

Natural Gas and LNG Markets

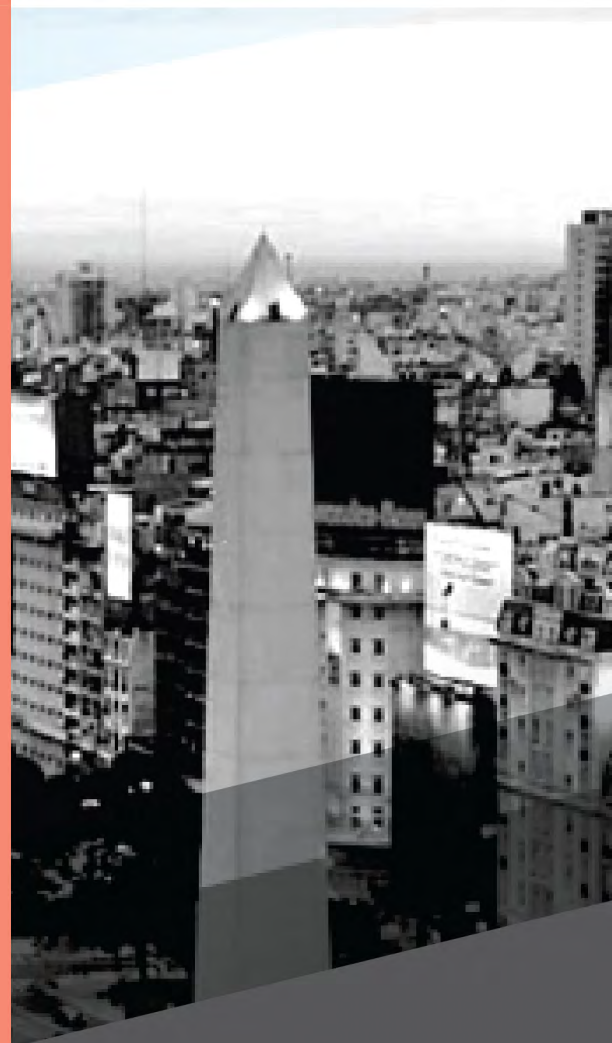
ARPEL Seminar

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EVENTS REPORTS



Event on Natural Gas and LNG Markets

Main Messages

In the framework of the Energy Week organized by OLADE at the Alvear Icon Hotel in Buenos Aires and held December 4-7, 2017, the Seminar Natural Gas and LNG Markets took place on Tuesday, December 5, organized by Arpel with the sponsorship of Compañía Mega and the support of the Association of Industrial Consumers of Natural Gas from Argentina (ACIGRA) and the Argentine Institute of Oil and Gas (IAPG).

One hundred executives and professionals of the energy sector participated in this event, with an outstanding agenda focused on the prospects for supply and demand of natural gas at the global and regional level, and the possibilities of development of different markets, such as the petrochemical or the electricity market. It was organized in six panels, whose conclusions are presented below.

Welcome

Luis Bertrán | Executive Secretary - International Gas Union

Pablo Ferragut | Project Manager – ARPEL

The natural gas scenario in Argentina

Daniel Montamat | Ministry of Energy and Mining of Argentina

Regional and global trends of natural gas and LNG

Tendencias Regionales y Globales del Gas Natural y el GNL

Rafael Huarte | Director - International Gas Union (Moderator)

Roberto Ferreira da Cunha | Director - IHS Markit

Mauro Chávez | Senior Research Analyst Latin America Gas & Power - Wood Mackenzie

Natural gas as industrial and petrochemical raw material

Marcos Sabelli | President - APLA (Moderator)

Alberto Laverán | Business Director - Dow Chemical

Alejandro Fernández | General Manager - Compañía Mega

Ignacio Millán | President - Argentine Petrochemical Institute

Technological trends in the natural gas and petrochemical sector

Jorge Ciacciarelli | Executive Secretary - ARPEL (Moderator)

Darío Guzmán | Senior Manager - KBR Technology

Michael Tallman | Manager of Catalytic Olefins Technology - KBR Technology

Natural gas and electricity generation. The progress of renewables. Competition and complementarity.

Daniel Bouille | Vice President - Bariloche Foundation (Moderator)

Juan Bosch | President - SAESA Energía

Óscar Ferreño | Director - Ventus Energía

Juan Carrasco | Executive Director - CIER

Mauro Soares | Senior Advisor in Renewables - EOS Energía

Main natural gas issues in the region. Conclusions and closing.

David Tezanos | Independent Consultant (Moderator)

Jorge Ciacciarelli | Executive Secretary - ARPEL

Luis Bertrán | Secretary General - International Gas Union

Andrés Schuschny | Director of Studies, Projects and Information - OLADE

Miguel Bolinaga | President - AES Panamá



The natural gas scenario in Argentina

Daniel Montamat, former president of YPF and former Secretary of Energy of Argentina, who now serves as an advisor to the Ministry of Energy of Argentina through a Committee of Experts set up for advisory purposes and whose members are former secretaries of energy, made an eloquent presentation on the current situation of gas markets at the global level and the potential that this represents for Argentina in a scenario of development of the Vaca Muerta formation. **He stated that natural gas is consolidating at the international level, among other things by the revolution of shale gas in the United States, and it is expected to replace coal as the second source of primary energy at the global level by 2035.** Natural gas will directly replace coal for power generation,

natural gas combined cycles being a very competitive alternative in a scenario of energy transition toward a cleaner mix with greater weight of electric transport. **Montamat highlighted that a fundamental characteristic of the gas markets is their increasing flexibility. The rise of LNG as increasingly accessible technology for gas transportation is turning this energy into an increasingly tradable asset**, making markets less captive, allowing more flexible contractual models and making the spot market more important. According to IGU data, the LNG market grew by 5 % in 2016, currently represents 10 % of the global market of natural gas and is expected to continue to grow in relative terms in the coming years.

In the face of this global scenario, he suggested that the region should not miss the opportunity and that energy integration is the key to take advantage of the situation. In this regard, he emphasized on the “three Rs” of integration: Resources in common, networks (“Redes” in Spanish) in common and Regulations in common, the latter being the issue on which more work should be done. In his opinion, the advantage of working on regulations today is that there are many past experiences from which to take the lessons learned so as not to make the same mistakes. He insisted that regional gas and electricity markets should be supported institutionally. He closed his speech referring to Argentina, which has significant advantages to become a global natural gas player. He stated that, in addition to the global scale resources of Vaca Muerta, there is also a mature and developed industry that has mastered the technology of extraction of unconventional. On the other hand, he said that Argentina must decide whether to focus on the domestic, the regional or the international market, which will ultimately make the investment and the massive development of Vaca Muerta feasible, estimating that it should lower prices at a level of \$3/million Btu to be competitive at the international level.

¹ IGU (2017) World LNG Report

Regional and global trends of natural gas and LNG

The panel moderator was Rafael Huarte of the International Gas Union (IGU), and speakers were Roberto Ferreira da Cunha of IHS Markit and Mauro Chávez of Wood Mackenzie.

Roberto Ferreira da Cunha highlighted that LNG prices continued to be low after the commissioning of new liquefaction infrastructures, mainly in the United States and Australia.

One of his most important remarks was that in an increasingly integrated and liquid global market, **the marginal price of gas in the United States will be the score of international prices in the long term**, which poses challenges to the competitiveness of the countries of our region.

He forecasts an annual growth in demand of 3 % in the Southern Cone and new market dynamics with many more possible flows of gas than before. This rapid growth in demand is a challenge from the supply side, which must adapt quickly, with the development of LNG infrastructure being a possibility.

Mauro Chávez, in turn, presented projections for the Southern Cone and highlighted some strategic issues of the regional markets dynamics.

In addition to the situation of Argentina, as detailed below, he presented a challenging scenario for Bolivia as a supplier of Brazil and Argentina through pipelines, in a projection of increasingly competitive prices of LNG. The extension of the Bolivia-Brazil pipeline contract to face reduced import requirements of Brazil until 2023 and the eventual development of the Vaca Muerta formation will present major challenges for Bolivia, as natural gas is the main export product and source of tax revenues.

With regard to Argentina, he highlighted that while the productivity of Vaca Muerta is good, it is necessary to reduce the logistics costs.

The most significant conclusion for Argentina is linked to the fact that **in a scenario of large-scale development of Vaca Muerta, the capacity of the domestic sectors would not absorb this production**,



with an excess supply mainly in the summer, which may affect investment decisions.

Such a dynamic growth of demand is not expected mainly due to two facts: on the one hand, the residential demand will be adjusted after the changes in rates and, on the other hand, the demand for electricity generation will not grow at a great pace, as the new electricity demand would be covered by renewables.

In view of this situation, he suggested two commercial solutions: renegotiating the take-or-pay agreement with Bolivia to cover the seasonality of the demand for gas in Argentina, with an eventual premium price for winter in counterpart, which could be a win-win situation, and sending surpluses to

Chile, for which certain regulatory challenges should be overcome. He also mentioned gas storage as an alternative technological solution, which would help to manage the natural gas balance with seasonality. In addition, he highlighted that seasonality in Argentina is off-season, with a higher demand when LNG is cheaper (summer in the Northern Hemisphere) and vice versa, which also generates opportunities for complementarity with the global market. Nonetheless, he stressed that the estimated price of U.S. LNG in Argentina is \$5/million Btu, which poses a strong challenge to the competitiveness of Argentinean gas. The development of Vaca Muerta would also have other effects, as it would alter the geography of the gas production, with an impact on infrastructure needs.

The main challenges identified for Argentina are:

- How to reconcile unconventional renewables and natural gas
- How to integrate the Argentine market to the region
- How to deal with oversupply and seasonality
- What infrastructure is required to support increased production





Natural gas as industrial and petrochemical raw material

The panel was moderated by **Marcos Sabelli**, President of the Latin American Petrochemical and Chemical Association (APLA), and speakers were Alejandro Fernández, General Manager of Compañía Mega, Alberto Laverán, Business Director of Dow Chemical, and Ignacio Millán, President of Argentine Petrochemical Institute.

Marcos Sabelli began by introducing the current scenario, referring to the importance of the petrochemical industry in everyday life and in the economies of the countries of the region. In this regard, he stated that **96 % of the products that we use are, to a greater or lesser extent, petrochemicals**, and this brings efficiency and sustainability to the current way of life, ensuring its dynamism. With regard to the economic importance of the petrochemical sector, he said that it is estimated that it represents 7 % of the GDP in Latin America, around 300 billion dollars, and the market is estimated to grow 2.4 % per year.

He stated that, at the global level, some changes have arisen in the market over the past ten years, among which is the fact that the demand that was formerly concentrated in China, today begins to be significant also in India and Latin America. In terms of installed capacity and raw materials, which were concentrated mainly in the Middle East, China and

the United States appear today as key players. Finally, he stressed that technology is increasingly specific.

In this scenario, Latin America is a region where raw materials are in surplus, yet products are in deficit. While petrochemical imports amounted to 100 billion dollars in 2015, exports were 35 billion.

Considering the opportunities of availability of raw materials resulting from the eventual large-scale development of the Vaca Muerta deposit, he stated that there is potential to develop the petrochemical sector, following the United States shale model. Gas-based petrochemicals are a way to monetize natural gas liquids and add value to the development of unconventional.

On the other hand, **Alejandro Fernández** of Compañía Mega, raised the issue that **no one can doubt that there are world class resources in Vaca Muerta, so that in Argentina there is no longer a crisis of supply, but a paradigm shift; the challenge for the development of Vaca Muerta lies in being able to boost demand**. He suggested that the Argentine demand is highly seasonal, with a residential market that is concentrated in four months of the year and an electricity market that is concentrated in eight months, and that the petrochemical or industrial market can offer a firm demand throughout the year.

As outlined in the initial panel, he agreed with the first panel that **neither the domestic market nor the electricity market can meet the required demand for natural gas for Vaca Muerta to become a global scale development with potential for the industrial and petrochemical sector, which could be the following stage of development of this formation.** It is clear that industrial sectors consider their investments in long-term horizons in view of the high sunk costs, so it is necessary to have a firm and constant availability of gas for a long time.

One of the challenges identified in Argentina is the need to support the development of the midstream sector, that is to say, the infrastructure for trunk line transportation of new deposits, and gas treatment and liquid separation plants.

This requires clear rules and providing more flexibility to companies like Mega to develop their investment decisions, because although today certain investment requirements are identified, they cannot be carried out due to legal restrictions established, for instance, by the Hydrocarbons Law.

For his part, **Alberto Laverán** of Dow Chemical agreed that **Argentina has today a demand problem and that, with the existing production, costs are not competitive at the international level because the necessary economies of scale are not reached.** It is necessary to be able to increase production levels in

order to expand petrochemical investments. Although he said that there would be potential in Argentina for the development of world-scale petrochemical trains, such investments are not very flexible and, depending on their characteristics (product, technology), they range from 1.5 to 6.0 billion dollars.

On the other hand, Marcos Sabelli said that supply problems are more common than demand problems in the industry.

Alejandro Fernández closed the panel stating that unconventional deposits cannot be adapted easily to seasonality, and therefore, it is necessary to develop export markets. For this purpose, Mega should grow in the midstream sector; however, there are also commercial tools that are used successfully in the world (such as time swaps) and not standardized in the Southern Cone, which is an issue to work on at the regional level.



Technological trends in the natural gas and petrochemical sector

Michael Tallman, Manager of Catalytic Olefins Technology of KBR Technologies, presented the technological advances that are being made to take advantage of the natural gas liquids. He stressed that after the revolution of shale gas in the United States, there was a resurgence of ammonia production, given the availability of cheap methane gas. On the other hand, he explained that U.S. shale fields are generally “wet,” so there are sufficient quantities of C2 or higher (ethane, propane, butane, pentane, etc.) hydrocarbon molecules to be exploited economically by the petrochemical industry.

Taking **IHS data** as a source, he stated that the installed capacity of ethylene thermal cracking units will increase by more than 10 % globally in the next five years, the United States being the place where it will grow the most. He also presented the challenges posed by the expected demand for fuels, and a catalytic cracking technology for olefins, which allows processing olefin, paraffin or mixed raw materials, resulting in high production yields of propylene, ethylene and by-products of gasoline rich in aromatic compounds, using units and technologies known as FCC.

Natural gas and electricity generation

The moderator of the panel on natural gas and electricity generation was Daniel Bouille, Vice-President of the Bariloche Foundation, and speakers were Juan Carrasco, Executive Director of the Commission for Regional Energy Integration (CIER), Óscar Ferreño, Director of Ventus Energía, Mauro Soares, Senior Advisor in Renewables of EOS Energía, and Juan Bosch, President of SAESA Energía.

Daniel Bouille made a presentation on the global scenario of electricity generation and, mainly, the advancement of unconventional renewables. His presentation was followed by a panel discussion on the complementarity and the competition of these sources with natural gas.

- The high growth of demand for electricity in South America, both in installed capacity, energy and consumption per capita, as well as percentage of population served.
- He stressed that, with the exception of some countries, new and renewable sources of energy still represent a low percentage of the electrical matrix of the region.
- He recalled the high investment needed in the next 15 years, if the rate of growth in the last quarter of the century is maintained.

Finally, he invited the speakers to reflect on the different mechanisms used to promote renewables.

Juan Carrasco stated that the long-term perspective is that the demand for electricity continues to grow at a rate of 2 % - 3 % annually, which represents a doubling of the generation needs approximately every 20 years. In addition, it is expected that urbanization will imply increased requirements of electrification in view of the need to improve the quality of air in the major cities. On the supply side, he stated that thermal generation will maintain current levels in relative terms, that unconventional renewables will grow, and that the share of the hydraulic source will be decreasing in view of the current difficulties to make new investments in this source.

Óscar Ferreño took the view that in the long term we

will have a 100 % renewable energy system and that natural gas is the bridge, but that it will be shorter than expected.

He stressed that **technology is maturing and some myths about unconventional renewables are being dispelled, among them, those that considered that they provide poor quality energy**, are expensive and do not provide firm energy. Experience has shown that it is good quality energy, that prices offered in tenders are competitive and that, by combining energy sources and taking advantage of their complementarities, it is possible to reduce significantly its variability and availability with a systemic approach. Technology will also allow better management.

Mauro Soares stated that the energy equation changed in Argentina, since there is a virtually infinite availability of natural gas, and that the future will be marked by a combination of natural gas and renewables for generation, which are two mature, proven and desirable technologies from the point of view of efficiency and environmental impact. The current challenge is to regulate the new opportunities from the demand side, such as distributed generation or self production, as this entails major challenges for the current business models, in particular for the transmission and distribution segments.

With regard to renewable energy markets and auctions, it was stated that trust is a key aspect in long-term contracts and that the market has matured toward a system of open tenders in which the price is set by the market and the regulator sets the needs of installed capacity and generation. This is much more efficient than incentive systems such as feed-in tariffs (regulator determines price and market determines quantity,

which can generate outperformance). In addition, attention was drawn to the differences between the cash flows of investments in renewables or natural gas, where variable costs are virtually negligible in the first case, so they end up being financial businesses. Complementing their presentations, the panelists commented on some additional questions proposed by the moderator, such as the importance of storage and their expectations in this regard, market mechanisms or the most appropriate advocacy tools to promote renewables, any existing conditions, the circumstances or variables that explain the dispersion of prices observed in the region, the issue of tenders and reckless bids, and the implications of advances in distributed generation.

The panel concluded that the trend toward electrification and renewables is irreversible because there is a need to move to a more efficient system in which there will be changes in technology and business models, in other words, a paradigm shift in the energy markets.



Final panel and conclusions

The moderator of the closing panel was David Tezanos, former manager of gas and energy of YPF and former controller of Enagas, and speakers were Luis Bertrán, Secretary General of IGU, Andrés Schuschny, Director of Studies, Information and Projects of OLADE, Miguel Bolinaga, President of AES Panamá, and Jorge Ciacciarelli, Executive Secretary of ARPEL.

In the introduction, **David Tezanos** said that **in order to take a quantum leap in the levels of development and generate genuine savings and investment, Latin American countries should not think dichotomously about the different energy sources such as natural gas or renewables, but that it is necessary to have all sources developing at the same time, which implies an effort by all the players, both public and private, and a comprehensive and regional vision of the energy sector.**

On the other hand, **Luis Bertrán** raised the issue of **the role of natural gas in the energy matrix of the**

future, not as a transition fuel, but as a fuel with a major role in a sustainable energy matrix, both from an environmental point of view and from the dimensions of access to energy and energy security. He highlighted the advantages of natural gas as the cleanest fossil fuel with lower CO₂, sulfur, nitrogen and particulate matter emissions, in addition to being compatible with the development of renewables, with all that this implies for climate change and air quality in cities, one of the main problems of public health today. He concluded that the development of natural gas can improve the quality of life, bring prosperity to Latin American countries and help to alleviate energy poverty; however, the region must overcome certain challenges such as recovering the production levels to supply a growing demand, improving energy integration and reaching a price of gas that is competitive, while at the same time attract investments and develop the domestic supply.

Andrés Schuschny of OLADE emphasized the role of natural gas in the energy mix and placed special emphasis on the issues of sustainability.

For his part, **Jorge ARPEL Ciacciarelli** focused **on regional integration as a fundamental pillar for the development of natural gas in the region, which is currently required for the development of investment in the upstream sector** as it will provide

flexibility and stability to demand, ensuring a cash flow able to repay investments. **At the global level, there are successful business models of integration that should be applied in Latin America, such as the gas swaps or exchanges of gas for finished products (petrochemicals or electricity);** however, certain regulatory barriers should be overcome, and this requires all stakeholders working together.

Conclusions

The natural gas and LNG market is increasingly flexible and liquid, and prices are expected to remain low for a long time, with the impact this has on the competitiveness of the countries of the region.

The new paradigm of the gas market in Argentina is that strong challenges exist in the development of demand to mitigate the possible scenario of oversupply of natural gas and its negative impact on investment and the development of Vaca Muerta.

Regional integration is vital for Argentina in order to expand markets and leverage the necessary investments in the upstream sector.

Flexibility in certain regulations in the Argentine market would allow the development of necessary investments in the midstream sector.

The petrochemical industry is a demand sector that could provide a strong market for natural gas, but the sector needs a boost and political decision for its development.

Renewables are still gaining ground for the new electricity demand, but natural gas will continue to offer the necessary firmness and flexibility in the energy system for many years, and is today the most viable option to gain efficiencies.

The vision of the energy sector cannot be dichotomous, but should consider the development of all the sources and demand sectors for this to bring economic development to the countries of the region.



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REGIONAL ASSOCIATION OF
OIL, GAS AND BIOFUELS SECTOR COMPANIES
IN LATIN AMERICA AND THE CARIBBEAN

ARPEL is a non-profit association gathering oil, gas and biofuels sector companies and institutions in Latin America and the Caribbean. Founded in 1965 as a vehicle of cooperation and reciprocal assistance among sector companies, its main purpose is to actively contribute to industry integration and competitive growth, and to sustainable energy development in the region. Its membership currently represents over 90% of the upstream and downstream activities in the region and includes national, international and independent operating companies, providers of technology, goods and services for the value chain, and national and international sector institutions.



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