

Working Paper

ATLANTIC ENERGY FORUM

A new dynamic for Vaca Muerta

**ARGENTINA WILL IMPROVE ATLANTIC BASIN CONNECTIVITY
BY BECOMING A LARGE OIL AND GAS EXPORTER**

A technical, economic and political analysis

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- * Introduction and Brief Summary Analysis: Change of Expectations in Argentina with the Current Administration.
- * The new dynamics of Vaca Muerta will increase Atlantic energy supply and improve Atlantic Basin connectivity.
- * Argentina has sufficient resources to achieve these broad goals.
- * Impact of this Argentine strategic decision on energy flows.
- * This project, now underway in Argentina, has as its focused objectives:
 - To export twice the level of current oil production.
 - To export gas to neighboring countries.
 - To export LNG in growing quantities to Europe, Asia and the rest of the world.

This paper has been prepared for the *Atlantic Energy Forum* to be discussed in the 2nd of three virtual meetings to be on October 31, 2024.

The objective is to present an up-to-date analysis of the trajectory of the new energy dynamics within the Atlantic space as a consequence of Argentina's decision to become a major exporter of oil and gas to neighboring countries, Europe (to help replace Russian gas), China, India, Asia-Pacific and the rest of the world – increasingly, from the present, and over the long run.

Introduction and Brief Summary Analysis: A Change of Expectations in Argentina

Today there are no major energy flows from the Southern Atlantic to the US, Europe, Asia, and the rest of the world except those from Venezuela and shipments of crude oil from the Brazilian pre-salt fields.

In terms of natural gas, the only relevant flow is from the North Atlantic: LNG from the USA to the European Union to replace the gas from Russia that was cut off after the invasion of Ukraine, in the wake of the pandemic, when the energy transition increasingly demanded gas to successfully confront climate change. At the time, Russia was sending to Europe around 650 MM m³/day; and 150 MM m³/day of this was delivered through the Nordstream I pipeline alone. Meanwhile, Nordstream II – at a cost of US\$ 11 billion -- was ready to enter service.

The pandemic paralyzed the world economy, disrupting massive global flows of energy, goods and services. And as soon as flows began to normalize, the unilateral Russian invasion of Ukraine interrupted the peace and integration of the world, at a moment when the major powers seemed to be settling their differences.

All of this has catalyzed “the new world order” that Henry Kissinger has described so well. The rise of China as a major world power has now been combined with a shock to global energy and the world economy as Europe's main sources of oil and gas supply must now rapidly change. This particularly affects Germany, France and Italy; in these costs around 60% of gas supply and a substantial part of crude oil imports have been impacted.

This serious imbalance has affected all of Europe and forced the continent to turn back to coal again, at temporarily, especially during 2022 -- despite the EU's own mandates targeted at controlling global warming and climate change. Even as Europe continued consuming some gas and oil from Russia, the latter "triangulated" through third countries to avoid Western sanctions. Nevertheless, they remained below minimum levels.

The situation worsened with the explosion that disabled both Nordstream pipelines. The problem was partially resolved with growing LNG imports from the US, and the rapid construction of regasification plants in Germany. A number of countries have begun to re-evaluation of their decisions to restrict or close down their nuclear power sectors.

This series of event has significantly raised energy costs for two years, sparked global inflation, and forced the central banks of the G-7 and OECD countries to raise interest rates and slow world economies. One of the results has been a significant delay imposed on the speed of the energy transition.

Due to the lack of gas, several countries, such as Germany, have returned to coal generation and delayed their plans to retire their nuclear reactors. This situation led the EU to request assistance in supply from countries such as Argentina, given the country's capacity to increase gas and oil production for export to Europe to help replace gas previously imported from Russian.

This request was ignored for three years by the previous Argentine government for ideological reasons, as it was aligned with Russia and China, and had already decided to join the BRICS Group.

Although the challenge is technically an energy problem, and not an ideological issue, we know that much of the time the two perspectives are tightly linked for geopolitical reasons. Indeed, that has been the case in this instance.

Coincidental or not, the disruption of these global flows has occurred just as Bolivian gas reserves have rapidly declined, and intra-zone flows to supply Brazil and Argentina¹ have also decreased. Furthermore, gas is a strategic resource for Brazil; domestic supply must be guaranteed at reasonable price, due to the country's high dependence on electricity generated from hydroelectric and renewable energies (a combined 84% of the power matrix), variable sources that increasingly depend on gas as a system balancer.

Argentina has sufficient resources: the new dynamics of Vaca Muerta will increase energy supply and improve Atlantic connectivity

Since June 2013, we have known (from the 2nd Report of the US EIA, entitled "Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations at 41 Countries Outside the USA") that the Vaca Muerta shale basin has 302 Tcf of technically recoverable shale gas resources and 16.7 billion barrels of shale oil. This makes Argentina the second country in the world in terms of abundance of shale gas resources, and the fourth in shale oil.

Eleven years later, Argentina is one of only three countries in the world (along with the United States and Canada) that has sufficient experience to commercially exploit shale technology to produce this "unconventional" oil and gas.

The US developed this technology and began to use it commercially produce shale gas in 2005 and shale oil in 2007. This unleashed the US "shale revolution" that boosted the country's economy, transformed fossil fuel supply and significantly altered the map of world energy.

Together with the Atlantic Basin boom in deep water offshore production, the shale revolution was one of the primary reasons why oil and gas production shifted its center of gravity from the East to the West -- as the Atlantic Energy Forum (AEF) pointed out 10 years ago. In turn, the growth of China, India and other Asian nations began to move a growing proportion of global consumption from the Northern Atlantic to the Asia-Pacific region.

At the height of the shale boom in the US, the Undersecretary of the US Department of Energy, Daniel Poneman, visited Argentina in May 2014. There he publicly stated that Vaca Muerta was a world-class resource, even superior to the Permian basin -- the largest shale formation in the US -- due to the greater productivity of its rock, a likely slower pace of subsequent decline, and a better internal rate of return (IRR). Poneman predicted

¹ Despite Argentina's own enormous gas resources, Bolivia has been gas supplier to the country for more than 25 years.

that “as soon as the Argentines make up their minds, they could reproduce the ‘boom’ of shale production in the US”.

But...it took 10 years for the Argentines to decide.

This finally occurred in December 2023. With the change of government, expectations shifted and the country decided to make the necessary changes in its economy and legislation to generate investment confidence and long-term legal security to induce companies to invest the more than 150 billion dollars that will be needed over the next 10 years in order to convert that raw wealth into economic value.

Ever since, the country has been putting its fiscal accounts and macro-economy in order. The National Congress approved new legislation for a ‘Regime for the Promotion of Large Investments’ (the RIGI Law), which grants legal, exchange, regulatory, labor and fiscal security for 30 years. These values are declared by the law to be “of national interest in constitutional terms”. This makes it impossible for any future government to make legal modifications that affect the “guarantees that the Law grants”, and more difficult to even call them into question.

After more than 20 years of continuous and steep decline, the news is that Argentina has finally decided to reverse course and take advantage of this unique opportunity offered by a world that needs the food and gas that Argentina can provide to combat climate change (while maintaining energy security). And the country is now committed to doing so.

To achieve this goal, it is essential that Argentina has a legal security framework that provides sufficient guarantee to investors that they will be able to withdraw their money with the same freedom as they bring it into the country. With such guarantees, the country can abandon its ideological prejudices, reintegrate into the world economy and become a trustworthy partner again. This requires that inflation and the public accounts be under control, and that the state is made accountable, and not left unrestrained to eye with envy and expropriate private foreign money.

We have understood that this is the only way to promote investments and exports, in a way that will allow for social and economic growth and development, and an improvement in the quality of life of our people. Without any doubt, the promotion of investments to increase production and exports of oil and gas from Vaca Muerta is the best path that Argentina can take to achieve sustainable development, through at least a doubling agroindustry exports. This will require the necessary concomitant investments needed to double oil production, triple gas production and build out the necessary infrastructure for export-- around 150 billion dollars over 10 years.

Argentina's ongoing strategic projects - Impact on energy flows

Argentina has the advantage that most of the major international oil companies -- such as Shell, ExxonMobil, Total Energies, Chevron, Equinor and Petronas -- are already working in the country, and operating in areas in Vaca Muerta, along with the principal national companies such as YPF, Pan American Energy (PAE), Tecpetrol, Vista Oil, Pampa Energy and Pluspetrol. This is truly large and varied group of companies:

collectively, they have announced productive investments of US\$ 9 billion for this year (2024).

This is an enormous challenge, given that they must also build out the additional infrastructure required: (1) to export more than 500,000 barrels of oil per day (including oil pipelines, storage, dock facilities, etc.); (2) the gas pipeline required to export to neighboring countries; and (3) the additional gas pipeline, the LNG plant, the storage facilities and dock installations needed for export of Vaca Muerta LNG to Europe, Asia-Pacific and the rest of the world. This infrastructure will require more than US\$ 50 billion in new investment.

The expectation is that such investment will generate a progressively increasing income over five to seven years and estimated to reach US\$ 70 billion to US\$ 80 billion annually. Together with the additional anticipated income from the expansion of agro-industry, such national gains will be dedicated to overcoming the recurring economic and exchange rate crises that the Argentine economy has suffered over the last 75 years.

To achieve this, Argentina must invest billions of dollars, given that only 6% to 7% of the Vaca Muerta area has been drilled (compared with the Permian where already 67% to 70% has already been drilled). This also implies that **most of the Permian's 'resources' are 'reserves'**, while nearly all of Vaca Muerta is still classified as 'resources' (because they have not yet been 'de-risked').

Argentina is already exporting 29,000 bpd of crude oil to Chile through the Trans-Andean Pipeline (OTA), and around 140,000 bpd through the Atlantic Pipeline (Oldelval) to Puerto Rosales.

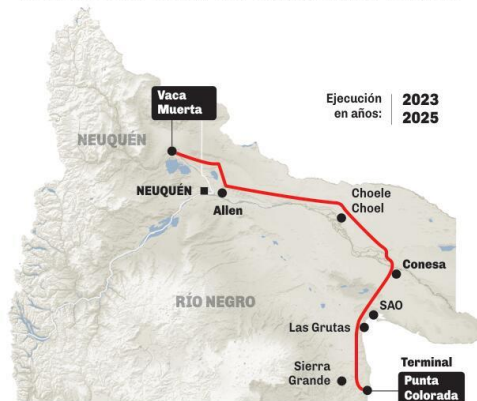


- **To export twice the current oil production**

Argentina must build a new 565 km-long oil pipeline (“Vaca Muerta Sud”) to Punta Colorada, along with new storage, a new energy port on the Atlantic Ocean in the Patagonia province of Río Negro, south of Buenos Aires province.

The country must also complete the already underway doubling of the capacity of the OLDELVAL oil pipeline from Vaca Muerta to the old Floating Terminal of Puerto Rosales on the Atlantic. Finally, the storage capacity expansion of 250,000 m³ (1.6 MM Bls) at the existing facilities of Oil Tank Company must also be completed.

Traza del oleoducto Vaca Muerta - Punta Colorada y Terminal exportadora



RÍO NEGRO Fuente: Informe de YPF, presentado al bloque del FdT.

- **To export gas to neighboring countries.**

There are seven existing gas pipelines to Chile, one to Uruguay and one to supply gas to the power plant at Uruguayana-Brazil.

But a gas pipeline to supply Brazil, the main Southern Atlantic consumer, is missing.

A pipeline from Bolivia has long been the main supplier of gas to Brazil and Argentina; but Bolivia’s producing gas fields are nearly exhausted. Forecasts indicate that Bolivia itself will need to start importing gas from Vaca Muerta as early as 2027 Colombia has also just reported that they will also have to import gas soon.

Consequently, Argentina’s Vaca Muerta is on its way to becoming the Southern Atlantic intra-regional gas supplier.

- **The export of LNG to supply Europe, China, India and Asia-Pacific**



To have the capacity to export LNG to global markets, inside the Atlantic Basin and beyond, Argentina will need to build a 42-inch gas pipeline "ad hoc" to Punta Colorada, where Argentina is also going to build a new modular LNG liquefaction plant (the location of which, it was recently decided, will be at the end of the oil pipeline in Río Negro province).

The first two modules are expected to be two floating (FLNG) vessels, the first of which has been already contracted by PAE with the Norwegian company Golar to begin production in 2027, and the nominated vessel is the FLNG "Hilli Episeyo".

With the necessary infrastructure to export gas to Europe, China, India, Asia-Pacific and the rest of the world, Argentina can emerge as a new player, with the dual role of regional *and* global gas supplier. This prospect arrives 'just in time', as China and India are close to reaching their peak coal demand for generating electricity. Both countries are planning to begin to drawdown their coal use, replacing it with gas in the short term and clean energy (solar and wind generation) in the long term, so that they can also extend and deepen the electrification of their energy matrix.

As a result, after 2030 gas is going to play an increasingly important role in the transition, as gas demand increases beyond what can be supplied by the Russian Trans-Siberian gas pipeline (the maximum capacity of which will be 150 MM m³/day).

Therefore, Argentina may play an important role as an LNG supplier, which is consistent with Argentina's strategic objectives since the change of government on December 10, 2023. This time, the country seems to be serious about its long-term vision.

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