

An overview on Argentina Energy Market

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Abstract. *The article presents Argentina energy market. It is made an overview on legal framework, regulatory authorities and transport and distribution system for electricity and oil and gas sector. Finally it is presented the today market of energy and renewables sector. Argentina's energy landscape is a dynamic tapestry woven with various legal frameworks, regulatory authorities, and transportation and distribution systems for electricity and oil and gas sectors. The country's energy market, encompassing both conventional and renewable sources, presents a compelling narrative of challenges and opportunities. Navigating the complexities of Argentina's energy market requires a comprehensive understanding of the legal framework, regulatory landscape, and transportation and distribution systems. The interplay of conventional and renewable energy sources further adds to the dynamic nature of the sector. As Argentina strives to secure a sustainable and affordable energy future, it will need to address the challenges while capitalizing on the opportunities that lie ahead.*

Keywords: *Argentina energy market, Argentina's energy market regulatory authorities , Argentina energy mix, Argentina electric grid, Argentina oil and gas transport and distribution networks*

JEL classification: K32, L94, L95

Introduction

The energy is today a resource which sustain almost all human activity. It is considered by some authors as the main resource which assure economic growth (Georgescu-Roegen 1971). There is a strong interdependence between gross domestic product and energy consumption both in developing and develop countries (Soytas and Sari, 2003; Sari and Soytaş, 2007; Lee, 2007).

Energy represents an important factor for national growth for the countries which are producers and a very important constraint for the countries who import it.

In Argentina the energy sector was vertically integrated since 1991. Due to lack of proper maintenance the electricity system experienced a major crisis in 1988-1989. After the crisis, the government of Carlos Menem introduced a new legal framework for the electricity sector through Law 24,065, which included the following elements: vertical and horizontal unbundling of generation, transmission and distribution; opening up of all segments to the private sector; and separation of the regulatory function from policy setting.

The new introduced reforms attract investment in sector which lead to increase with about 75% of the generation.

In the same time investment was done in order to repair and to extent the transmission and distribution networks which lead to increase of efficiency and quality of electricity transport and distribution.

Literature review

International Energy Agency in its 1999 “Regulatory reform on Argentina’s natural gas report” focus on reform on gas sector and tries to show the successful results of them which lead to increase of efficiency and the decrease of the unit costs.

Recalde et al. (2015) in “Limitation for renewable Energy Development in Argentina”, published in 2015 make an overview of renewable energy development and their integration in electricity market, focusing on the reasons which prevent them to have a better absorption.

Asociación del Personal Jerárquico del Agua y la Energía (APJAE), in Privatization of energy in the Argentine Republic- Losses and gains as seen by a trade union, published in (Hall, 2005) present Argentina energy privatization with its problems and achievements. Datla A. in “Integrating Renewable Energy in Argentina” published in 2019 under Harvard Kennedy School supervision present the evolution of renewable energy starting with 2016 when that represents less than 2% of country’s energy mix and its estimation of reaching about 20% until 2025 the possibility of their integration in Argentina electricity market.

Siboldi et al. (2020) in “Electricity regulation in Argentina: Overview”, published in 2020 present the domestic electricity market, the companies involved in energy production, transmission, and distribution. It is presented the laws involved, the regulatory authorities, the condition it must be fulfilled for authorization and operation and as well the sale-purchase conditions for energy.

Irastorza et al. in “The once and (perhaps) future Argentine electricity market” published in 2021 present the electricity market, its beginnings, problem which this market faces and authors suggestion to overpass them.

International Energy Agency in its World energy outlook special report -Argentina energy profile, 2023 make a short presentation of based on data starting with 2010 to 2021 and the prediction until 2050 of country’s most important energy indicators like primary energy supply, trade of main energy and non-energy products, recent policy developments, major infrastructure project, energy consumption, electricity and fuel generation and demand.

Argentina's energy sector is governed by a comprehensive legal framework, including the Electricity Market Law No. 24,424 (1993) and the National Gas Market Law No. 24,546 (1996). These laws establish a competitive market structure and define the roles of regulatory authorities such as the Ente Nacional de Regulación de la Electricidad (ENRE) and the Ente Nacional de Regulación del Gas (ENARGAS) (Gutiérrez-Gutiérrez & López-Pita, 2018).

Argentina's electricity transmission and distribution systems are managed by Transener and Delfin, respectively, while the natural gas transmission network is operated by TGS and TGN, and the distribution system is managed by numerous regional companies (Gutiérrez-Gutiérrez & López-Pita, 2018). These networks play a crucial role in delivering energy to consumers across the country.

Natural gas dominates Argentina's energy mix, accounting for approximately 50% of primary energy consumption, followed by oil and hydropower (Gutiérrez-Gutiérrez & López-Pita, 2018). Argentina faces challenges in balancing its reliance on imported natural gas with its domestic production capabilities and environmental sustainability goals.

Argentina possesses abundant renewable energy resources, particularly wind and solar, offering promising opportunities for diversification and sustainability (Lema et al., 2020). The government has implemented incentives such as tax breaks and preferential tariffs to promote renewable energy investments, leading to significant growth in the sector (Lema et al., 2020).

Argentina's energy sector faces challenges in addressing declining domestic production, aging infrastructure, high reliance on imports, and the need for increased investment in renewable

energy (Lema et al., 2020). Simultaneously, the country presents opportunities in renewable energy development, shale gas and oil exploration, and potential for energy efficiency improvements (Gutiérrez-Gutiérrez & López-Pita, 2018).

Argentina energy market legislations

Electricity market

Until 90's Argentina electricity system was mainly owned by the state with poor results regarding energy availability and quality,

Based on Laws No. 23,696 (State Reform Law), issued in 1989, and No. 24,065 (Electricity Regulatory Law, issued in 1992) the state launches a privatization program in order to increase quality and efficiency of energy supply.

The National Regulatory Commission for Electricity (ENRE) adopted a guideline framework, for energy supplied which lately was implemented by all provinces. As result, the electricity regulatory framework aims to:

- Promote competition.
- Encourage investments.
- Reduce the rates paid by final consumers.
- Protect consumer rights.
- Improve the quality of service.
- Promote efficiency, reliability, and open access.

(Siboldi et al, view April 2023 on <https://ca.practicallaw.thomsonreuters.com>)

Oil and gas markets

The national oil and gas sector was assured by a national state-owned company named YPF SE which owned the exploration and production rights in the hydrocarbons fields. After YPF SE privatization in 90's the system was organized into exploitation concession and exploitation permits given by Federal Government.

In 2012, the national regulation for exploitation concession and permits become not attractive to internal and foreign investor, which lead the abrogation of deregulated regime and expropriation of 51 % of YPF SA. (Bomchil, 2022- A general introduction to oil and gas law in Argentina view on April 2023 on <https://www.lexology.com>)

The result was dramatic, Argentina losing the self-sufficiency on hydrocarbons market.

Realizing the enormous legislative mistake, the administration changes the policy and taxation in order promote new investment in industry.

Energy market regulatory authorities

Electricity market

The regulatory aspects considered to evaluate power quality service directly, affect the results of power systems performance. Among the inherent characteristics, it can be verified whether the service is public or private, how many utilities exist, and the influence of international companies. In addition to these points, it is worth highlighting issues related to the existence of service quality metrics, the level of consumer satisfaction, the amount of investments in the network, the profit achieved by the utilities, initiatives aimed at research, and the dissemination of data on the performance of distributors. The search for this information aims to obtain an overview of the

electricity distribution sector in South America, to highlight similarities, differences, and peculiarities between the analyzed countries, focusing on the quality of electricity (Delavechia et al, 2023).

Argentina regulatory framework is mainly formed by the bellow acts, collectively known as the Electricity Regulatory Framework (ERF)):

- Law No. 15,336 (enacted on 20 September 1960),
- Law No 24,065, which implemented the privatization of government-owned companies in the electric power sector and unbundled the industry vertically into generation, transmission, distribution and demand. Law No. 24,065 also reorganized the WEM based on the guidelines in Decree No. 634/91.
- Decree No. 186/95, which introduced the concept of WEM (wholesale electricity markets) participants, including traders (defined as a company that is not a WEM agent but trades electric power in bulk).

Secretariat of Energy, a subdivision of Ministry of Productive Development represents main governmental body involve in energy regulation.

A set of regulatory provisions called the Procedures for the Programming of Operation, Dispatch and Price Calculation were issued through Resolution No. 61 of 29 April 1992. The Procedures have since been amended, supplemented and extended.

(Siboldi et al, view April 2023 on <https://ca.practicallaw.thomsonreuters.com>)

Oil and gas markets

According Argentina national constitution, the subsoil resources like hydrocarbons are belonging to the state and provinces until they extracted. That means state / provinces has full authority to award rights for the exploration, development and exploitation of the resources (exploration permits, exploitation concessions and association agreements with state-owned companies) and is the enforcement authority in connection with these awards and contracts (law 17,319- The hydrocarbons Law).

Secretariat of Energy, have an under-secretariat specifically devoted to oil and gas is the Under-Secretariat of Hydrocarbons.

There are separate regulators for gas and oil, each of them acting according Hydrocarbons Law and by provincial legislation and regulations.

Transport, system operators and the distribution system

Electricity sector

The coordination of the energy transmission, supply and demand of Argentine interconnected system is assured by the national operator called CAMMESA.

In order to build a new transmission unit, it is necessary to be approved by local transmission company, CAMMESA and ENRE.

CAMMESA also overlooks over wholesale electric market transactions and together with ENRE approve connection to transmission grid.

The distribution to the electricity consumers it is made by public utility companies authorized by provincial authorities.

Oil and gas sector

Natural Gas Law 24.076 (1992) establish that natural gas transportation system is state monopoly organized under ENERGAS.

There are licensed 2 transport operators (Transportadora de Gas del Sur (TGS) and Transportadora de Gas del Norte (TGN)) covering 9 distribution zones. (Figure 1)

Off – system private pipelines coexist with the monopoly, but they are used for export operations.

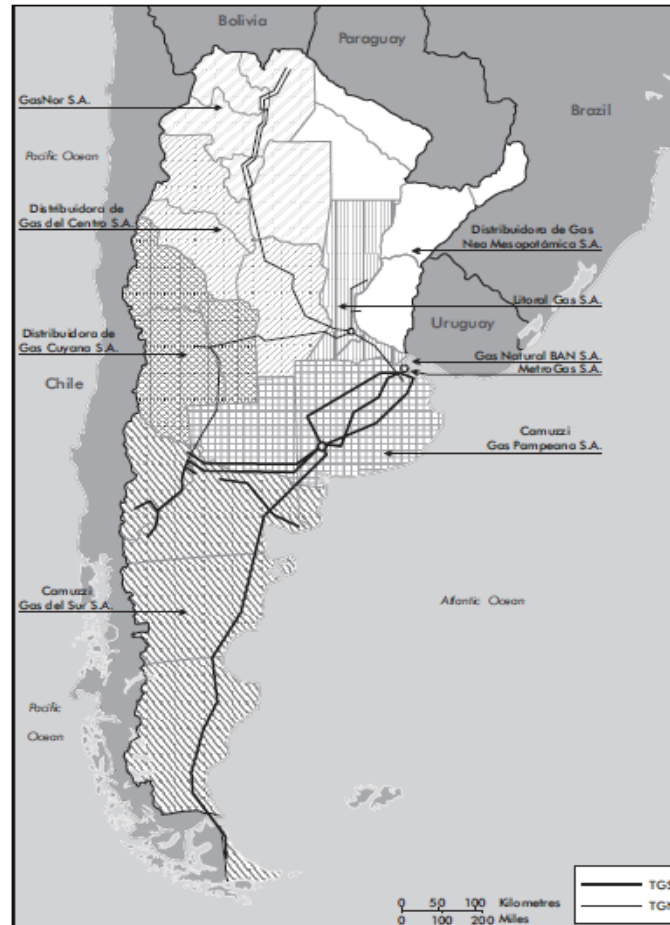


Figure 1. Map of Argentine Gas Transmission Infrastructure

Source: OECD/EIA.

Today market

The main sources of electricity generation are thermal, hydroelectric and nuclear. The total installed capacity of the WEM as of December 2019 was 39,704MW, as follows (see table 1 and figure no.2):

- Thermal: 24,545MW (61.8%).
- Hydroelectric: 10,812MW (27.2%).
- Nuclear: 1,755MW (4.4%).
- Renewables: 2,592MW (6.5%).

Table 1. Argentina Energy Mix

Source	%	Production (MW)
Thermal	61.8	24,545
Hydropower	27.2	10,812
Nuclear	4.4	1,755
Renewables	6.5	2,592

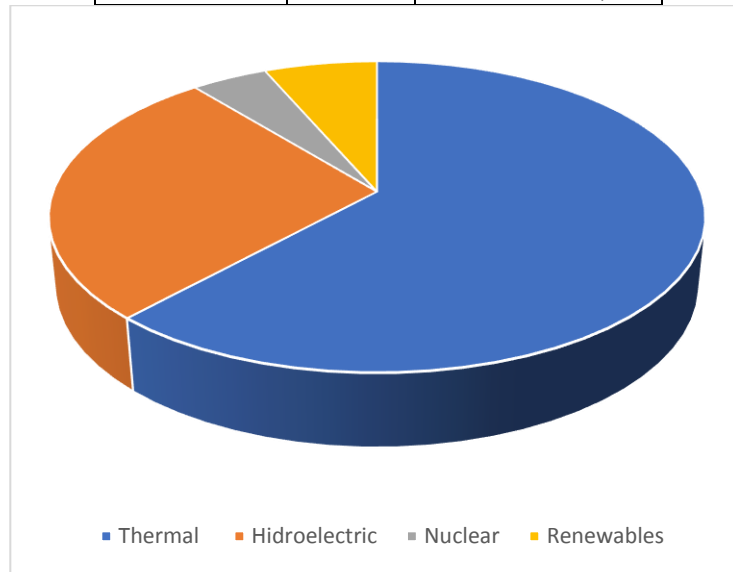


Figure 2. Argentina Energy Mix graphic

Source: own calculations.

Fossil fuels

Fossil fuels are the main source of electric generation in Argentina.

Nuclear fission

There are currently three nuclear power plants in Argentina:

- Atucha I.
- Atucha II.
- Embalse Nuclear Power Plant.

Trading between generators and suppliers of electricity market

CAMMESA is the dispatch operator in charge of the technical and commercial transactions in the WEM and is the entity responsible for traded electricity.

There are two competitive ways of trading electricity in the WEM:

- The Futures Market, which allows market participants to enter into long-term PPAs.
- The Spot Market (an hourly market with prices established by the rules of supply and demand), where the generators can declare to CAMMESA the costs involved in generating electricity. CAMMESA then dispatches the offers required to supply the spot demand, starting from the lowest declared cost for electricity generation, until the demand is met. The declared electricity costs of the last generation plant dispatched determine the price on the Spot Market. There is also a Stabilization Fund to moderate fluctuations of the Spot Market over time (reviewed every quarter).

Electricity trading is regulated by the Procedures for the Programming of Operation, Dispatch and Price Calculation, which in turn are enacted by the Secretariat of Energy). (Siboldi et al, view April 2023 on <https://ca.practicallaw.thomsonreuters.com>)

Electricity price and conditions of sale for the Final Consumers

The end consumer receives an invoice which includes the costs of generation (determined in a competitive market), transmission and distribution. Transmission and distribution costs are established by tariffs set by the relevant authorities (transmission at the National level by ENRE and the provincial regulatory bodies for distribution).

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Renewables industry forecast

Argentina has vast resource availability to generate a significant part of its electricity from renewable sources, for example:

- The southern provinces have one of the strongest and most constant onshore wind resources in the world (about CF50%).
- The northern provinces have the highest solar radiation levels in the world, comparable to the Atacama Desert in Chile (CF>30%).
- The country has resources for biomass, mini-hydro (<50MW) and geothermal generation. (Siboldi et al, view April 2023 on <https://ca.practicallaw.thomsonreuters.com>)

The installed capacity of renewable energy has been growing for the last four years. Consequently, the level of production is likely to increase. According to information from CAMMESA, in June 2020, CAMMESA covered 8.7% of the national demand with renewable energy.

CAMMESA reported a remarkable growth in renewable energy generation from 2011 to 2019, increasing from 1,403.2 GWh (2011) to 7,811.5 GWh (2019). By June 2020, 4,533.33 GWh of renewable energy had been generated.

The latest data published on the website of the former Government Secretariat of Energy indicates that, from January 2016 to October 2019, 57 new renewable energy projects started commercial operations (with an approximate installed capacity of 1,744MW).

Renewable energy targets

The targets for the percentage of renewable energy were set in 2016 as follows:

- For 2018, the target was 8% of the total installed capacity.
- For the period from 2019 to 2021, the target is 12% of the total installed capacity for 2019, increasing by 2% for each following year.
- For the period from 2022 to 2025, the target is 17% of the total installed capacity for 2022, increasing by 1% for each following year.

The total installed capacity generated from renewable energy is expected to grow from 3 GW in 2018 to 10 GW in 2025

Government policies/incentives

In order to promote renewable energy, it was included in wholesale energy market system and also stimulates and preferential subsidies price was offered.

Law No. 27,191, published in 2015, provides that renewable energy should account for at least 20% of the total electricity consumption by 31 December 2025, and 35% by 31 December 2030. To reach the 2025 target, about 10,000MW of electricity from renewable energy sources

must be incorporated into the Argentine Interconnected System, which would significantly reduce greenhouse gas emissions and bring new investments.

To promote renewable energy, Law No. 26,190 was adopted in December 2006. This approved the national promotional regime for the use of sources of renewable energy destined to electric production (Promotional Regime). Sources of renewable energy under this system include:

- Wind.
- Solar.
- Geothermal.
- Tidal.
- Hydraulic (hydroelectric power plants up to 30MW).
- Biomass.
- Landfill gas, sewage-treatment plant gas and biogas (except for the uses under Law No. 26,093 on biofuels).

Law No. 26,190, as amended by Law No. 27,191, also establishes a system of investment for the construction of new plants intended to generate electric power from renewable energy sources, which will remain in force for ten years from its enactment (that is, until 2025).

This system incentivizes individuals and legal entities to invest in renewable energy generation projects with the approval of the regulator. The electricity must be delivered to the WEM.

Law No. 27,191 seeks to establish a legal framework to increase investments in renewable energies and encourage electricity generation diversification (increasing the renewable sources ratio). (Siboldi et al, view April 2023 on <https://ca.practicallaw.thomsonreuters.com>).

Conclusions

Argentina's energy market is undergoing a period of significant transformation, driven by a complex interplay of challenges and opportunities. The country's reliance on natural gas, aging infrastructure, and need for increased renewable energy investment pose significant challenges. However, Argentina's abundance of renewable energy resources, potential for shale gas and oil development, and supportive government policies present promising opportunities for a sustainable and secure energy future.

As Argentina navigates this transformation, it will need to address the challenges while capitalizing on the opportunities to ensure a reliable, affordable, and environmentally responsible energy supply for its citizens. Key areas of focus include:

i) Diversifying energy sources:

- Promote renewable energy development by providing incentives such as tax breaks, preferential tariffs, and streamlined regulatory processes.
- Encourage investment in renewable energy technologies, such as wind turbines, solar panels, and energy storage systems.
- Explore the potential for shale gas and oil development, ensuring adherence to strict environmental regulations and community engagement practices.

ii) Modernizing energy infrastructure:

- Upgrade aging electricity transmission and distribution networks to improve efficiency, reduce energy losses, and enhance grid stability.
- Develop smart grid technologies to enable real-time monitoring, demand response, and integration of distributed renewable energy sources.

- Expand natural gas transportation networks to support increased renewable energy integration and provide access to energy resources for underserved regions.
- iii) Promoting energy efficiency:
 - Implement energy efficiency standards for buildings, appliances, and industrial processes.
 - Provide incentives for consumers and businesses to adopt energy-efficient technologies and practices.
 - Launch public awareness campaigns to promote energy conservation behaviors.
- iv) Enhancing regulatory frameworks:
 - Streamline regulatory processes to reduce bureaucratic hurdles and expedite project approvals.
 - Create a more stable and predictable investment environment by minimizing regulatory risks and ensuring transparency.
 - Establish clear and consistent regulatory frameworks for renewable energy, shale gas and oil development.

By addressing these challenges and seizing the opportunities, Argentina can transition towards a sustainable and secure energy future that supports economic growth, environmental protection, and societal well-being. The country's abundant renewable energy resources, untapped fossil fuel potential, and supportive government policies provide a solid foundation for this transformation.

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