In 1979, Argentina discovered Loma La Lata during one of the worst economic periods in the oil and gas industry. Fifteen years later...Vaca Muerta is 100 times bigger than Loma La Lata, and history will repeat itself."

THE INDUSTRY IN NUMBERS

Despite Argentina's hydrocarbon addiction, the country has had to look to neighbors like Bolivia to get its fix, as oil and gas production have steadily fallen since 2010. In the last five years, the drop in gas produc-

ARGENTINE PETROELUM PRODUCTION, CONSUMPTION, AND REFINERY CAPACITY (THOUSAND BARRELS PER DAY), 1980-2014



tion has outpaced the drop in oil production. From 2010 to 2014, gas production fell by an average of about 3.1% while oil production fell by an average of about 2.5%.

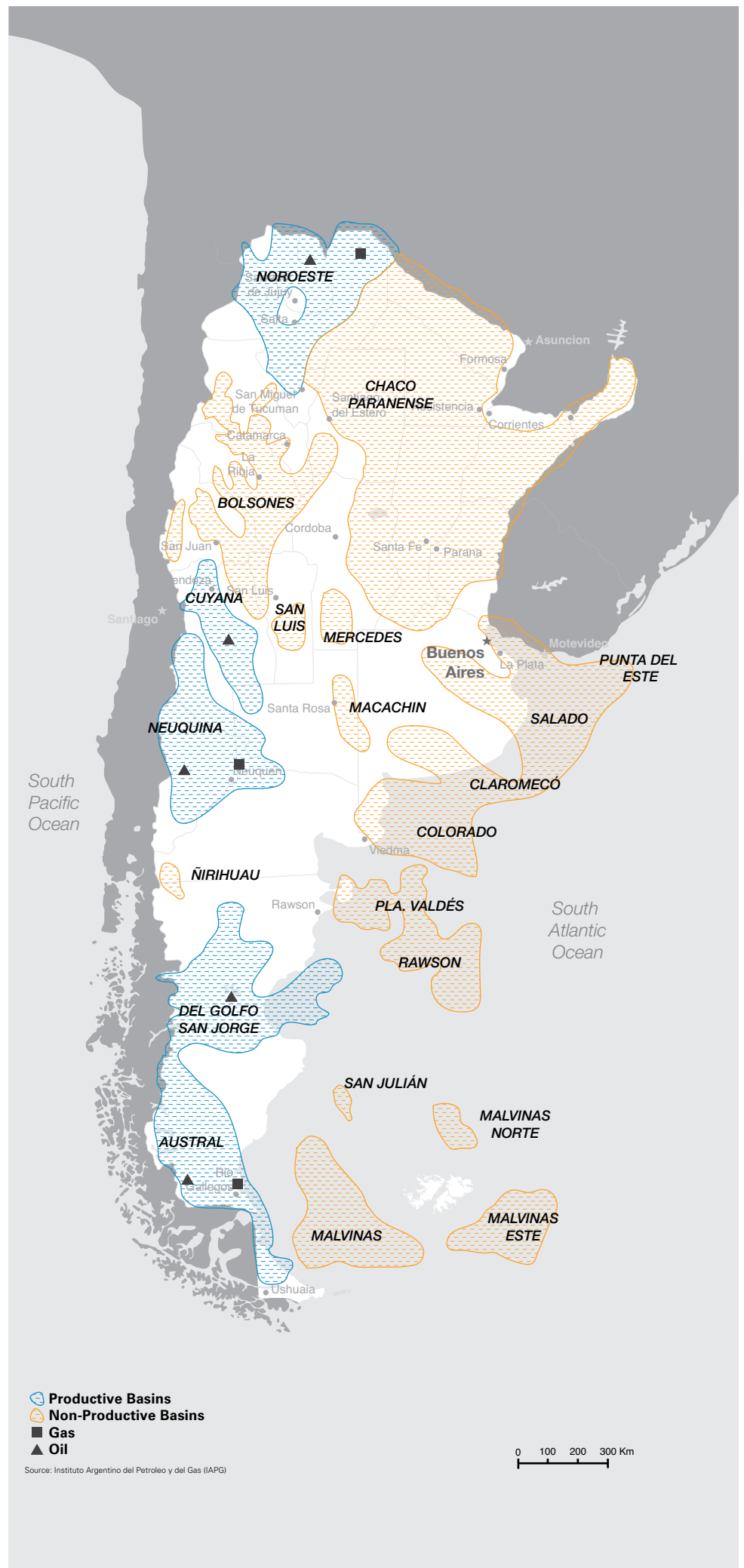
Oil and gas production continued to decline in 2014, when oil production hit a record-low of about 532 barrels per day (bpd), while natural gas production also bottomed out at about 113,654.8 Mm3 per day. In 2011, Argentina became a net energy importer for the first time since 1984. Getting its hydrocarbon fix has come at a cost—Argentina now has an energy trade deficit of about \$7 billion.

Yet 2015 seems to be a turning point for hydrocarbon production in Argentina. Producers extracted about 1.4% more oil and 1.8% more gas in July 2015 than they had in the same month a year ago, which indicates that the last few years of local and foreign investment are finally paying off.

Three companies dominate hydrocarbon production in Argentina: Yacimientos Petrolíferos Fiscales (YPF), Pan American Energy, and Total. From 2010 to 2014, YPF and Pan American Energy produced 55% of all the oil that Argentina produced, while YPF and Total produced 54% of all the gas that Argentina produced, according to data from Argentina’s Secretary of Energy. In 2014, YPF was the top oil and gas producer in Argentina. From 2010 to 2013, Total dominated gas production as YPF produced an average of about 18% less every year. But in 2014, YPF took the top spot for both oil and gas when it produced almost 2% more than Total. Since 2010, Pan American Energy has been consistently the second most prolific oil producer and has produced about half of what YPF produces every year.

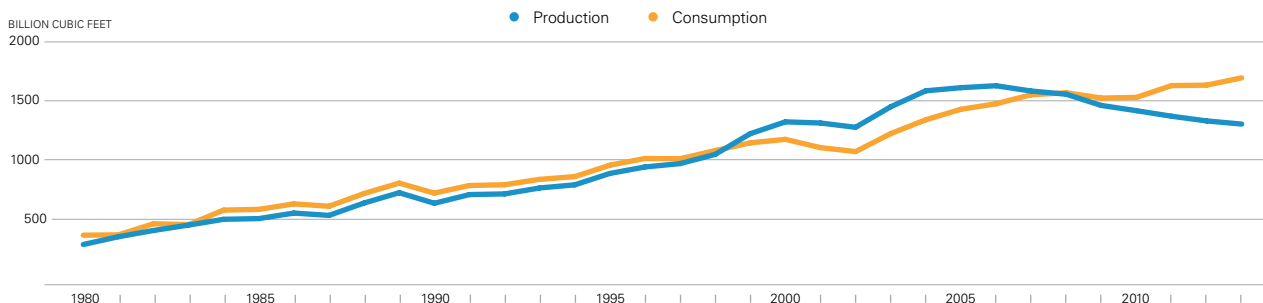
Argentina has five hydrocarbon-producing basins. From northernmost to southernmost, they are the: Northeast basin, Cuyana basin, Neuquén basin, San Jorge Gulf basin, and Austral basin. Most of Argentina’s oil comes from the San Jorge Gulf and Neuquén basins, which together produced 88% of the country’s oil from 2010 to 2014. During the same time, the Neuquén and Austral basins produced about 79% of the country’s gas, of which Neuquén produced 55%.

Ernesto López Anadón, president of the Instituto Argentino de Petróleo y Gas (IAPG) reflected on the technical features of Argentina’s producing basins: “Each province has its own basin with distinct characteristics. For example, exploration and pro-



ARGENTINE NATURAL GAS PRODUCTION AND CONSUMPTION (BILLION CUBIC FEET), 1980-2012

Source: U.S. EIA



duction are complicated in places like the Malargüe fold-and-thrust belt in Mendoza province where drilling wells might be costly. Then the San Jorge basin in Chubut province has a significant amount of oil and gas intercalation and drilling wells that cost between \$3 and \$7 million. The Neuquén basin differs from San Jorge in that it is prone to light oil with much more gas content than the San Jorge basin. And then Vaca Muerta has good organic content, good quality of rock that can be fractured, and the kind of access to water and other infrastructure needed to develop the oil and gas sector that the other basins lack.”

If YPF, Pan American Energy, and Total are the main corporate players, the provinces of Neuquén, Chubut, and Santa Cruz are the main government players, along with the national government. These three provinces regulated the production of almost 70% of total oil production from 2010 to

2014. Yet Neuquén stands out as the most important provincial player, overseeing about 45% of Argentina’s total gas production, the most vital hydrocarbon to the country’s economy, over the last five years.

2015

From the re-nationalization of YPF to the discovery of Vaca Muerta, and the arrival of new and important players, where do these events leave Argentina’s oil and gas industry in 2015? Daniel G. Gerold, one of Argentina’s most respected energy consultants and director of G&G Energy Consultants, laid out what 2015 means for the oil and gas industry in Argentina: “2015 is a transition year for Argentina. Falling international oil prices have left Argentina decoupled from international oil prices. After twelve years of being well below international oil prices, Medani-to crude is now higher than WTI and Brent. 2015 is also a year of uncertainty since the pressure to lower fuel prices, which deter-

mine the price for crude oil, reduces clarity on actual future prices. Finally, 2015 is a presidential election year. The general consensus is that the new government will be friendlier with investors and will establish a better framework for energy investments. However, candidates have avoided making statements about concrete plans and will not make any statements until the new government is elected.”

Gerold also specified the country’s exploration and production (E&P) challenges: “Argentina has many mature oil and gas fields, and E&P companies have made so few exploration efforts that there have been no new discoveries of conventional resources. Companies are focused in assessing unconventional shale plays, which will not bring sizeable production in the short term. Most of the current activity has been reduced to infill drilling and eventually appraisals in existing fields. On top of that, wells have low production rates.”

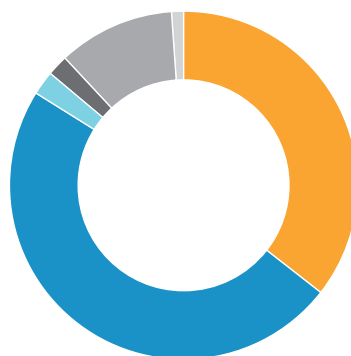
“Vaca Muerta has good organic content, good quality of rock that can be fractured, and the kind of access to water and other infrastructure needed to develop the oil and gas sector that the other basins lack.”

- Ernesto López Anadón,
President, IAPG.



ARGENTINE NATURAL GAS PRODUCTION AND CONSUMPTION (BILLION CUBIC FEET) 1980-2012

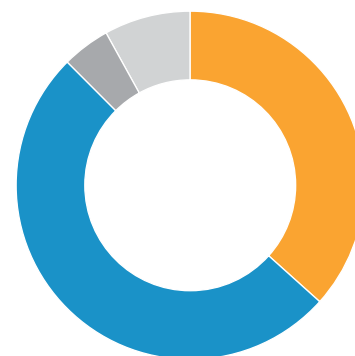
Source: BP



Oil	30.9	36%
Natural Gas	42.4	49%
Coal	1.3	2%
Nuclear	1.3	2%
Hydroelectric	9.3	11%
Renewables	0.7	1%

PRIMARY ENERGY PRODUCTION BY FUEL (MILLION TONS OF OIL EQUIVALENT) 2014

Source: Argentina Secretary of Energy



Oil	28.7	36.7%
Natural Gas	39.7	50.8%
Coal	0.05	0.1%
Nuclear	0	0.0%
Hydroelectric	3.6	4.6%
Renewables	6.1	7.8%



Hydraulic stimulation site in Loma Campana, Neuquén. Photo courtesy of Geopark Argentina.

State of the Industry

The Good, the Bad, and the Ugly

INFRASTRUCTURE

Some foreign oil and gas investors may wonder whether old, leaky pipelines will disrupt production; whether single-lane roads will cause traffic jams and delay important deliveries; or whether logistics companies will be professional enough to foresee and fulfill delivery times. Oil and gas infrastructure, transportation infrastructure, and logistics are three issues that pose distinct challenges in Argentina, but that also provide several opportunities.

López Anadón of the IAPG, does not believe that oil and gas infrastructure will be a problem: “The industry is capable of supplying the rigs, pumps, motors etc., that are required to sustain increased activity.”

With a century-old hydrocarbon industry, Argentina unsurprisingly has well-established companies that have built the country’s oil and gas infrastructure. One of those companies is Contreras Hermanos, which built much of the internal road network in the fields of the San Jorge Gulf basin throughout the 1960s and 1970s. Though these fields are isolated from major roads, according to Oscar E. Le Calvet, general director at Contreras Hermanos, “it is vital to be able to reach everywhere within a reservoir.”

Yet pipelines are another story. Hugo Eurnekian, president of CGC, explained the importance of improving Argentina’s pipelines: “Midstream companies like Transportadora de Gas del Norte (TGN) and Transportadora de Gas del Mercosur (TGM) are in a bad shape since

they have had to cope with the same tariffs for the past 12 years. We think this scenario will change in the future. The need for new and better infrastructure is so high given the country’s hydrocarbon potential and energy deficit that the next government will have to support companies like TGN and TGM. . . Whether Argentina chooses to continue increasing its natural gas imports, or shift to becoming a gas exporter, there is one certainty: the country needs to improve its gas pipeline infrastructure.”

Sergio Paredes, vice president of CGC, explained how the company sees a business opportunity in the need to improve the country’s pipeline infrastructure: “CGC is consolidating its position in the midstream sector through its interests in TGN GasAndes and TGM. These pipelines extend over 1,000 kilometers, transport more than 40% of

“Argentina will develop its tight gas assets before developing its shale resources...”

**- Hugo Eurnekian,
President, CGC.**



the natural gas in Argentina, and the grid connects Argentina with Chile and Brazil. Furthermore, because of Argentina's vast shale gas resources, gas transportation is a good long-term investment. Over 50% of Argentina's energy matrix relies on gas, and CGC is working to produce and transport it. Moreover, gas transportation companies have positive growth outlooks, especially given recent stock price increases. Due to the obligation to supply the Argentine market's gas needs, companies have not used pipelines for transportation or exports since 2007. For example, CGC uses its ownership of a part of GasAndes exclusively for the storage of gas. Now these pipelines can be used either to export or import gas from neighbor countries."

Le Calvet, of Contreras Hermanos, explained that the need to revamp Argentina's pipeline infrastructure has also given companies like Contreras Hermanos some of their most important projects in the last seven years, especially in Patagonia: "Since 2008, Contrera's main projects in Argentina have related to the expansion of the country's gas transport capacity. The government and ENARSA aimed at in-

creasing transport capacity of the pipes that come from all regions. For this project, TGS and TGN have acted as technical sponsors, and the Nación Fideicomisos managed the funding.

Like pipelines and intra-field roads, companies in Argentina will need to improve the roads and highways that connect oil and gas fields to cities and ports. López Anadón explained: "Up to now, the lack of adequate transportation options to and from the Neuquén has not been a problem since oil and gas activity does not yet compare to the activity in, for example, the United States. But if the number of rigs and fracking equipment were to triple, then the lack of roads and railroads would be a problem. The need to transfer water, propane, chemicals and trucks will surpass the capacity of our current infrastructure. That said, federal and provincial governments know what needs to be done and have been active in facilitating investment in this area. If governments keep up the pace, the rate of infrastructure development will go in line with development."

Speaking at the 2015 World Shale Oil and Gas Latin America Summit in Neuquén,

Alex Fleming, oil and gas senior manager at Ernst & Young (EY), gave a sobering view about the impact of increasing unconventional activity on infrastructure and labor markets. He predicted that while Argentina's unconventional activities will require about 1,000 full-time truck drivers in 2016, the industry may need up to 1,900 drivers by 2025 if the industry continues to develop at its current pace. He also highlighted the need to develop local suppliers since imports of, for example, proppants, chemicals, etc., traveling from Buenos Aires to oil and gas fields can be delayed. Indeed, imports—whether or not they are better than their local counterparts—are of little use if they cannot arrive to fields on time or at all. Even if governments and companies succeed in building the necessary roads and railroads to support a shale boom in Argentina, how companies use them is another challenge for the industry. López Anadón identifies overcoming problems related to logistics as the greatest challenge facing the oil and gas industry in Argentina: "Companies must look to integrate their activities in the most efficient way possible to lower well completion costs."

Miguel Di Vincenzo, vice president of global sales & technology at EcoStim Energy Solutions, seconds the challenge that logistics pose in Argentina: "Our customers started using hydraulic fracturing techniques in Neuquén more than 30 years ago, so the region is well prepared in some respects. Our main concern is the still immature logistics network, which is necessary to materially expand operations in Neuquén in a way comparable to a major shale development in North America. The volume of sand and supplies needed for unconventional shale development is significantly greater than for the smaller well stimulation efforts performed historically."

I-FLOW has provided logistics solutions to retail and other industries for over 40 years. In 2013, the company ventured to apply the lessons it had learned in retail logistics to the oil and gas industry. Raúl Horacio Morales, president of I-FLOW, criticized the current state of logistics within the Argentine oil and gas industry: "Logistics in the oil and gas industry are rudimentary. For example, products are rarely tracked, much less with tracking bar codes. I-FLOW found an industry it was unfamiliar with and where quality standards left much to be desired. The oil and gas industry in Argentina works with



Photo courtesy of Gas y Petróleo del Neuquén S.A

processes that are 50 years old. Companies offer only transportation services, not integrated logistics solutions.”

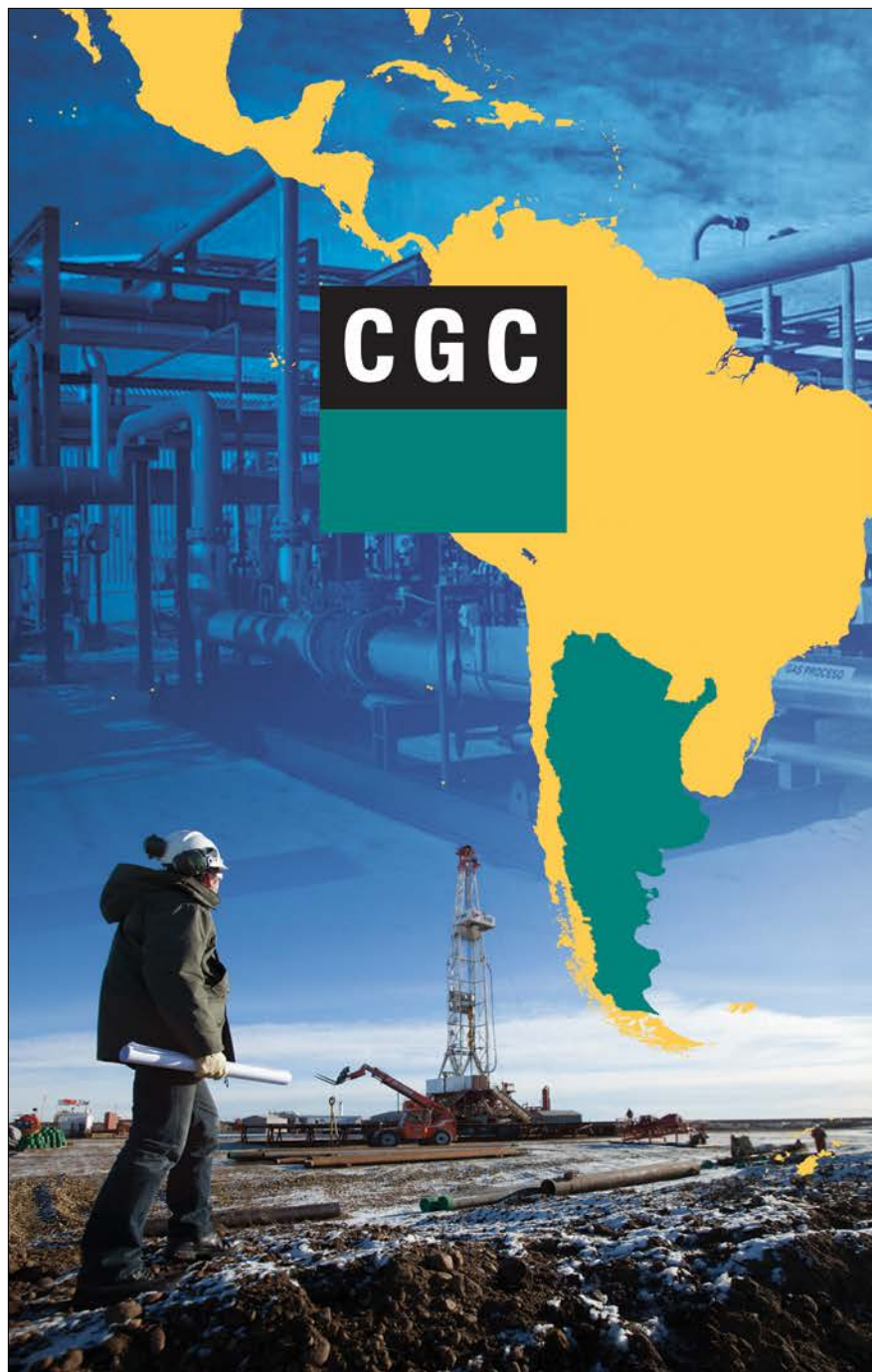
Yet he concedes that penetrating the industry is complicated, and describes how old habits within the industry die hard: “The top levels of management of the oil and gas industry have received I-FLOW’s proposal positively. However, lower levels of management have been more resistant to change. Top levels of management want to hear about how they will save costs by implementing an integrated logistic system, but it is harder for people on the ground to make the shift. Though these outdated logistics processes may have worked for supporting the development of conventional wells, they will not work for unconventional ones. Without proper logistics, fracking will fail in Argentina.”

Alberto Saggese, president of Gas y Petróleo del Neuquén (GyP), also sounded the alarm: “Argentina clearly needs to make massive investments in infrastructure to cope with intensifying oil and gas production. The challenge will be to overcome the vicious circle that is hampering infrastructure investment. Without production, there is no money; without money, there is no infrastructure investment; and without infrastructure, there is no production.”

FISCAL REGIME

Argentina taxes at the federal, provincial, and municipal levels, and has a relatively attractive fiscal regime: “Income tax is 35% and oil and gas exploitation concessions have a system of royalties ranging from 12% to 18%, which are low compared to other producing countries in the world with similar systems, and a sales tax of 3%. Dividends to foreign beneficiaries are taxed at 10% and capital gains at 15% on net income or 13.5% on sales,” said Miguel Maxwell and Ricardo Ruiz, CEO and oil & gas industry leader, respectively, of Deloitte LATCO.

Yet Bacher of PwC provided a slightly more critical perspective: “Argentina’s fiscal regime is better than some countries and worse than others. Compared to Brazil, for example, it has a lower number of regulations. Brazil has an enormous quantity of regulations in all spheres—national, state, provincial, municipal—and they are complex. On the other hand, Norway is less complex and has fewer taxes than Argentina. In terms of taxes, Argentina is relatively expensive. Half of what is paid for gas



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is taxes. There is also an income tax, taxes on shares, patrimony of people, among others. In this country, companies and individuals pay taxes based on what they earn, what they have, and what they consume.”

As with other aspects of Argentina’s regulatory regime, the interpretation of tax regulations is not straightforward. Enrique Grotz, a partner at EY Argentina, explained: “The main difficulties in Argentina are not the regulations themselves, but rather the interpretation of regulations. Sometimes companies and governments interpret regulations differently. For example, tax laws have an inflation-adjustment clause, but this clause was suspended several years ago. For years, companies have been asking for the reinstatement of the inflation-adjustment clause. Though companies pay a 35% corporation tax, an inflation rate of 30% to 40% makes the effective tax rate higher. Nevertheless, the real solution to these kinds of problems is tackling the root macroeconomic causes. In this particular case, the goal should be to tackle inflation since it is not likely that the inflation-adjustment clause will be re-instated.”

One of the main concerns that foreign potential investors have about investing in Argentina is whether and to what extent they will be able to reap what they sow. And local players understand that the complexity surrounding the repatriation of profits and dividends has muted investment, as Saggese of GyP noted: “Developing Vaca Muerta will need about \$30 billion per year and large-scale production may begin in 2020, if these investments begin today. However, before these large investments and production begin, Argentina will have to radically change. For example, when the current pilot projects in Neuquén begin to require additional investment, it is difficult to say whether companies will be willing to make these commit-

ments if they cannot repatriate their profits. Making it easier for companies to repatriate profits would promote investment in the long-term. Argentina will need to make these and other reforms if the country is to take full advantage of the opportunities in Vaca Muerta.”

Yet the repatriation of profits and dividends is not impossible, though it is challenging. “Dividends, if authorized, can be paid based only on audited financial statements, though flow of foreign currency has been restricted due to pressure of balance of payments on Central Bank reserves. To ask for the authorization to repatriate profits, the company must present a good business case and show how they generate resources for the country. Making a case is lengthy and costly, and it does depend on the state of reserves. These restrictions might be eliminated, however, by the incoming government since the two main presidential candidates support eliminating those restrictions,” detailed Maxwell and Ruiz of Deloitte LATCO.

Certainly, Argentina’s fiscal regime has room for improvement, which prompts investors to wonder whether the next government will enact fiscal reforms. Gerold of G&G Energy Consultants doubts that further legal reforms like the 2014 amendment of the Hydrocarbons Law will occur: “Politicians think that the oil and gas industry is booming. But the government should offer fiscal incentives like accelerating the depreciation and amortization of shale invest-

“The next step for the oil and gas industry will be the development of shallow gas plays, tight oil in conventional reservoirs in the Neuquén basin, and deeper natural gas in the San Jorge basin.”

- Daniel G. Gerold, Director,
G&G Energy Consultants.



PRODUCTION GROWTH AND SIGNIFICANT UNCONVENTIONAL RESOURCES



Strong production from conventional fields - diversified production base of ~3,450 boepd from participation in 150 wells and 8 fields, in two countries

25m boe of 2P reserves in Argentina

Developing world class position in the Vaca Muerta and Agrio Fm. - current Andes’s shale resources are 26 times the present reserve base and provide a platform for significant production growth

One of the largest acreage positions in proved Vaca Muerta (250,000 net acres), Agrio acreage and high quality assets, ~90% in the oil window

4 shale oil discoveries; 500 million equivalent oil barrels of certified resources

Currently producing from Vaca Muerta

Partnered with YPF (the most active player) in 4 licences in Vaca Muerta and 8 more in other plays

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ments. Shale assets currently produce little but accumulate a given number of barrels in the long run. As a result, E&P companies face reduced rates of return since they pay a significant amount of income tax at the beginning of undertaking shale activity. Costs that are not attached to wells like drilling costs and fracking costs should be tax-deductible for E&P companies.”

IMPORT RESTRICTIONS

Importing in Argentina is infamously complicated. Companies wishing to import foreign goods must pass three veto players. For any import request, importers must submit a DJAI, or sworn affidavit of intention to import. Though it is the Secretariat of Commerce that approves or denies DJAIs, the Argentine Tax and Customs Authority (AFIP) must first certify that the importer has paid its taxes and has the means to pay for the imported goods. The third veto player is the Central Bank that, depending on the state of its foreign reserves, must release the funds to the importer for payment.

Import restrictions have had a mixed effect on the oil and gas industry in Argentina, depending on whether the importer is a foreign oilfield service company or a local supplier. Whether foreign or local, companies must wisely pick their battles when it comes to what goods they import given the Central Bank's ever-dwindling supply of dollars. Since companies can only import a limited amount of goods, they naturally opt to import the most vital, high-tech goods. Foreign oilfield service companies go to

great lengths to comply with the import restrictions. EcoStim is one company that has successfully imported vital equipment, as Di Vincenzo recounted: “Importing equipment into Argentina is always difficult, but EcoStim has a firm commitment to supporting local industry and job creation. To this end, we worked closely with several government agencies and local vendors, including QM Equipment, to make sure that we meticulously followed all the importation laws while simultaneously making a substantial commitment to building additional equipment locally in Argentina. This process took several months to accomplish but once it was complete, the importation went smoothly. In fact, we received our first set of equipment in Buenos Aires in September 2014 and executed our first job in December of the same year with excellent results.”

Gaining the approval of the Secretariat of Commerce can be a time-consuming task that requires more attention than the mere submission of a DJAI. Companies must also convince the Secretariat to allow imports of a particular good. Importers cannot simply argue that this good would reduce their capital expenditures or efficiency. They must often show that local industry cannot manufacture it and, in fact, needs it. Sandvik in Argentina is one company that has managed to persuade the Secretariat. Sergio Monterotti, Sandvik Coromant's director of South and Central America, and Camilo Cuevas, Sandvik Argentina's group company manager, shared its experience: “Import restrictions in Argentina have been

a problem for Sandvik and its customers. The company has had several meetings with the Secretary of Commerce during which Sandvik has explained the impossibility of manufacturing most of the company's products with local technology. After several presentations, the Secretariat of Commerce and Sandvik have agreed on importing certain technologies given the impact that a shortage of Sandvik's products would have on the production capacity of local manufacturers and their own export aspirations.”

It is tempting to say that the policy decision to protect Argentina's local industry with import restrictions has created both winners and losers. The most likely candidates for the winners are local suppliers who manufacture and distribute commodity goods that are not worth fighting for with the Secretariat of Commerce. Though illiberal policies like the implementation of import restrictions may create individual winners, they create a loser out of industry as a whole, as Pablo Puerino, Valvtronic's director and general manager explained: “Import restrictions benefit a set of Argentine manufacturers but hurt the industry. Valvtronic has benefitted from import restrictions. Yet the company believes that if Argentina is to become a global oil and gas player, the government will have to redefine the way the domestic industry is protected. If not, the damage to the supply chain caused by a shortage of certain vital technologies will hold back the development of Argentina's oil and gas industry.” •

CREATING VALUE AND GIVING BACK



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The Role of the National and Provincial Governments

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NATIONAL

With so much oil and gas waiting to be extracted, Argentina has the potential to not only supply its own energy needs, but also export energy to its neighbors and the world. What is stopping Argentina from becoming the Saudi Arabia of South America? It's the politics, stupid. "In the last decade, the energy sector has faced political pressure, price controls, and energy consumption subsidies that increase demand but do not incentivize investment. As a result of these shortsighted policies, Argentina has lost energy self-sufficiency," explained former secretary of energy of Argentina and former head of YPF, Daniel Montamat. One of the public policies that Monta-

mat argues has negatively impacted the oil and gas industry is the government's implementation of energy subsidies: "In Argentina, you usually have to make a correction of relative prices. The average price of gas is around 25% of the regional average, and electricity prices are around 22% to 23%. Subsidies make relatively lower energy prices possible, especially subsidies for natural gas consumption. Energy subsidies cost around \$15 billion per year and thus represent around 3% of GDP. Phasing subsidies out will be a serious challenge for Argentina, but they also affect investment in the oil and gas industry. Low electricity and natural gas prices stimulate energy de-



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“Oil and gas regulations are merely words on paper. Government interventionism and a lack of respect for the rule of law make Argentina’s regulatory framework weak.”

- Juan José Aranguren, Former President, Shell Argentina.



mand, but the problem is that current prices are not covering production costs. New price signals must attract more investment. Without new price signals, the only investment will be government investment with public funds.”

And as Juan José Aranguren, recently retired president of Shell Argentina explained: “Oil and gas regulations are merely words on paper. Government interventionism and a lack of respect for the rule of law make Argentina’s regulatory framework weak.”

When Argentina abandoned the peso’s peg to the dollar, the Argentine Congress passed the 2002 Public Emergency Law, which gave the executive branch the authority to significantly alter economic regulations. If the law is allowed to expire at the end of 2015, Argentina’s 13-year long state of emergency will finally end. Meanwhile, President Cristina Fernández de Kirchner has not been shy to manage the economy with a heavy hand, especially regarding the energy sector. In 2012, President Fernández’s government spooked international investors when it re-nationalized YPF, Argentina’s state oil firm that was previously owned by Spain’s Repsol. As Aranguren explained: “The Argentine government poorly managed the expropriation of Repsol’s interests in YPF. It failed to pay Repsol for its YPF assets prior to seizing them. Thus, the re-nationalization of YPF was, in effect, a

confiscation that later became an expropriation. It was only after negotiations and an agreement between the government and Repsol that the re-nationalization of YPF became a constitutionally legal expropriation. Prior to the expropriation, Repsol was considered a close ally of the government. That the government could so quickly turn against Repsol sent a very bad message to the business community”.

But not all of the Argentine government’s actions have sent oil companies running to safer investment environments. Through executive decree 929/13, President Fernandez controversially let oil companies export 20% of their production abroad at world prices and exempted them from export taxes and requirements to repatriate profits if they invested over \$1 billion. As a Harvard paper noted: “The day after the incentives were announced, Chevron signed to make an initial \$1.24 billion investment with YPF in the Vaca Muerta fields, and subsequently Wintershall entered a joint venture with Gas y Petróleo de Neuquén to explore and produce in a field taken back from a previous investor by the Neuquén provincial govern-

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“Argentina will only develop its hydrocarbon potential by adopting market-oriented reform focused on making political institutions and rent regulations more predictable.”

**- Daniel Montamat,
President, Montamat &
Asociados.**



ment for lack of investment. Dow Chemical Company agreed two days later to invest \$120 million in a joint pilot project with YPF in the El Orejano block of Vaca Muerta.”

Moreover, the national government has incentivized oil and gas production by setting the price of crude oil at up to \$77 per barrel and \$7.5 per million BTU for new natural gas production. Though hydrocarbon-producing provinces and YPF support the continuation of fixed internal prices aimed at incentivizing production, some critics argue that the internal prices decoupled from international ones creates uncertainty and distorts investment. “Argentina’s incentive structures and the misguided view that oil prices would stay at \$100 per barrel have caused investors to prioritize the E&P of oil over gas. Price controls that set the internal price of oil at \$77 per barrel favor the E&P of oil over gas. Moreover, the first investments in Vaca Muerta, like the agreement between YPF and Chevron, went to oil because oil prices were expected to remain around \$80 to \$100 per barrel in the long-term,” argued Montamat, who also added: “Investors need predictable signals of how the rules of the game are going to evolve. Constantly changing rules concerning rent distribution will cause companies to overproduce and limit new investment in developing new reserves.”

In 2014, the Argentine Congress amended the law that governs the oil and gas industry known as the Hydrocarbons Law. The amended law extends concession periods from 25 to 35 years, incentivizes investments of over \$250 million, and standardizes the regulation of hydrocarbons across provinces, among other provisions. Alberto Saggese, CEO of GyP, concedes that the amended law “is a step in the right direction,” but highlights that “it does not address awarding new concessions” and that “newcomers will have to partner with the current players” since “most blocks are already contracted out in Neuquén.”

NEUQUÉN

As the owners of hydrocarbon resources in Argentina, the provinces share a significant portion of the responsibility to regulate the oil and gas industry with the national government. Yet provinces have not always played a role in the regulation of the industry. The 1996 Short Law gave provinces a greater role in the industry’s regulation, which came with certain challenges, as Martín Pérez de Solay, president of Petróleos Sudamericanos Energy, explained: “The passage of the Ley Corta (Short Law) transferred control of oil and gas fields from the national government to the provinces. The provinces’ power and control capabilities toward companies grew significantly. Companies had to get used to this change, with provincial governments, not the national government, as their new regulators during a time of contract extension negotiations. Companies entered into 25-year

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Active drilling rig in Loma Campana, Neuquén.
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contracts between 1990 and 1993, so all contracts matured between 2015 and 2017. Provincial governments were not prepared to negotiate extensions, apart from Neuquén, a province with a background in oil and government offices that knew and understood the industry. Negotiating with a province with a background in oil makes the process easier. Provinces with less background have a harder time understanding the needs and issues of the industry, so it took more time to educate and learn along with them. For example, *Petróleos Sudamericanos* has been trying to renegotiate terms with the provinces of Neuquén and Río Negro, and the company's negotiations with Río Negro took longer than in Neuquén. As a result of the extended negotiations with Río Negro, *Petróleos Sudamericanos* has focused on maintaining its environmental liabilities rather than investing in the operational quality of the field."

Provincial governments, particularly the government of Neuquén, have played an important role in attracting foreign oil companies to Argentina. Saggese related: "Governor Sapag of Neuquén has been very important in the creation of GyP and convincing companies like ExxonMobil to come to Argentina. From 2008 to 2010, it was difficult to convince companies to invest in exploring the blocks that they had already relinquished. The first bidding round only yielded about \$180 million. However, Governor Sapag successfully wooed ExxonMobil and XTO Energy during his trip to Houston."

Jorge Sapag, governor of the Province of Neuquén, provided some background about Neuquén's history with oil and gas: "Neuquén has been exploring and producing oil and gas since 1919. After years of declining oil production due to maturing fields, the development of Neuquén's unconventional resources is turning a new page in Neuquén's hydrocarbon story."

Governor Sapag's family has been highly influential in the politics of Neuquén. His uncle, Elías Sapag, was a national senator and the first president of the party to which he belongs, the *Movimiento Popular Neuquino* (MPN). Governor Sapag explained: "MPN has always promoted federalism and provincial ownership of hydrocarbon resources as enshrined by the constitutional reform of 1994."

Though Governor Sapag's mandate ends in December 2015, Omar



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Gutiérrez, also of the MPN, will take control of the governorship. Nevertheless, Governor Sapag outlined the MPN's strategy to attract oil and gas investment to Neuquén: "Attracting investment to Argentina and Neuquén requires the involvement of all three levels of government: national, provincial, and municipal. Nevertheless, MPN's strategy has been to knock on doors. For example, the government of Neuquén was able to woo Wintershall when it went to Germany, and to woo ExxonMobil when it went to Houston. The government aims to attract investors not just with the prov-

"After years of declining oil production due to maturing fields, the development of Neuquén's unconventional resources is turning a new page in Neuquén's hydrocarbon story."

- Jorge Sapag, Governor, Neuquén Province.



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ince's favorable geology, but also with clear rules of the game, transparency, and the certainty that investors can enjoy their fairly earned profits."

MPN's strategy has yielded results, as Governor Sapag's numbers show: "My government has succeeded in attracting a significant amount of investment to unconventional activities. From 2009 to 2015, investment has increased from \$1 billion to \$5 billion, drilling rigs from 50 to 150, drilling teams from 26 to 56, and drilled wells from 260 to 500 (60% of which are unconventional)."

Part of Governor Sapag's strategy to develop the oil and gas industry in his province has also been the creation of GyP. "The province of Neuquén founded GyP in 2008 with the mission to supply Argentina's energy needs by developing Neuquén's hydrocarbon resources. The government of Neuquén created the company at a time when oil prices were at \$32 per barrel, causing E&P companies to relinquish their areas. Left with blocks and no contractors, Neuquén created GyP to woo E&P companies back," recounted Saggese, president of GyP. "Nevertheless, GyP's strategy is not to be an operator itself. GyP hires qualified personnel who manage the company's relationship with its E&P partners. Though GyP generally has about a 10% interest in joint ventures, GyP wields a rarely used veto right over all project decisions."

Saggese also highlighted the value the provincial company adds to its joint venture partners like Shell, Total, Exxon, and Wintershall: "GyP advises the provincial gov-




Photo courtesy of Rodial S.A


ernment on business and technical issues, like settling landownership disputes and choosing an oilfield service company. And given its relationship with the province, GyP is also a good partner and facilitator for E&P companies operating in Neuquén. One of the ways in which GyP helps operators is by organizing and participating in workshops where its partners discuss common issues like logistics, drilling, human resources, and landowner relations."

Neuquén also has a plan to develop the infrastructure that the province will need to support the growth of the oil and gas industry. Neuquén has created the following provincial companies to support three specific kinds of infrastructure projects: the Ente Provincial de Energía del Neuquén for electricity distribution, the Ente Provincial de Agua y Saneamiento for water treatment and sewage, and the Dirección Provincial de Vialidad for roadways. These three state-owned companies will act as the province's tools to develop the basic infrastructure needed to support hydrocarbon E&P in Neuquén.

Governor Sapag also suggested that the province would allow private investors to

develop some of the necessary infrastructure: "Generally, the government of Neuquén assumes the responsibility of building schools, hospitals, roads and other public goods with the support of the Inter-American Development Bank, the Development Bank of Latin America, the World Bank, and other similar institutions. However, the province is looking into developing industrial parks in Añelo with concessions to private companies by which an investor would be awarded the administration of such parks after a public bidding. Concessionaires could also feasibly develop toll roads specifically for the use of the oil and gas industry. However, allowing concessionaires to develop toll roads for the use of the general public would be a more complicated issue. Neuquén has already tried having private companies develop two infrastructure projects—the Cipoletti-Neuquén bridge and the Neuquén-Centenario road—that were not successful since tolls collected from the general public were insufficient. Nevertheless, an open toll road for which oil and gas companies would pay one toll and the general public another is certainly possible." •





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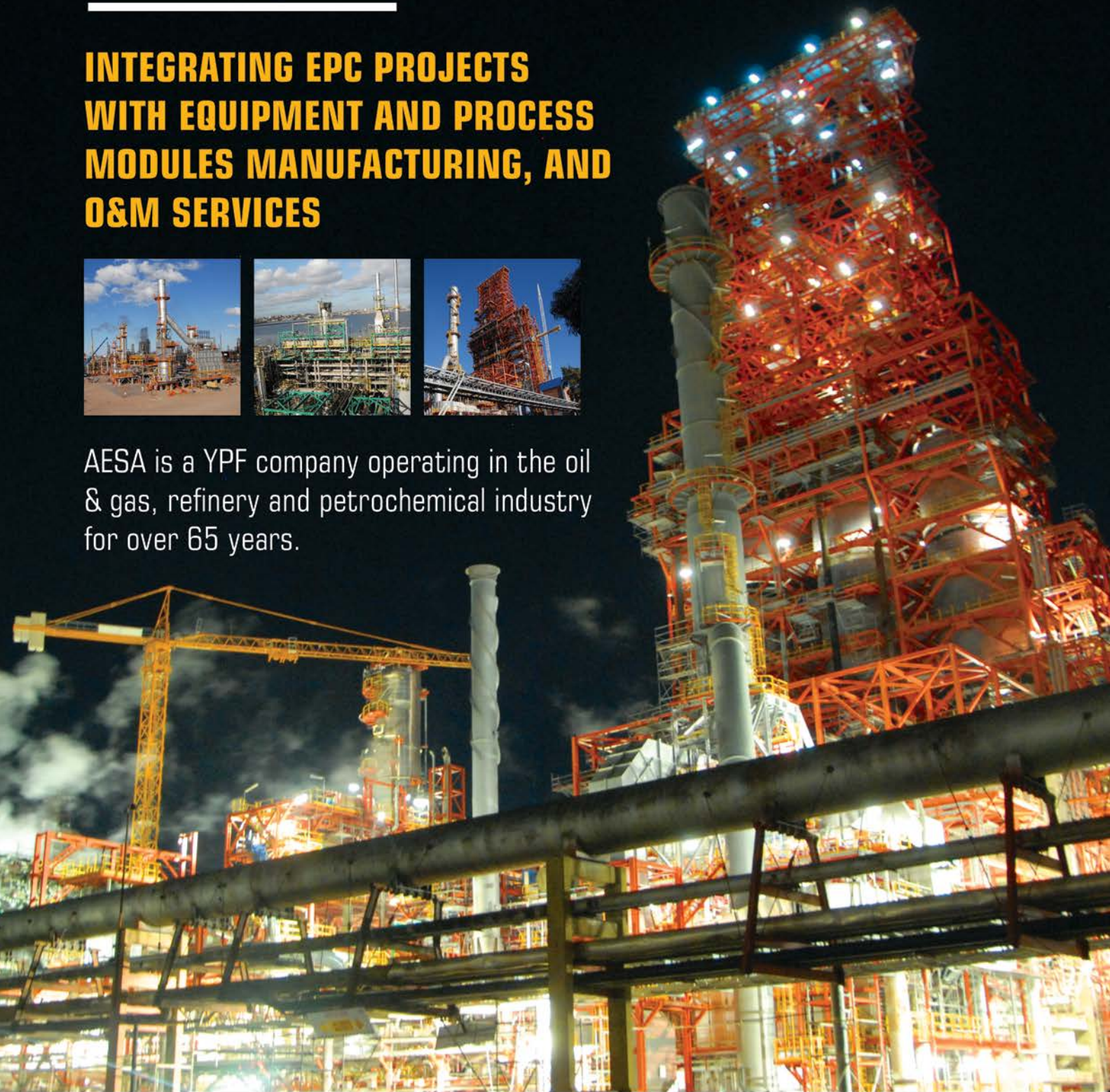
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Miguel Galuccio

President and CEO

YPF



How has YPF's corporate culture changed under your leadership?

YPF is one of the first state-owned oil companies in the world and has sought to build its own company culture that focuses on operational and technical excellence. It has world-class geophysicists and geologists that other national oil companies rarely have. In the last three years, YPF has focused on improving the quality of its management and leadership. For example, it is putting together a management school to instill common values among all of its managers. These values will reflect YPF's company culture, which differs from the culture of YPF under Repsol in several ways.

Under Repsol, YPF was more centralized around Buenos Aires and Madrid but today it is decentralized. For example, regional managers are fully empowered to independently take decisions and risks. Taking risks is extremely important, and I encourage managers to go above and beyond my preliminary instructions.

Also, YPF is now a more open company and is devoted to diversity. My management team is very diverse. The chief financial officer, Daniel González, was new to oil and gas when he started; he was a mergers and acquisitions (M&A) expert previously. In the last few years, YPF has acquired Apache and interests in local petrochemical companies such as Petroken Petroquímica Ensenada and Petroquímica Cuyo. YPF has also entered into deals with Petronas, Chevron, and Dow Chemicals. Daniel's expertise has been vital to the success of YPF's M&A success over the last few years. YPF currently lags behind peers in gender diversity, but is convinced that such diversity will improve the company's work environment and decision-making.

Another important change in YPF is its focus on fostering a national sense, which was one of three points of my plan for my first 100 days as CEO. This does not mean that YPF's employees gather every morning to hoist the Argentine flag before entering Torre YPF; rather, it means that YPF recog-

nizes its importance in supplying Argentina's energy needs and helping the country regain energy self-sufficiency.

You define 'national sense' as YPF's commitment to helping the country become energy self-sufficient. How would YPF's business strategy differ were it to lack a 'national sense'?

YPF's business strategy would not differ much were it to lack a national sense since YPF's commitment to Argentina also makes business sense. How could YPF not be committed to the country when almost 80% of the company's revenue comes from Argentina? Setting aside feelings, Repsol's management of YPF did not make business sense. Though most of Repsol's revenue came from its activities in Argentina, it was investing most of that cash in its international portfolio to secure short-term profits rather than future reserves. This business strategy was doomed to fail. YPF now has a tangible commitment to Argentina, but this does not mean that the company's decisions do not also make business sense.

YPF's commitment to the country has motivated it to undertake risky yet forward-looking projects, like developing Vaca Muerta. Commercializing the vast hydrocarbon resources of Vaca Muerta and developing Loma Campana—the second most important productive field in Argentina and the largest unconventional field outside of the United States—requires taking risks. Sure, YPF could invest in, for example, the Niger Delta, where investments might yield a 2% return. Yet it does not make sense for YPF's long-term profitability to convert foreign resources into foreign reserves. Once YPF secures local reserves, YPF's long-term business strategy will transcend Argentina. YPF has already begun operations in Bolivia and Ecuador and is considering Mexico.

You have talked about how you do not delegate YPF's relationship with unions. What is the importance of per-

sonally managing YPF's relationship with union leaders?

I do not and cannot delegate my relationship with the president when the national government owns 51% of YPF's shares. Moreover, YPF's relationship with unions is fundamental given that improving the productivity of labor in Argentina will take YPF to the next level. Argentina cannot quibble about whether the international price of oil will go up or down; it must focus on making its labor force as competitive as possible. Doing so will require cooperating with union leaders, which is a task I personally manage that takes about an hour of my time each day.

There is actually a union within YPF called SUPeH that is historically important to the company. My relationship with its leader, Antonio Cassia, is one of trust and friendship. When he has a problem, we talk over coffee. The members of SUPeH strongly relate to YPF, which makes negotiations with it easier. The challenge in working with SUPeH and other unions is to communicate where YPF wants to go and that some of the tasks that lie ahead are easy, while others are difficult.

YPF has implemented SUSTENTA, which aims to improve the productivity, competitiveness, and quality of goods and service providers for YPF and the Argentine oil and gas industry. Why is it important for YPF to promote Argentine industry?

YPF prioritizes developing Argentina's national industry because developing the country's unconventional resources will require services that are close to the operations. SUSTENTA does not promote an absolutist, nationalistic industrial policy; instead, it promotes the substitution of imports where it makes sense. YPF's core business is the production of oil and gas, not the manufacturing of pipes, valves, etc. Nevertheless, YPF has a stake in seeing the national industry improve since YPF needs these products.

You have stressed the importance of YPF as a hybrid organization, that is, majority-owned by the state but with a strong private sector culture. At the same time, the United States fostered its shale revolution without a state-owned or hybrid company. Why do you think some countries benefit from state-owned or hybrid energy companies and other countries do not?

Countries, like people, have a fundamental nature. The recipe that worked in the United States to develop its hydrocarbon resources will not necessarily work elsewhere. Every country has to find their own way of doing things, and particularly the way to best extract value from its resources. Given Argentina's complexity, I communicated my view to the government that shaping YPF into a hybrid organization made the most sense.

The United States, for example, has different laws that make landowners not only the owners of the land but also of the hydrocarbon resources under the land. The United States also has legal and tax regimes that facilitate commercial transactions. Argen-

tina lacks this kind of transaction-friendly system.

Yet YPF's hybrid model works for Argentina. If YPF were 100% state-owned, it would have difficulty accessing international capital. If it were 100% private-owned, it would have difficulty having the kind of symbiotic relationship that it needs to have with the national government as the chief regulator. Thanks to its hybrid nature, YPF has been able to secure a minimum price of \$7.5 per million British thermal units (BTU) for local gas producers. The government used to import liquefied natural gas at prices up to \$13 per million BTU, but realized that a domestic price of \$7.5 saved foreign reserves and created jobs. By communicating with YPF, the government can set policies that simultaneously foment investment and help it reduce its fiscal deficit.

Do you have a final message to international oil and gas investors?

YPF must think about regionalization in light of the opportunities that Latin American energy companies have to exchange know-how. For example, Argentina has interesting offshore resources, but YPF does

"The next step for Argentina will be to outline rules of the game that will allow the country to develop its resources regardless of what happens in the rest of the world."

not have the know-how to develop them like Petrobras does. Moreover, YPF could pursue opportunities with Bolivia, Chile, and Uruguay, to name only a few of the countries that represent potential members of a regional energy market.

If you ask me to sell Argentina to oil and gas investors, Argentina cannot be sold with a slogan. Argentina has attracted and will continue to attract investment by delivering on its promises. Certainly Argentina needs more investors, and YPF has had the good fortune of partnering with top-notch players like Chevron, Dow Chemicals, and Petronas, and is in discussions with Gazprom. The next step for Argentina will be to outline rules of the game that will allow the country to develop its resources regardless of what happens in the rest of the world. •



Active drilling rig in Loma Campana, Neuquén.. Photo courtesy of YPF.

YPF

The Leader of an Industry

After the first oil well was drilled in Comodoro Rivadavia in 1907, a national decree under President Hipólito Yrigoyen created YPF on June 3, 1922, making it one of the oldest national oil companies in the world at 93 years old. Since its birth, YPF's ownership has gone from the hands of the national government, to international investors' hands, to Spanish hands, and finally back to the hands of mostly Argentines.

Today, the Argentine national government and hydrocarbon-producing provinces own 51% of YPF's shares, and major institutional stockholders include Lazard, Soros Fund Management, and Goldman Sachs.

An analysis of data provided by Argentina's Secretary of Energy indicates that the re-nationalization of YPF in 2012 was a turning point for the oil and gas industry in Argentina. In 2010, YPF produced about 35% of all the oil Argentina produced and about 25% of the country's gas. In 2014, YPF contributed over 40% of the country's total oil production and about 29% of the total gas production. From 2008 to 2012, YPF drilled about 68% of the country's completed exploration wells and about 43% of the country's completed production wells. From 2013 to 2014, YPF drilled about 33% of the country's completed exploration wells and about 77% of the country's completed production wells.

Comparing the production rates before and after 2012 highlights the impact of YPF's

re-nationalization on Argentina's total oil production and on the company's own production. In 2010 and 2011, year-on-year Argentine oil production fell by an average of about 4% as international oil prices rose; from 2012 to 2014, oil production fell by 1%, or three percentage points slower. In 2010 and 2011, YPF's oil production fell by an average of 4%; from 2012 to 2014, the company's oil production increased by 5%, which represents a positive difference of about nine percentage points.

Yet YPF's re-nationalization has not been associated with similar changes in Argentina's gas production. In 2010 and 2011, year-on-year gas production fell by an average of 3%, and continued to fall at the same average rate from 2012 to 2014. The continued decline in gas production stands in contrast to YPF's own gas production. In 2010 and 2011, YPF's gas production fell by an average of 7%, but it increased its gas production to an average of 3% per year from 2012 to 2014.

Some use these production figures to argue that YPF's re-nationalization was positive, but the move was not without consequences and critics. After the re-nationalization, Moody's downgraded YPF's from B3 to Caa1, or high long-term credit risk, which it has maintained for most of the time since then. Nevertheless Aranguren, formerly of Shell Argentina, criticized the management of the nationalization: "The Argentine Constitution allows for expropriations in cases where the public interest could be demonstrated, so companies should be willing to bear this risk. However, the Argentine government poorly managed the expropriation of Repsol's interests in YPF. The government failed to pay Repsol for its YPF assets prior

to seizing them. Thus, the re-nationalization of YPF was, in effect, a confiscation that later became an expropriation. It was only after negotiations and an agreement between the government and Repsol that the re-nationalization of YPF became a constitutionally legal expropriation. Prior to the expropriation, Repsol was considered a close ally of the government. That the government could so quickly turn against Repsol sent a very bad message to the business community".

If YPF's re-nationalization sent a bad message to the international business community, the event meant something totally different to Argentina's local industry. Local manufacturers and EPC companies have benefitted significantly from YPF's commitment to develop and prioritize local industry, as well as from the national government's trade protection. Yet international companies who export from Argentina have also benefitted. Fabian Mamia, president of Flowserve's Latin America operations, reflected on the impact of YPF's re-nationalization: "The re-nationalization of YPF was an inflection point for Flowserve's business in Argentina, but the company succeeded in finding the right balance between its focus on local and foreign markets. YPF under Repsol invested little in the country and Flowserve's revenue from the local market was not as high as it is now. During Repsol's ownership of YPF, Flowserve focused on serving the Brazilian market and on taking advantage of the explosion of offshore activity in Brazil."

The re-nationalization falls in line with the current Argentine government's distinctly statist strategy for the management of the country's economy. It followed a couple of nationalizations in 2008 when the national government transferred the country's private pension funds to the government social security agency and nationalized Aerolíneas Argentinas, which was also owned by Spaniards.

"Around the time of YPF's re-nationalization, Eduardo Dvorkin, a technologist, wrote about recreating INVAP's success as a company in partnership with research centers, but for the oil and gas industry. When President Fernández de Kirchner read the article, she asked Dr. Barañao if he could analyze and carry out such a project," recounted Santiago Sacerdote, general manager of YPF Tecnología S.A. (Y-TEC). INVAP is a company owned by Río Negro Province focused



Photo courtesy of YPF.

on developing solutions for high-tech industries like nuclear energy, among others.

Y-TEC is an association between YPF and the National Scientific and Technical Research Council (CONICET), and Santiago explained that the idea to create Y-TEC, which became YPF's official R&D branch, "came about in 2002 when Miguel Galuccio (CEO of YPF) and Lino Barañao (Minister of Science, Technology, and Productive Innovation) both noted Argentina's high potential to tackle the country's energy-related challenges with the creation and application of its own know-how."

Argentina's recent nationalizations, the creation of Y-TEC, and other initiatives suggest that Argentina's political leadership often wonders why they should let others run the show when Argentines can do it better. Another part to the Argentine government's economic management strategy is the idea that the government is the indispensable partner in the economy. Whether Argentina would be better off with another economic strategy is an important debate to have. Yet the reality is that the presidency has become so powerful in Argentina that a company of YPF's size and importance could not have remained independent from the national government for long. When Galuccio talks about the fundamental natures of countries, it is difficult to avoid the thought that he was referring to Argentina's exceptionally powerful presidency. The executive branch may remain just as powerful even if Mauricio Macri, Buenos Aires's mayor and the presidential candidate perceived to be more business-friendly, wins. Given that a strong presidency will likely remain a feature of Argentina's political and economic landscape, a national

oil company with a direct link to the government seems pragmatic, if not inevitable.

YPF under Miguel Galuccio's leadership as CEO has largely lived up to the challenge. Despite the credit downgrade and criticisms of domestic and international commentators, YPF's stock price remained relatively stable after the re-nationalization and increased after the U.S. EIA's announcement about Vaca Muerta. That YPF's stock continued to rise after the announcement indicates that investors have approved of YPF and the country's ability to attract the kinds of foreign investors that Argentina will need to develop its vast unconventional resources. Since the re-nationalization, Galuccio's leadership has contributed to signing agreements with the likes of Chevron (2013), Dow (2013), Petronas (2014), and most recently, Gazprom (2015).

YPF's footprint on Argentina's oil and gas industry, however, surpasses the barrels that the company has produced, the wealth that it has generated, and the investment that it has attracted. Countless former YPF employees from almost every stage of YPF's colorful, modern history have gone on to found many of Argentina's oil and gas companies, from valve manufacturers to local oilfield service companies. One such company is UGA Seismic: "YPF had its own crews for seismic data acquisition in Argentina. When the company was privatized, it decided to remove those divisions, and a group of their geophysicists, engineers and technicians decided to form a company to provide these services, which led to UGA's founding," explained Gabriel Winter, UGA's manager for institutional relations. •



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Vaca Muerta and Unconventionals

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OVERVIEW AND ANALYSIS

Vaca Muerta is home to most of Argentina's 27 billion barrels of unconventional oil and 802 TCF of unconventional natural gas. When asked whether Vaca Muerta's development will come at the expense of other unconventional plays in Argentina, López Anadón of the IAPG responded: "Yes. Except for a couple of wells that have been drilled in the San Jorge basin in the D-129 formation, the bulk of shale exploration and development has been in the Neuquén basin, specifically in the Vaca Muerta formation. Other areas present challenges and difficulties that make them less attractive as an investment for the time being. Oil and gas companies will begin developing unconventional resources in the rest of Argentina's basins only after they overcome the learning curve at Vaca Muerta."

A comparison with other unconventional resource plays explains why Vaca Muerta has so much potential. Like Marcellus that has a total organic content (TOC) of two to 12%, Vaca Muerta has a TOC of three to 10%; like the Wolfcamp play whose thickness ranges from 200 to 300 meters, Vaca Muerta's thickness ranges from 30 to 450 meters; like Eagle Ford whose reservoir pressure ranges from 4,500 to 8,500 psi, Vaca Muerta's reservoir pressure ranges from 4,500 to 9,500 psi.

Despite the technical specifications in Vaca Muerta's favor, one of the many challenges that is stopping Argentina from fomenting its own shale revolution are E&P costs. "The challenge with developing unconventional resources is finding ways of making production more economic. You cannot achieve this with a single technology; rather you need to find the right combination. We need to have a better understanding of the geological characteristics of basins and the hydraulic stimulation process. To that effect, Y-TEC works on, for example, reservoir characterization, the development of fracture simulators, or the

development of different types of proppants and fluids to make hydraulic fracturing more efficient," said Sacerdote of Y-TEC. A 2014 YPF update on Vaca Muerta further laid out the industry's goals. To increase productivity, companies in Argentina will need to improve their understanding of the subsurface, identify the sweet spots, optimize completions, and master horizontal drilling. To reduce well construction costs, companies will need to improve case drilling techniques, look to local sand, increase operational efficiencies, and renegotiate labor contracts.

YPF has made progress in reducing well construction costs. In 2011, it cost about \$11 million to drill and complete a well with 3.1 stages in about 43 days; in 2014, it cost about \$7.6 million with five stages in about 25 days. 46% of the total cost now relates to drilling and 35% to completion. Yet some critics, like Daniel Gerold, argue that YPF could have done better, and references the development of the Loma Campana field: "YPF and Chevron started to develop an unconventional play in 2012. They selected a strategy to develop the play in the black shale oil window through vertical wells. However, they would have been better off by drilling horizontal wells with more fracking stages, especially in the shale gas, wet shale gas, and volatile oil window to where they are now shifting. Despite the large investments that companies have made, it has been difficult to increase production. Oil and gas production in Argentina is still 4% below production levels before YPF was nationalized"

Gerold stressed that well construction costs will need to keep decreasing before unconventional production becomes profitable in Argentina. He posits that operators can continue to cut costs "by drilling a horizontal well with 15 to 20 fracks, as operators are starting to do, and drilling gas and wet gas and in the volatile oil window." Yet he clarifies that only 5% to 10% of wells cur-



rently implement this strategy and that "oil and gas players still need to understand the process more."

Drawing from the lessons learned in other shale plays will help operators overcome the learning curve associated with developing Vaca Muerta. Yet López Anadón of IAPG adds that not all lessons learned in, for example, the United States will be easily transposed to Argentina: "Regarding operational efficiency, it would be difficult to directly apply the lessons learned in the United States to Argentine shale fields. Oil and gas companies in the United States have access to 12 million horsepower of fracking equipment, whereas companies in Argentina have access to only about 200,000 horsepower. Oil and gas companies will have to overcome the learning curve associated with understanding Vaca Muerta as a formation. However, lessons related to well completion and the development of drilling and working rigs can be applied in Argentina. For example, companies in the United States put most of their rigs online, even though only 60% of their fracking clusters became productive. Companies in Argentina will need to learn to more efficiently use their rigs to obtain better returns on investment."



Photo courtesy of Transeparation.

**LOMA CAMPANA
SEPTEMBER 7, 2015**

Rodolfo Chávez, Communications Director at YPF, and Matías Acosta, a third-year YPF stimulation engineer, drove us to Loma Campana in a Ford pickup emblazoned with YPF's proud blue logo on a chilly September morning. Driving on Neuquén's provincial Route 7 from the city of Neuquén to Añelo, the town nearest Loma Campana, we passed cows, vineyards, and fellow YPF-marked pickups—a true snapshot of Argentine industry. Route 7 is a narrow two-way road that forms part of the ruta del petróleo, along with provincial Routes, 51, 8, and 17. Heavily used by vehicles carrying material and workers to and from fields, Route 7 is being expanded to a four-lane road, though it seems like the expansion has only just begun. We passed wineries like Malma, where mostly patroleros and their families go to sip on the region's pinot noir and dine on Patagonia's famous lamb.

As we approached Loma Campana, the earth started to take on the region's distinctively semi-arid appearance with red rock and sparse, grey-green shrubbery. Matías talked about his participation in YPF's Exploration and Production Master's Program. Some, like the IAPG's López

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Anadón, have lamented the lack of people graduating from technical careers in country's the world over but added: "The personnel currently working in Argentina are highly equipped to overcome the learning curve associated with understanding Vaca Muerta's geology and how it will react to stimulations."

While engineers and the like may be in short supply, the master's program is competitive and some of Matias's friends were rejected, which surely comes with disappointment since YPF is one of the most sought after companies among Argentina's engineers. Once Matías joined YPF, he spent time on the field under the tutelage of senior engineers. In his second year, he began

"Water management is one of the biggest issues that needs attention because 90% to 97% of the production from mature fields is water."

**- Rodolfo E. Gayoso,
President,
Transeparation.**



participating in the design of projects and continues to do so. Matias first worked in Santa Cruz where he worked on the design and optimization of stimulations in conventional well completion and repair. But in 2013, he was moved to Loma Campana to design hydraulic stimulations for vertical and horizontal wells.

We entered Loma Campana by passing Batería 3, which is the final point where all the production from the field goes for oil-water separation. Rodolfo Gayoso, president of Transeparation, identified some of the challenges associated with constructing the separation plant: "This project was especially challenging because the oil is completely different to conventional oil. It is paraffinic and very volatile. The difficulties coming from these characteristics for the plant design were substantial and the successful completion of this project will be an important milestone."

Almost twice the size of Buenos Aires, Loma Campana is the 395-km2 block in the hands of the joint venture between YPF and Chevron that was formed in 2013. The joint venture aims to invest \$15 billion to construct 1,400 wells. Since 2013, Loma Campana has become Argentina's second largest oil producer after a significant increase in activity. YPF reports that investment in Loma Campana increased by 343%, from \$380 million in 2012 to \$1.7 billion in 2014. These investments have contributed to an increase of nine drilling rigs and 59 producing wells at the end of 2012, to 19 drilling rigs and 290 producing wells in 2014. By the end of 2014, the 290 wells produced about 7,000 barrels

of oil and 17 million cubic feet of gas per day. The joint venture plans to put an additional 150 wells into production by the end of 2015. On the way to the temporary facilities of the Gerencia No Convencional, or Unconventional Management, we passed the management's new permanent facilities that resemble a suburban high school campus and are set to open in October 2015. After parking in what looked like a Ford pickup dealership, we entered the temporary facilities. A survey of the one-story office building brought the meaning of the YPF-Chevron joint venture to life, as it was impossible to tell which workers belonged to YPF and which to Chevron. YPF and Chevron professionals work side by side, and though YPF is the operator, the joint venture is managed as if it were one company.

YPF decided to take us to Rig 234. On the way, Matías explained that the wells like those drilled by Rig 234 are normally 2,700 to 3,000 meters deep and 1,500 meters wide. The most common configuration is to drill four wells in one area. The main impediment in expanding beyond 1,500 meters is the technology related to coil tubing length. He also explained that one of the greatest technical challenges is the sand that comes back in production, or when sand can no longer be injected into the fractures.

Rig 234 is in the hands of Helmerich & Payne (H&P), an American drilling contractor, which began drilling in January 2015 and have since drilled two wells. Though H&P drills all over the United States, the company received its biggest contract ever from YPF for 10 Flex3 rigs. Aldo Guerrero, the rig

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manager from Mexico City, who has worked in countries like United States and Bahrain, gave us a tour of the rig. Some of the biggest challenges are ones related to logistics. Whereas it might take a day and a half to move a rig in the United States, it might take about five days in Argentina. Another challenge has been to overcome some cultural differences, like the sacrosanct lunch hour or mate breaks. In the United States, workers might be willing to skip lunch to get a project done. Yet Aldo clarifies that these challenges are common throughout Latin America and are not particular to Argentina.

After touring Rig 234, we asked Matías if he would consider working outside of Argentina. He does not preclude a stint in the United States, but finds it difficult to imagine leaving YPF and Argentina. Matías is a testament to YPF's success at attracting and retaining talent. More than once, we heard YPF workers praise Galuccio's leadership. According to Pablo Bizzotto, executive upstream vice president, who left Pan American Energy to join YPF, professionals used to start their careers at YPF hoping to go elsewhere; now the opposite happens. "Hearing Miguel talk sometimes leaves you wanting to go out and eat the world," said one YPF employee.

Mr. Bizzotto also noted that Mr. Galuccio has not only succeeded in attracting international investors and spearheading technical successes; he has also convinced many of his employees that they are participating in a historic moment. For Matías, the best part of working for YPF is the opportunity to be part of a soon-to-be milestone of Argentine history.

E&P PERSPECTIVE

E&P companies, especially the majors, are known for their willingness to operate in difficult and risky business environments. Yet international players must decide whether they are willing to remain in a country after each marginal increase of a country's risk profile. The re-nationalization of YPF was one such event, which forced international players to decide whether they would remain in Argentina, lest they be next. For several E&P companies, the benefits associated with the successful development of Vaca Muerta outweigh the risks.

Days prior to his departure from Shell Argentina as president, Aranguren talked about why the Anglo-Dutch major has remained in Argentina after over a century, even after YPF's re-nationalization: "The main objec-

"Wintershall has chosen Argentina to develop its center of excellence for unconventional operations, which in the future such expertise could be used in other regions in the world where Wintershall is active."

- Gustavo Albrecht, Managing Director, Wintershall Energía.



tive of an oil company is to convert resources into reserves. Shell entered into Vaca Muerta in 2012 because it would help the country to develop its resources and the company to produce the oil and natural gas that it needed to remain profitable. But before thinking about delivering a return to shareholders, an oil company needs to make sure that it has resources that can be turned into reserves. Securing reserves, in turn, justifies operating in Argentina, where, for the time being, the regulatory framework ignores international standards, but the opportunity to improve is in front of our eyes."

Gustavo Albrecht, managing director of Wintershall Energía, also shared the rationale behind the German oil and gas company's decision to continue and advance its operations in Argentina: "Wintershall has decided to continue investing in Argentina's oil and gas industry for three main reasons. First, Wintershall is convinced about the potential of the oil and gas sector in the country. Secondly, Wintershall has chosen Argentina to develop its center of excellence for unconventional operations, which in the future such expertise could be used in other regions in the world where Wintershall is active. The third factor is the massive amount of contingent resources in Vaca Muerta."

For many international E&P companies, the opportunities in Vaca Muerta may change the relative importance of Argentina to their operations, as Carlos Ormachea, CEO of Tecpetrol, recounted: "Tecpetrol sees very high growth potential in unconventional E&P in



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Reckoning With The Iron Triangle: A New Era Of Project Engineering

In an ideal world, the entire project of a new plant or the revamping of an existing one should be done to ensure that cost, schedule and performance are as planned. Yet this so called Iron Triangle normally forces project managers to decide between two of these variables at the expense of the third and, sometimes, to choose only one of them. After the crisis from 2008 to 2009, companies around the world including Argentina began to demand more fast-track projects, making the management of the Iron Triangle more important than ever. The life cycle of a standard engineering project typically follows three sequential stages: conceptual or pre-FEED, basic engineering or FEED, and detailed engineering.

Pre-FEED and FEED are arguably the single most important phases in a facility project life cycle. Focusing on FEED, however, is not enough to cope with the increasing demand for fast-track projects, which is the reason that Hytech created extended Front-End Engineering Design (eFEED).

eFEED is defined as a comprehensive engineering package that includes sufficient definition of deliverables to provide secured value during any project's overall execution phase. Hytech's experience shows that accurate conceptual and extended front-end engineering design leads to more predictable costs, decreases the overall project execution life cycle, and ensures final plant performance.

Though eFEED initially takes more time than a traditional FEED phase, it saves money and time in the long run and makes the Iron Triangle less rigid.

Neuquén Province, and the real focus will be in Vaca Muerta, where Tecpetrol predicts the most growth domestically. Argentina currently comprises less than 20% of Tecpetrol's revenues, but with increased investment and the resulting production, it stands alongside Mexico as the company's biggest areas of growth in the coming years"

But developing Vaca Muerta poses several challenges. Ormachea outlines those that stand out to him: "All regions pose a particular set of challenges, but three stand out at Vaca Muerta. First, Argentina needs a stable financial situation in order to facilitate the financing of the anticipated projects. The development of these resources will require between \$10 and \$15 billion dollars per year. This is difficult to finance from existing operations without fresh money to supplement it. The second challenge is to improve cost efficiency. In order to attract the investment needed in Argentina, the country needs a minimum critical mass of volume and new services in the country. Third, companies need a more precise understanding of the opportunities in Vaca Muerta. Vaca Muerta is undoubtedly a substantial asset, but companies must identify the sweet spots, identify whether these are gas or liquids, and determine how best to extract the hydrocarbons. The learning process is costly both in terms of money and time. Overcoming the learning curve will be a great challenge."

Another challenge will be attracting more small and medium-sized players, like those that helped foster the United States' own shale revolution. "Small companies de-

"In order to attract the investment needed in Argentina, the country needs a minimum critical mass of volume and new services in the country."

**- Carlos Ormachea,
CEO, Tecpetrol.**



Photo courtesy of Hytech Ingeniería.

veloping unconventional resources have been successful in the United States and can sometimes be more agile than bigger companies. Small companies can take decisions more quickly," said Grotz of EY. Saggese of GyP further stresses the importance of attracting more companies to Vaca Muerta: "Without reform, the second largest reserve of shale gas in the world will be in the hands of a dozen companies instead of the hundreds of companies that are needed. Blocks need to become available to smaller companies, and the only way that this will happen is if smaller blocks are handed out. Once companies find several sweet spots in a block, they may decide to develop only a portion of those. There needs to be a way to allow other companies to take control of the other sweet spots. Developing Vaca Muerta will require allowing more players to enter the game."

OFS PERSPECTIVE

The development of Vaca Muerta will depend on the availability and quality of oilfield service (OFS) and other service companies. As Grotz of EY put it: "Service companies of all kinds—drilling, pulling, food, maintenance, logistics and transport—especially stand to benefit because regardless of which E&P companies become operators, service companies will have a job to do in Argentina."

Diego Manfio, CEO of Ingeniería SIMA, added: "Opportunities for service companies like SIMA abound. As E&P companies continue to develop Argentina's shale

plays, they will need the support of companies that provide services related to infrastructure and logistics. Service companies will need to build new facilities, and to create new solutions as the industry learns more about Vaca Muerta and the Neuquén Basin.”

Like E&P companies, OFS companies must also undertake their own risk-benefit analysis in a world where other shale plays exist. Di Vincenzo of EcoStim explained the process by which his company decided to enter Argentina: “We started our first operation in Argentina after thoroughly evaluating each international shale market. In 2012, when we started evaluating opportunities to expand our operations to other unconventional markets, it was clear to us that Argentina had all the elements for a successful shale play. In particular, the geology was world-class, the infrastructure was in place from nearly one hundred years of oil and gas development, there was a well-educated workforce, the pace of activity for oilfield services was fairly high and we had executives on our senior management team with many years of experience building companies in Argentina

and more broadly throughout Latin America. After evaluating shale resources, and in some cases conducting reservoir characterization studies in places such as the United Kingdom, Australia, Mexico and Colombia, we concluded that Argentina was the only country outside North America at this time with the right balance of risk and reward.”

Though opportunities for OFS companies abound, that does not mean that setting up shop in Argentina is a no-brainer. Adolfo Sánchez Zinny, president of Bolland y Cía, details some of the challenges that foreign OFS companies interested in coming to Argentina face: “Bolland believes that the oilfield service market has natural barriers for newcomers—not only because of the needed investments and structure, but also due to the country’s volatile regulatory framework. Bolland has shown its ability to face and solve unusual situations, even accepting to replace competitors who were unable to solve complex cases.”

DLS Archer is another foreign OFS company that has decided to enter Argentina, and has learned about the district technical challenges that Argentina’s various oil and gas

“Pursuing cost reductions through increases in productivity would increase mutual benefits and establish a professional and sustainable relationship between E&P and OFS companies.”

**- Adolfo Sánchez Zinny,
President, Bolland.**



fields pose, as Carlos Etcheverry, the company’s President of Land Drilling, recounts: “There are different challenges associated with different parts of Argentina, depending on the area and geography. In the south, wells are not very deep and have to be



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“There are different challenges associated with different parts of Argentina, depending on the area and geography... In Neuquén the challenge is to sufficiently hire and train personnel with the technical know-how to operate the complex operations demanded in unconventional fields.”

**- Carlos Etcheverry,
President of Land Drilling,
DLS Archer**



drilled very fast in order to guarantee high production and decent returns. Fluid loss and rig stability are also challenges associated with the south. In Neuquén, you need bigger rigs with between 1,000 and 2,000 horsepower, where the main issue then becomes how to reduce the cost of drills. The operation differs by the type of well, its depth, and the type of reservoir. In Chubut, unconventional activity has not taken off, but technology is changing constantly. In Neuquén the challenge is to sufficiently hire and train personnel with the technical know-how to operate the complex operations demanded in unconventional fields.”

Yet taking part in the opportunities generated by Vaca Muerta does not mean that foreign OFS companies must take an all-or-nothing

approach. They can share the risk and the benefits by partnering with local companies. Diego Manfio, CEO of Ingeniería SIMA, explained the partnership between his company and an American one: “SIMA has become a very reliable partner for American companies looking to get involved in Neuquén and ideally our partnerships will continue to grow. There have been a number of companies, like Thru Tubing Solutions (TTS), that have hesitated when operators in Argentina like YPF and Shell ask them to come to Argentina due to the challenges associated with import restrictions and the repatriation of profits. In the case of TTS, SIMA entered into a partnership with the company by which SIMA imports products from TTS and receives TTS experts. In return, TTS receives a cut of the profits.”

Some foreign OFS companies have already proven that it is possible to succeed despite Argentina’s regulatory and economic challenges. “Recently, Calfrac implemented the annular frac and ball drop, and became the first company to complete 12 stages in less than 8 hours in a horizontal well in Argentina,” boasted Gerardo Kuracz, president of Calfrac Well Services in Latin America.

Di Vincenzo of EcoStim also shared a success story: “We have conducted the first ever down-hole fiber optics monitoring study in the Vaca Muerta shale play. Beginning in December 2014, we commenced operations of our first well stimulation fleet and in February 2015, we started operating our first coiled tubing unit. We have also signed a technology development agreement with Y-TEC.”

One of the most salient issues that OFS companies must address is how they will help operators reduce costs. Of course OFS companies everywhere must bear efficiency in mind with the current low oil price environment, but it is especially important in Argentina where labor unions have driven up labor costs. Many companies have stepped up to the challenge. Esteban Nuñez, director of Innovisión, presented his company’s approach: “The main challenge with unconventional resources is not finding them, but rather making this kind of production profitable. Innovisión has focused initially on a solution that improves logistics to decrease costs and allows operators to identify sweet spots, and have on time and in place all the equipment, infrastructure and services needed. With this information in real-time, every sector in the company, and also suppliers, is efficiently communicated with and can focus on each business objective.”

Di Vincenzo highlighted the importance of predictive modeling in reducing costs: “The cost of completing a multi-stage horizontal unconventional well in Argentina is very expensive today. We are offering our customers a methodology that allows them to high-grade their acreage without drilling thousands of wells, to predict sweet spots along each horizontal well, to confirm the accuracy of each prediction using proprietary diagnostics tools and then a means of calibrating the predictive model based on real-time observations from the wells’ stimulation, flow back and ultimate production. This methodology has the potential to significantly reduce the stimulation of non-productive zones in order to focus on those zones with the highest probability of success.”

SUPPLIERS

Four factors have affected suppliers in Argentina: YPF’s re-nationalization, increasing unconventional activity, infrastructure, and import restrictions. Like OFS companies, suppliers, both foreign and local, have benefitted from the increase in local oil and gas projects since YPF’s re-nationalization and still have much to gain. YPF’s re-nationalization and investment in Vaca Muerta have in-

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creased the demand for products and services, which often have to adapt to unconventional exploration and production processes. Monterotti and Cuevas of Sandvik talked about the impact of these two trends on their company's business in Argentina: "Sandvik's involvement in the oil and gas industry has increased significantly in recent years, especially after YPF was re-nationalized and led investment in unconventional areas. Sandvik Coromant benefitted from an increase in demand of not just more valves and components, but for more complex valves and components as a result of increased unconventional activity."

Yet increasing unconventional activity affects companies in different ways. Rolando Balsamello, general manager of Oiltanking, hypothesized how his company would react if the crude oil produced in Neuquén from unconventional activities did not fit the needs of local refineries: "This oil could be exiting the system through Oiltanking's terminals and the compensation for that should be entering into our operation. If this happens, maritime operations will significantly increase."

Nevertheless, increasing unconventional activities will prompt most suppliers to alter their products or production processes in some way. Monterotti and Cuevas of Sandvik elaborated on the need to cooperate with its clients to produce increasingly complex end-products: "Increased unconventional activity has also prompted Sandvik Coromant to work closely with clients to meet their increasingly complex needs. For example, unconventional activity has increased the complexity of fitting certain equipment. The company often works with clients through a process called integrated engineering by which Sandvik develops the metal cutting tools that clients need to manufacture their own products according to specific requirements. For example, Sandvik works with Tenaris to develop the cutting tools they need to manufacture products with the kind of fitting that will prevent leaks."

Air Liquide Argentina & Uruguay is looking to its American team members who have had more experience with adapting to unconventional activity. "Though unconventional activities like fracking have only begun in Argentina in the last few years, Air Liquide has been providing related services in other countries for years. The team of Air Liquide in Argentina works together with the teams in Canada and the United States to discuss new opportunities and new ways of serving the needs of the company's oil and gas clients," explained Gonzalo Ramón, the company's managing director.

As this report's discussion about the state of infrastructure in Argentina showed, E&P and OFS companies rely on local suppliers and their proximity to fields to deliver their goods on time. MS Representaciones is one distributor that has developed its own system to ensure that it makes deliveries on time. "Argentina is huge and the distances traveled are long. The strategy of MS Representaciones is to combine transportation services of our own with other companies. MS Representaciones has over \$10 million in inventory, which is why the company owns ten strategic warehouses across the country in order to be as near as possible to our clients. Argentina's oil and gas industry is full of opportunities, but distribution companies must professionalize their operations by improving their logistics strategies and educating clients about their products," detailed Marcelo Saldías, the distributor's president.

Import restrictions have especially opened doors for local suppliers. "Restrictions make it difficult to import certain kinds of valves,



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which is where Válvulas Worcester often comes in. Válvulas Worcester manufactures valves that might otherwise be imported. For example, Schlumberger plans to locally manufacture some products that they cannot import. Sometimes the company works along with them to supply special valves,” explained Gil Prado, CEO of Válvulas Worcester de Argentina, Argentina’s main ball valve producer. Though import restrictions ultimately hurt the quality of products in an industry, as this report notes, YPF implemented SUSTENTA, a program aimed at improving the quality of local industry. Baker Hughes has a similar program with local suppliers, and the idea is to participate in suppliers’ design processes. Puerino of Valvtronic described how SUSTENTA works for his company: “Valvtronic’s participation in the program starts by first making a proposal to YPF to supply a product. Then, Valvtronic representatives go to YPF’s operations to assess the needed product specification, and YPF representatives go to Valvtronic’s production plants to jointly design the product. Finally, YPF places an order if the production testing goes well.”

Puerino also opined on the program’s effects: “Valvtronic has a close relationship with its clients and has participated in YPF’s SUSTENTA Program. These programs have certainly helped Argentina’s industry meet the increasingly complex needs of unconventional exploration and production. SUSTENTA created a channel of communication between YPF and its suppliers that did not exist before its re-nationalization.” In short, SUSTENTA and similar programs are examples of how E&P and OFS companies must and have adapted to one of Argentina’s challenges.

“Argentina’s complicated business environment and Hytech’s experience in various industries motivated Hytech to explore markets beyond Argentina.”



- Miguel Wegner, CEO, Hytech Ingeniería.

EPC

Engineering, Procurement, and Construction (EPC) companies have also benefited from some of the same dynamics as suppliers, especially YPF’s increase in projects related to unconventional activity after re-nationalization. AESA is one such company, as Adrián Mascheroni, the company’s general manager explained: “In the last four years, YPF has pursued an aggressive investment strategy that did not exist before its re-nationalization. YPF has increased the company’s rig count from 20 to 80 drilling rigs, which increased the need for production facilities. AESA began to participate in E&P projects after having for a long time only focused on downstream projects. Since 2012, AESA’s projects portfolio share has moved to half upstream and half downstream. Before YPF’s re-nationalization, AESA participated in projects outside of Argentina, but the company finished its last project abroad in early 2013 to focus on domestic upstream and downstream projects despite continuing demand for EPC projects outside Argentina.”

Yet as a subsidiary of YPF, AESA’s increase in domestic projects comes as no surprise. Though AESA does not receive preferential treatment in bidding rounds where YPF is the client, projects sometimes go to AESA without any bidding round at all, as Mascheroni pointed out: “AESA does not have an advantage in bidding rounds for YPF projects. AESA as a rule goes through the bidding process just like any other company. However, YPF does not hold bidding rounds when for strategic reasons it makes the decision that AESA works on a project on its own.”

Though domestic demand for oil and gas projects has increased, some EPC companies are decidedly international. Hytech Ingeniería, has pursued an internationalization strategy to hedge against the volatility of Argentina’s domestic market, as Miguel Wegner, Hytech’s CEO, shared: “Argentina’s complicated business environment and Hytech’s experience in various industries motivated Hytech to explore markets beyond Argentina.”

Wegner also touched upon another trend affecting EPC companies related to Argentina’s declining oil and gas production and country risk: “Argentina’s country risk makes it expensive for companies to borrow internationally. Oil and gas companies and refineries looking for new projects are no exception. Secure feedstock in a declining oil and gas production scenario is putting downward pressure on revenues and thus the amount of capital available for investment, requiring also fast track projects and assured performance at startup. Clients are becoming more knowledgeable and more demanding. Moreover, clients usually want projects fast tracked. And the only way to do fast track projects is to do engineering at the same time the project is being done...This is part of what engineering firms call extended FEED.” •

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Pumping unit installed in former field of the company located in the province of Chubut.. Photo courtesy of Central Resources Inc.

Beyond Vaca Muerta

Remaining Conventional Opportunities

E&P PERSPECTIVE

Despite the fixation on Argentina's shale gas and oil, investors should note the numerous opportunities separate from unconventional activities. Other opportunities include those related to tight gas, offshore, and maturing fields.

"Argentina will develop its tight gas assets before developing its shale resources," declared Hugo Eurnekian, president of CGC, and continued, "the government sets the price of natural gas at \$7.5 per million BTU, which makes investment in tight gas production more profitable in the short-term when compared to long-term investments in shale."

Gerold of G&G Energy Consultants further delineated the importance of tight gas: "There is significant short-term potential

in tight gas, which some companies are already pursuing. The next step for the oil and gas industry will be the development of shallow gas plays, tight oil in conventional reservoirs in the Neuquén basin, and deeper natural gas in the San Jorge basin. At the same time, the consortium among Total, Pan American Energy and Wintershall will continue to develop offshore assets that will come on stream by the beginning of 2016."

Albrecht of Wintershall elaborated on his company's tight gas assets: "Vega Pleyade, Wintershall's flagship project in Argentina since 2010, is a billion dollar offshore gas field that will produce between seven and eight million cubic meters a day of gas." In particular, Argentina's declining oil and gas production have made the optimiza-



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tion of maturing wells particularly important. Many independent E&P companies have found their niche in exploiting maturing wells. Pablo A. Chebli, Argentina's country manager and vice president at Central Resources, outlined the motivation behind his company's focus on mature fields: "Much has changed for Central since Argentina has become a country in which unconventional activities have increased their appeal. However, Central is convinced that there are still opportunities in conventional fields, and the company's focus remains on mature fields. In the last few years, Central has sold assets in Chubut province to focus on fields in the Neuquén basin where other companies have not seen opportunities. About four years ago, Central acquired some of Chevron's fields in the provinces of Rio Negro and Neuquén with no or little production. Central put them back in production. One field now produces about 42 cubic meters per day and the other produces about 30 cubic meters per day, which are production rates that make these fields economic for a company with low overhead expenditures like Central. In the first years of activity in the new blocks, Central focused on workovers and pulling activity to put the oil wells back in production. Then the company continued with workovers to open new layers, and finally the company carried out new seismic acquisitions and drilled wells." Chebli also detailed some of the technology necessary to stimulate mature fields: "In terms of reservoir, Central continues to focus on primary recovery and secondary recovery. To carry out primary recovery, Central fractures and acidizes wells to stimulate production. Central's goal is to control costs and increase the production potential of the company's wells. For example, Central reduced costs in the El Sauce field by installing new surface equipment like long-range pumps."

As major oil and gas companies like YPF, Shell, and Chevron focus their attention on developing Argentina's unconventional resources, independents are taking advantage of the conventional assets that the majors are leaving behind. Augusto Zubillaga, COO of GeoPark, detailed his company's strategy for conventional assets in Argentina: "Like in other countries in Latin America, NOCs like YPF have some of the best blocks available. Independents like GeoPark can take ad-

vantages of opportunities of partnering with YPF to develop some of their non-core, often conventional, blocks. Some E&P companies are divesting from assets in Argentina and are looking for independents to take over relinquished assets."

Carlos Grimaldi, vice president, and Mary Esterman, director, at Medanito, talked about the opportunities for the company as majors refocus their attention: "The focus of large international, E&P companies on unconventional activities has left a vacuum for smaller, local companies to fill with their specialized skill sets, like Medanito's combination of expertise in E&P and the midstream sector. Medanito initially made a significant investment in unconventional resources. However, Medanito's strategy is now to move away from unconventional activities and focus on conventional ones. Medanito's plan is to be in a strong position for when it makes more economic sense for medium-sized companies to enter unconventional activities."

CGC, bought by Corporación América, has its eyes set on conventional exploration in the Austral basin. Hugo Eurnekian, president of CGC, recounted how the company's presence in the basin has evolved: "Among all producing basins in Argentina, we identified the Austral basin in Santa Cruz as a great opportunity because it is underdeveloped and underexplored. The basin extends into Chile and into the island of Tierra del Fuego, and has a similar acreage to the Neuquén basin. Nearly the entire on-shore part of the basin had been controlled by Petrobras for the last 15 years, but it never was Petrobras's main focus. At the time of the purchase, CGC was producing over 10,000 barrels of oil equivalent per day (Boed). After buying CGC, the next step was to expand within the Austral basin and to perform as operators in the areas where CGC had assets. We fulfilled this goal on April 1, 2015, when we started operating all the areas we purchased from Petrobras in the Austral Basin, becoming the operator and owner of a large portion of a basin with a huge potential. From that date on, CGC raised its production to almost 25,000 Boed." CGC's president stressed the strategic importance of the potential of gas: "We are convinced that the economic scenario to invest in exploration and production of gas fields will improve, being even more attractive in the future. Regarding the Austral basin, it has larger gas



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reserves than oil reserves (67% are gas, 33% oil)—a fact that was also decisive in CGC’s move towards consolidating its position there. The Austral basin is home to maturing fields, new discoveries, and a diverse geology that includes three regions known as Platform, Slope, and Deep Areas, with five reservoirs of proved hydrocarbon. Though opportunities in the Austral basin abound, I would highlight it as a tight-gas discovery with the potential to produce up to one TCF of gas.”

Moreover, Eurnekian aims to eventually make the Austral basin join the ranks of the Neuquén and San Jorge basins: “Part of the strategy is also to develop these areas in partnership with investors with additional capital. More companies will need to arrive to bring the basin to a similar degree of maturity as Neuquén or San Jorge. Though CGC aims to manage most of the areas as the operator, we would welcome other companies operating the blocks that are not part of CGC’s core strategy. From shale to low-risk exploration, and from building pipelines to optimizing current operations, so much is yet to be done in the Austral basin.”

Highlighting the size of the assets in CGC’s hands, the company’s president added: “After the purchase of Petrobras’s former assets, CGC now controls 13,900 km² (3.4 M acres) in exploitation blocks and 37,460 km² (9.3 M acres) in exploration blocks. It is as if CGC had an entire basin to itself.”

While opportunities, both conventional and unconventional, abound for E&P companies, they must also remember that their activities have significant impacts on the communities near oil and gas fields. Ingeniería Alpa is one company that has understood the symbiotic relationship that needs to exist between oil and gas companies and the communities that surround them, as Ricardo Andriano, the company’s president, elaborated: “Ingeniería Alpa’s policy from the beginning was to make sure that locals could share in the projects being developed on the land around them. In reality, operators often tend to run into complications with landowners and farmers, and Ingeniería Alpa did not want these kinds of issues. The best way to incorporate them into projects was to get them involved. By giving locals an interest in Ingeniería Alpa’s operation, the company provided them with a means of income and a way to participate in the development of their land. This partnership was successful not






Photo courtesy of Bolland y Cía. S.A.

only because of the income it provided local communities, but also because of the sense of involvement they felt. It was one of a series of mutually beneficial relationships that have worked to Ingeniería Alpa’s advantage.”

OFS PERSPECTIVE

Optimizing the production of conventional and mature wells requires just as much innovation as unconventional ones, as Sánchez Zinny of Bolland explained: “Conventional operations must increase oil recovery rates and slow decline rates of fields, improving efficiency and using modern technology appropriate for mature fields. As mature oil fields in Argentina become downright old, these fields will require different solutions, products, and services to slow decline rates. At the moment, Bolland is working with the major oil companies to study new technologies. We are in charge of the first Single Well Test Tracer pilot test with one of them.”

Y-TEC, and thus YPF, is also dedicating R&D resources to tackle the challenges associated with mature fields: “Y-TEC has created various technological programs to tackle the opportunities and needs of the development of mature fields. Some of these programs include the development of products and techniques for enhanced oil recovery, new materials to improve the technical integrity of on-field installa-

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tions, and the development of remote measuring and monitoring technologies to reduce operating costs,” said Sacerdote.

Some technology requires addressing conditions particular to certain basins. The San Jorge Gulf basin produces highly abrasive oil, which requires high efficiency pumps to be able to withstand harsh conditions. Mario R. Forchiassin, general manager at Novomet in Argentina, talked about how his company’s imported pumps meet this challenge: “Metallurgical quality is fundamental when facing fluids that have a certain degree of abrasiveness or corrosiveness. Novomet has a manufacturing methodology called powder metallurgy that creates a smoother surface in pumps than those produced in a foundry, which increases efficiency, less wear, better balance and allows the pumps to spin faster. In Argentina there are currently about 4,500 working pumps and they all are made in foundries and use asynchronous motors. When you combine our more efficient PMSMs with our pumps, we create a much needed cost advantage for producers.”

Maturing fields also pose challenges unrelated to optimizing production, as Rodolfo Gayoso, president of Transeparation explained: “Water management is one of the biggest issues that needs attention because 90% to 97% of the production from mature fields is water. So operators are to a large extent water producers as well as oil producers. Water treatment and management is difficult, costly and require very qualified operations to get the proper results.”

Though procedures aimed at optimizing mature well production can be invasive, del Campo of GNC Galileo Technologies highlighted one of his company’s technologies dedicated to mature wells: “The

province of Neuquén showcases how our new MX Wellhead Compressors double or triple natural gas production from these wells. This increase is achieved without modifying the existing pipelines and gathering infrastructure, thus reducing financial risks and making this process more profitable.”

And just as important as innovative equipment, software has the potential to optimize the logistics of operations related to mature and marginal wells. As Nuñez of Innovisión noted, his company develops software aimed at this kind of logistical optimization: “Innovisión designed RMtools initially to track and manage marginal fields in the San Jorge basin. With this platform, YPF created Asset Management teams, which work as individual companies inside the corporation. The software permits the setting of benchmarks and objectives for each business unit, but most importantly lets them track the performance in real-time. RMtools allow oil and gas companies to easily define and track their business plans for developing oil and gas fields. Originally designed for marginal fields, the application of the software to unconventional ones makes even more sense. Tightly integrated with corporate information, the software suite allows companies to monitor projects in detail and consolidate them in the Corporate Portfolio. Project leaders can effortlessly control their budget, production rates and economic indicators of all business units. RMtools combines the technical view of the operations, with the real-time economic impact of each change over time. The reality of fields has a large impact on original plans. The improvement is to track changes over time, and easily evaluate each new scenario and alternative.” •

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Productivity and Labor

A Surmountable Obstacle

UNIONS

Argentine oil executives put down their mate when they talk about unions. Though improving logistics may be one of the most important technical challenges, few other issues incite as much concern among company heads as those related to labor and productivity.

Today, there are more than 3,000 unions in Argentina, 30 of which pertain to the oil and gas industry, according to Leandro Lanfranco, a professor of human resources and labor relations at the Universidad Católica Argentina and an employees and labor relations manager of an oil and gas service company, who set the historical context of unions in Argentina: “For years, the national government has strongly supported unions. Since the first years of President Néstor Kirchner’s presidency, he created a strong partnership with unions. The structure of unions has changed in the last decade. A decade ago, there was one powerful union leader, which made labor negotiations easier. As employees and delegates became more involved in union affairs, they began to understand that they could make a career out of their participation in union politics. The ambition and political aspirations of union officials motivated them to secede from federations, which caused the proliferation of unions and union

leaders. Now, for example, the oil and gas industry has to negotiate with more than 30 leaders. Each union has their own expectations and comes from different provinces, which also influences reaching agreements. Small companies, preferring to avoid conflict, have often given into union demands that have included increases in pay or personnel. Through incremental rises in pay and personnel, unions have become bigger and more powerful in the last 10 to 12 years. Outsiders might perceive that Argentine companies pay higher salaries and employ more people than is needed. However, productivity agreements and increased employer-employee engagement is changing the labor landscape in Argentina.

“The support of unions by the national government is also changing. Government support of unions varies by province and by governor. All three main presidential candidates promise change, saying that they will provide more institutional support for companies. New union leaders also understand the game. This change and support from the national government has allowed companies to begin working on reducing the number of employees by helping employees wishing to retire to do so and by terminating low performance workers. In the first half of 2015, service companies and operators have been able to fire some personnel. Previously, it seemed impossible to fire someone in Argentina—it is tough, but not impossible, and companies are trying to increase their effectiveness.”

According to Ignacio Ferreira de las Casas, a partner at Estudio Jurídico Ferreira de las Casas, some of the most important union leaders in Argentina include Jorge Ávila, the secretary-general of the Sindicato del Petróleo y Gas Privado of Chubut Province; Claudio Vidal, the secretary-general of the Sindicato Petrolero y Gas Privado of Santa Cruz Province; and José Llugdar, the secretary-general of the Sindicato del Personal Jerárquico y Profesional del Petróleo y Gas Privado de la Patagonia Austral.

“The only way of definitively ending disputes with unions is to appeal to the law.”

- Ignacio Ferreira de las Casas,
Partner, Estudio Jurídico
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Ferreira de las Casas summarized the Argentine legal system as it pertains to labor relations: “The Argentine judicial system categorizes cases into the following subject matters: civil, commercial, administrative, and labor courts. However, the Argentine judiciary does not have specialized courts that handle matters exclusively related to oil and gas. National Law 14786 regulates all union affairs. One important portion of the national law states that if two parties cannot solve a dispute, one or both of the parties must seek the mediation of the administrative authority to begin a 15-day conciliation period before taking any direct action like a strike. However, provincial tribunals rarely enforce the compulsory period of conciliation or penalize unions for failing to observe it.”

When involved in legal disputes, most oil and gas companies play the role of defendant, as Total Austral did in one of the landmark cases of Ferreira de las Casas’s firm. His firm represented Total in a 1999 labor dispute that arrived before Argentina’s Supreme Court. Ferreira de las Casas recounted the case: “Total had contracted an OFS company to transport water and pipes to wells in one of its operations in Santa Cruz Province. The OFS company went bankrupt and left behind a number of newly unemployed workers who sued both Total and the OFS company. The Superior Court of Justice (Tribunal Superior de Justicia) of Santa Cruz Province ruled in favor of the workers and Total was sentenced to take responsibility for the actions of the OFS company. The firm appealed the case to the Su-



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preme Court (Corte Suprema de Justicia de la Nación), which overturned the decision of the provincial court and ruled in favor of Total. As a result, the Supreme Court established non-solidarity between E&P and OFS companies whereby E&P companies cannot be held responsible for actions of the OFS companies that they contract. The Supreme Court’s decision represented the first jurisprudence related to the non-solidarity between E&P and OFS companies.”

Ferreira de las Casas has successfully represented his oil and gas clients as defendants,

but he has also encouraged his clients to be more aggressive and proactive in their relationships with unions: “The firm always advises companies to defend their rights with conviction and to assume not only the role of defendant but also plaintiff. The Argentine legal system can yield favorable results for oil and gas clients, but litigants must activate it. Argentine businessmen often avoid taking unions to court. To prevent labor strikes, they prefer to come to extrajudicial agreements with unions. Yet our firm is known for being firm with unions.

The only way of definitively ending disputes with unions is to appeal to the law. It is a business decision and has to be taken with strong conviction. Judges have the power to rein in the influence of unions, but it is up to the business community to take cases before them. Businessmen in Argentina must become more litigious.”

Though foreign oil and gas investors might wonder what further legal reforms might benefit the industry in Argentina, further reforms are neither likely nor necessary, as Ferreira de las Casas put it: “The as-written body of law governing labor relations in Argentina does not need any changes because it is capable of protecting the rights of companies and of reining in the influence of unions. What must change is the disposition of industry leaders. Industry leaders must lawyer up. They must accept the risks associated with litigation to reap the potential rewards. Argentina’s reputation as an unpredictable regulator and as a country with expensive labor costs deters investors. Yet the Argentine judicial system has the power to attract investors by changing the country’s reputation. It is up to industry leaders to use it.”

INDUSTRY PERSPECTIVE

“Specifically in the case of Vaca Muerta, one of the main drivers to achieve profitability in this new emerging play is related to costs. When comparing D&C cost in the United States with Argentina, there is still a long way to go. Materializing the massive potential of Vaca Muerta will require an effort from all stakeholders (service compa-

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nies, government, unions, operators, etc.) to dramatically reduce the current costs structure and to gain efficiencies,” declared of Wintershall.

Cooperation among E&P and OFS companies during a time of low international oil prices is especially important, argues Sánchez Zinny of Bolland: “This kind of cooperation is particularly important at a time when E&P companies are seeking to reduce costs due to low international oil prices. To that effect, E&P and oilfield service companies must also work together to reduce costs in a way that generates a win-win approach to both. Some oil companies pressure service companies to reduce prices without engaging in a discussion about productivity. When oil companies ask service companies to reduce their prices without an accompanying increase in productivity, they are in effect asking service companies to reduce their profits or their service level. Pursuing cost reductions through increases in productivity would increase mutual benefits and establish a professional and sustainable relationship between E&P and OFS companies.”

Etcheverry of DLS Archer echoed a similar sentiment about the relationship between OFS and E&P companies: “Although cost reduction is important, DLS Archer will never compromise on safety or performance. Currently DLS Archer is working with Pan American Energy in the south doing all of the drilling for their rigs under a contract. This allows them to focus on leading projects while DLS Archer provides all drilling services, creating a closer connection and more consistent collaboration on developing the highest standards of technology. Working together in this manner is the most efficient and productive for all parties involved, and helps to reduce cost while increasing efficiency.”

Moreover, cost-saving technology can only be useful if the industry allows for its implementation. Thankfully, YPF, as the industry leader, has been highly receptive to the implementation of new technology, as Kuracz of Calfrac illustrates with a comparison to Mexico and Pemex: “The relationship between OFS companies and a fully state-owned, national oil company (NOC) like Pemex tends to be more

rigid, and the NOC might resist change related to, for example, the implementation of cost-reducing innovations. Calfrac has seen that in Argentina, the relationship between OFS and YPF and other E&P companies has been flexible enough to optimize costs and change plans when necessary.”

Argentina’s oil and gas industry must find a way to raise productivity in a way that benefits all of the parties involved, which includes national and provincial governments, E&P companies, OFS companies, workers, and unions. Doing so will require all parties involved to debate the issues at hand. On August 20, 2015, the meeting between Governor Martín Buzzi of Chubut and the Cámara de Empresas de Operaciones Petroleras Especiales (CEOPE), the body that represents OFS companies in Argentina, contributed to that debate. Continuing the debate on productivity is especially important at a time when international oil prices may remain low for the short- to medium-term, and when Argentina’s elevated oil price may disappear on a political whim. •

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Petrochemicals

Downstream Looking Up

Much like Argentina's upstream business, the downstream sector and petrochemical industry is on the cusp of promising change. The successful development of the country's unconventional resources could be a game-changer for the petrochemical industry. What is certain is that the upstream and downstream will either sink or swim together. Until now, both have been able to remain afloat thanks to the government's support. The current Gas Plus plan that offers \$7.5 per million BTU to natural gas producers and \$77 per barrel of Medanito crude to oil producers has also sustained downstream and petrochemical players just as much as they sustain upstream players.

Declining oil and gas production has not only hampered the revenues and profits of upstream activities, but has also choked refineries and petrochemical companies from vital feedstock. According to the Instituto Petroquímico Argentino, the production of most natural gas liquids decreased from 2009 to 2013. Ethane production in Argentina decreased by 8%, propane by 10%, and butane by 13%. Argentine winters exacerbate the lack of feedstock for refineries. Households compete with refineries and petrochemical plants for natural gas. Households need it for heating and petrochemical plants need it for producing steam. During the winter, the government has prioritized the need for consumers to heat their homes over the need for companies to power their plants. One foreign, integrated oil and gas company explained that the winters of 2012 and 2013 were especially challenging since they had to use fuels that are less efficient than natural gas, though this year's unusually warm winter partially alleviated this problem.

With declining supplies of feedstock, total petrochemical production fell by 12% between 2009 and 2013, especially in basic and intermediate products. During the same period, a fall of 73% in the export of basic products drove a decline of 53% of total petrochemical exports. And though total imports of petrochemical products declined, the import of basic products increased by 26%.

Argentina has eight petrochemical centers located throughout the country in: Río Tercero, Luján de Cuyo, Greater Buenos Aires, Plaza Huincul, San Lorenzo, Campana (San Nicolás), Ensenada, and Bahía Blanca. Bahía Blanca is the most important petrochemical center in Argentina and one of the most important in Latin America. It is home to some of the most important downstream petrochemical units in Argentina.

In 2013, the five most important refineries by refining capacity in terms of cubic meters per day were YPF (50,800), La Plata (30,000), Shell (18,000 at Dock Sud), Luján de Cuyo (16,800), and AXION (14,000). However, YPF is truly the king of all things hydrocarbon related in Argentina since YPF owns the La Plata and Luján de Cuyo refineries, making it the main petrochemical producer in Argentina. YPF produces benzene, toluene, xylenes mixture, ortho-xylene, cyclohexane, solvents, MTBE, butene-1, oxoalcohols, TAME, LAB, LAS, polyisobutylene, maleic anhydride, methanol and urea. Shell inaugurated its Dock Sud refinery in 1931 and, according to Shell's 2014 annual report, has a crude distillation capacity of 100,000 barrels



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per day (bpd), a thermal cracking/visbreaking/coking capacity of 18,000 bpd, and a catalytic cracking capacity of 20,000 bpd.

Along with Total, Transportadora de Gas del Sur, Refiner, and YPF, Mega is one of Argentina's most important producers of petrochemical feedstock. Mega is a company formed by YPF, Petrobras and Dow to recover and fractionate heavy natural gas compounds. Mega has two plants, one in Loma La Lata and another in Bahía Blanca, both of which are connected by a 600-kilometer, 12-inch wide pipeline that crosses the provinces of Neuquén, Río Negro, La Pampa, and Buenos Aires.

Despite the challenges of increasingly scarce feedstock, Dow Argentina has been making significant investments in its 120-hectare complex in Bahía Blanca, where it produces performance materials and chemicals, as well as performance plastics. In a November 2014 press release, Dow announced that it would invest 450 million pesos to expand the Bahía Blanca facility. The expansion will allow the American multinational to continue supplying increasing Argentine demand for plastics and to boost exports to Mercosur, especially Brazil. The investment is also part of Dow's plan to expand and improve its four polyethylene production units in Bahía Blanca which will involve the introduction of new equipment and technology that will significantly improve the facility's production.

"The chemical and petrochemical industry in Argentina has a bright future thanks to the quality and size of the country's infrastructure, market, technology, an extensive history in hydrocarbons and refineries."

**- Jorge de Zavaleta,
Executive Director,
CIQyP.**



Photo courtesy of GNC Galileo Technologies S.A.

The investment will allow Dow to produce resins in Argentina that the country has been importing and will increase the production capacity of LDPE, HDPE, and LLDPE—products that Argentina's national industry uses to manufacture products related to flexible and rigid packaging, health and, tubing, and industrial and agricultural films, among others.

Three waves of investment have already washed over Argentina's petrochemical industry and the fourth is coming, according to Jorge de Zavaleta, the executive director at the Cámara de la Industria Química y Petroquímica (CIQyP): "The third wave occurred in the late 1990s and early 2000s, characterized by the construction of several new plants that were propelled by the growing supply of natural gas feedstock. Oil refining capacity has remained about the same at about 500,000 bpd for the last 20 to 25 years, which has led to bigger investments in natural gas and natural gas liquids than in oil. The third wave ended in 2003, after which the petrochemical industry enjoyed full production until 2007, when a combination of issues arose. Declining oil and gas production, combined with a series of tough winters, caused petrochemical units to suffer from a shortage of natural gas. Winters after 2007 saw increasing de-

mand for natural gas for household heating and other gas-consuming activities. The government prioritized household consumption of natural gas over the industry's needs for steam and feedstock."

Yet Zavaleta has high hopes for the petrochemical industry in Argentina: "The chemical and petrochemical industry in Argentina has a bright future thanks to the quality and size of the country's infrastructure, market, technology, an extensive history in hydrocarbons and refineries. Importantly, Argentina has a mature hydrocarbon industry with gas pipes connecting all gas fields. Moreover, Argentina has vast unconventional resources that, if successfully developed, would greatly benefit the petrochemical industry."

The 2013 agreement between YPF and Dow speaks to a larger vision about what Argentina may become. Investors already recognize the possibility that Argentina may be home to the world's second shale revolution. However, Miguel Galuccio, president and CEO of YPF, goes further. If Argentina manages to foment a shale revolution and thereby secure feedstock for refineries, Galuccio contends that Argentina may become a regional and global center for petrochemical excellence. Yet that is one big, politically dependent "if." •



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Conclusion

New opportunities place Argentina at a crossroad

Analysts of the oil and gas industry have expressed high hopes for the potential of the future of Argentina's oil and gas industry. "Today Argentina is a net importer of natural gas, though the resources are there to turn that around. If all technically recoverable shale oil and gas resources were economically producible and turned into proved reserves, the oil production horizon would extend to more than 100 years and natural gas production horizon to more than 600 years. That said, Argentina is the only country in Latin America whose rig count has not decreased significantly over the last year, which is a positive sign for the future," stated Maxwell, and Ruiz of Deloitte LATCO.

Grotz, of EY Argentina, expressed similar enthusiasm: "The resources are there. Overcoming Argentina's challenges may take some time, but I am highly optimistic that Argentina's oil and gas industry will see a boom. When that boom will occur is the big question. If companies wait too long to enter, they may lose their chance."

It is difficult to understate the impact that the successful development of Argentina's unconventional oil and gas reserves would have on the country and its economy. Del Campo of Galileo Technologies believes that successfully developing Vaca Muerta "will change the country's energy matrix, with 70% of the energy matrix comprised of natural gas. With natural gas produced from Vaca Muerta, it would make no sense to import diesel or LNG. Argentina could become the main natural gas exporter in the region."

Yet exploiting Vaca Muerta and the rest of Argentina's vast hydrocarbon resources depends on reform, which, for many, is inevitable. October's presidential elections hold the promise that a new administration will foster the kind of regulatory and economic stability necessary to attract the investment Argentina needs. "Argentina will only develop its hydrocarbon potential by adopting market-oriented reform focused on making political institutions and rent regulations more predictable," argued Montamat.

Nevertheless, many oil and gas experts in Argentina are convinced that if the pressure from the business community is not enough to force change, the need to supply Argentine households and firms with reliable energy will be. "Regardless of who wins Argentina's 2015 presidential elections, Argentina's current macroeconomic conditions are so poor that the next president will have to keep incentives for the production of oil and natural gas. It would not be the business community that would motivate a government to enact reform; it will be the economy itself. Argentines will demand more economic growth, which can be achieved by increasing domestic oil and gas production. The growth of the Argentine economy greatly depends on the availability of an affordable supply of oil and gas, which constitute 86.5% of Argentina's primary energy consumption—representing a dependence on hydrocarbons only seen in countries with large oil and gas reserves like those in the Middle East or Venezuela. Certainly the business community will continue to push for change, but it will be consumers who will force the future government to pass reforms that will benefit the oil and gas indus-



Photo courtesy of TAVAL S.A.

try," said Gerold.

The failure to enact reforms that would let the oil and gas industry in Argentina flourish would have grave consequences. "Argentina's economic wellbeing rests on attracting investment to the country. If Argentina does not regain energy self-sufficiency, the country might not have the energy resources it needs to continue growing the economy," warned Saggese of GyP.

Similarly, Montamat cautioned: "If Argentina begins reforming today, the country has the potential to be in a much better position in 10 years. However, Argentina will only develop its hydrocarbon potential by adopting market-oriented reform focused on making political institutions and rent regulations more predictable. If Argentina does not begin reforming today, the country may face inflation with low growth, which would cause serious social problems in the long-term."

Aranguren exhorted: "In October 2015, Argentina has the opportunity to change its reputation in the international community. We need to regain trust from the international community because Argentina does not have enough capital to fully exploit its resources. Argentina will not achieve energy self-sufficiency in the next 10 years by implementing the failed policies of the last 10 years." •

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ARGENTINA

IT IS TIME TO BE UNCONVEN TIONAL

Vaca Muerta is the biggest shale development outside North America. It is becoming the main oil and gas producer in Argentina, offering advantageously competitive oil and gas prices.

YPF is the 3rd largest unconventional acreage holder in the Americas.

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