

3. Argentina: From an Energy Stalemate Towards Shale Gas Expansion and Creating a Renewables Market



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After years of stalemate, attracting investment in the energy sector to mitigate electricity shortages and meet rising demand are top priorities for Argentina. To this end, the new government has established main goals of increasing shale gas production and fostering renewable energy deployment and development while drastically reducing energy subsidies. However, investments in renewables and unconventional gas are highly capital intensive and require long-term guarantees, while Argentina still lacks international financial trust. To recover financial trust, the current administration is seeking international agreements with the main financial institutions as well as the US and the EU.

General challenges for the energy sector in Argentina

High inflation and interest rates, scarce access to credit lines, a highly indebted public sector and lack of trust in the state have frustrated all kinds of initiatives to develop renewables, energy efficiency or shale gas. In addition, a powerful fossil fuels sector, shaped in the past and consolidated through a host of special advantages (e.g., non-targeted subsidies to maintain the electricity tariff households and industry), has contributed to low investment in renewables and energy efficiency. The electricity mix is strongly dominated by thermal plants (63.3% of total demand) fed mainly by natural gas (69%), oil (28%) and some coal (3%) (CAMMESA, 2016). National production of these fuels was insufficient to meet demand, so the government began importing fossil fuels in 2006. Despite the growth of imports, electricity shortages have worsened over the years, leading to frequent power outages. Increasing fossil fuel imports and state subsidies to maintain electricity and heating

tariffs below market prices have financially squeezed the public sector. This has constrained innovation capacity within the energy system and had negative macroeconomic consequences. According to CADER (2015), in 2014 the state spent USD ten million on diesel fuel, liquid natural gas and fuel oil imports to generate electricity through thermal plants. In 2015, the share of renewable electricity generation, excluding hydropower, was 0.4 percent, which corresponded to an installed capacity of 201 MW, mostly in wind power and some photovoltaics (PV). Large-scale hydropower continues to be an important source of electricity (30.3%), but its share in the electricity mix has decreased since 2001 (CAMMESA, 2016) as there have been no new investments in the sector. Regarding primary energy supply, in 2012 fossil fuels contributed almost 88 percent (including 54% natural gas), while the contributions of hydro and nuclear power were about four percent and two percent, respectively. Biodiesel, bagasse, wood and bioethanol amounted to five percent (Jimeno, 2015).

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With a highly indebted public sector and the need to increase electricity supply, facilitating a return to international capital markets after a 15-year ban on capital market transactions and stimulating investments in power generation capacity were seen as urgent priorities when the Macri administration was elected in December 2015. To this end, the government implemented macroeconomic changes, such as reaching a financial agreement with international creditors, and implemented key energy sector reforms, including reducing energy subsidies and adopting cost-reflective tariffs. Immediately following the election, the new administration reduced subsidies in the electricity sector while retaining subsidies for the lowest-income households under the so-called social tariff. The increased tariffs provoked heated debate in the country; nevertheless, the government upheld the decision and announced that, in mid-2016, it would implement additional subsidy reductions for natural gas – the principal fuel for heating, electricity generation and transport. Subsequently, in June 2016, the Ministry of the Economy reduced subsidies for natural gas but had to limit tariff increases following resistance from the trade unions, certain governors and opposition political parties. Despite the introduction of these limits, residential users mounted a legal challenge to the increased gas tariffs in the household sector. The Supreme Court temporarily suspended, by unanimous decision, the increase in gas tariffs for residential users, though not for companies or corporations.

Main trends in shale gas and nuclear energy

The new administration upheld the state's support for shale gas and nuclear energy. The exploitation of the Vaca Muerta shale gas reservoir in Neuquén province constitutes one of the most significant initiatives to expand local generation capacity. For policymakers, the emerging shale industry has the potential to reverse the decline in Argentina's conventional gas production and meet its increasing energy demand, while potentially enabling the country to regain its position as a fossil fuel exporter. To achieve these

goals, the former and current governments have implemented tax reductions and exemptions as well as higher prices for unconventional oil and gas produced domestically (Gonzalez & Martinez, 2016). Accomplishing these objectives still faces a number of challenges. Annual investment of about USD eight billion is required for drilling and well completion, along with financial security and a stable regulatory framework (World Oil, 2016).

In the case of nuclear energy, the National Commission for Nuclear Energy has signed an agreement with the German consortium TECNA-Siemens, to advance the construction of CAREM, a prototype small modular reactor designed in Argentina that was promoted by the former administration (Mining and Energy Ministry, 2016). The prototype might eventually be followed, in 2021, by a larger (100 MWe or 200 MWe) version, located in the northern Formosa province at the border with Paraguay. Although the proposal has not yet progressed beyond preliminary discussions, public protests have already taken place in Paraguay. The government has also confirmed the decision to extend the life of Embalse, a nuclear plant in operation since 1984.² Nuclear power accounted for 4.8 percent of electricity demand in 2015 (CAMESA, 2016).

Renewable energy deployment

Argentina has enormous potential to develop renewable energy. There are several attractive sites, due to the low cost of land and very high solar irradiation and wind speed (CADER, 2015). The greatest potential for solar energy occurs in the northwest region and Cuyo, where solar irradiation is approximately 1.8–2.2 MW/h/m² annually (Righini & Gallegos, 2011). Wind speed in the Patagonian region and in the central provinces averages 10 m/s with a capacity factor higher than 35 percent (Energías Sustentables, CREE). At the same time, electricity consumption has increased continuously since 2003 due to economic recovery and highly subsidised electricity tariffs (Haselip & Porter, 2010). The installed capacity would have to at least double by the year 2035 to

² Argentina owns three nuclear power plants, Atucha I, Atucha II, and Embalse. Atucha I is the oldest (operational since 1974), whereas Atucha II was commissioned in 2014.

meet predicted demand even with the implementation of energy efficiency policies (EEA 2030, 2015). Although energy needs and potential are very high, these difficult financial conditions and fossil fuel path dependencies have hindered investment in renewables and energy efficiency measures.

The new administration began to encourage the development of renewable energy, aiming to increase electricity generation capacity and open a new market that had previously been marginalised. On 31 March 2016, the government enacted Law 27191 establishing renewable energy goals for the coming years: Electricity consumers should meet eight percent of their demand through renewable energy, other than large hydropower, by the end of 2017, and 20 percent by 2025. Following this, the government issued a complete regulatory framework for renewable energy (the RenovAr Program), that sets the conditions and tax incentives for the calls for tenders and for FODER, the newly created renewables funding regime. Under RenovAr, tender rounds covering wind, solar PV, biomass, biogas and small-scale hydropower are foreseen. The first round tendered 1 000 MW of renewable energy, but the government received offers for 6 366 MW, mainly wind and PV. Offers will be allocated in November 2016. FODER constitutes a fund to guarantee the payment fulfilment and ensure compliance with the power purchase agreements signed between the winning projects and the national electricity market administrator (CAMMESA). The decision to implement FODER has been crucial to rebuilding investor confidence in the country's renewable energy policies and for increasing legal security, one of the main barriers to project development (German Solar Association & eclareon, 2015). The government has underwritten the fund by issuing treasury bills amounting to USD three billion in addition to USD five hundred million already issued by the World Bank for the same purpose (Decree 882/2016 & RenovAr Program Round 1, 2016). Another significant component of the new regulatory framework is that independent power producers are allowed to commercialise the renewable electricity directly with large consumers.

Parallel to RenovAr, the government launched the second phase of the Renewable Energy in the Rural Market Project, a call for tenders for about 6 500 off-

grid systems to be installed in rural and isolated areas. The project has been running since 1999, aiming to support off-grid installations in areas without electricity access. It should be noted that five percent of the population does not have access to electricity, representing nearly two million people living in dispersed rural areas (German Solar Association & eclareon, 2015). About USD 58.2 million was invested in the first phase of the Renewable Energy in the Rural Market Project, with 70 percent from the World Bank and the Global Environmental Facility, and the rest from the national government, provincial funds and private investors (AHK, 2013). When the Renewable Energy in the Rural Market Project I was concluded in 2012, 27 422 households and more than two thousand schools were supplied through individual PV and wind systems as well as through mini grids. Additionally, it provided solar thermal energy systems to public service institutions (PERMER, Ministerio de Energía y Minería). The objectives of the second phase of the Renewable Energy in the Rural Market Project, issued in 2016, are not only to supply electricity to households and public service institutions but also to productive micro-enterprises (PERMER call for tender, 2016).

As of October 2016, the Deputy Chamber is debating a law to support self-consumption in the residential sector through distributed generation of renewables. It is considered highly likely that these distributed residential installations will initially be supported through a feed-in tariff, shifting in later years to a net metering mechanism (Villalonga, 2016).

A large project specifically within the solar sector is the Solar Cluster, located in Jujuy, a low-income northern province. The Solar Cluster was planned within the framework of the Plan Belgrano, a project to develop infrastructure linked to poverty mitigation in the northern areas. The plan expects to receive financial support from the World Bank Group, Inter-American Development Bank and Corporación Andina de Fomento (CAF: Development Bank of Latin America) (CADER, 2016).

Energy efficiency

As electricity tariffs have increased following subsidy reductions, the government has shown interest in

promoting energy efficiency. A few energy efficiency bills have been proposed and are currently under discussion. The Argentine Fund for Energy Efficiency (FAEE) is in place, with the purpose of providing credit lines to small- and medium-sized companies that present investment projects aimed at reducing their energy consumption.

International energy cooperation strategy (in preparation)

International cooperation strategies for the energy sector have still not been clearly defined by the new administration, as it has been in office for less than one year. The government has instead focused on the internal problems within the national electricity system. Nevertheless, it is possible to observe a departure from the approach of the previous administration. The government is seeking to re-establish the relationship with the United States and the European Union, confirmed by the first visits to Argentina by US and French presidents in almost two decades, and the visits by President Macri to the European Council, Germany and France (Télam, 2016a; La Nación, 2016; The White House, 2016).

Since one of the country's main priorities is to attract national and foreign investment to expand electricity generation capacity, the international agenda has focused on establishing agreements with international financing institutions and multilateral banks. According to an expert on Argentinean energy policy, electricity supply shortages are not only an energy problem, but also a great difficulty for the sustainability of the entire economy, including both macro and microeconomics (Recalde, 2013 in Jimeno, 2015). This explains the efforts of the Macri administration to obtain financial support from the principal investment banks such as the World Bank Group, Inter-American Development Bank and the Development Bank of Latin America for the electricity and infrastructure sectors.

The World Bank plays a significant role in both the RenovAr and Renewable Energy in the Rural Market projects. Under RenovAr, a World Bank fund guarantees payment by the national electricity market administrator to renewable projects. Its role is also crucial for phase II of the Renewable Energy in the Rural Market Project (CADER, 2016). In October

2015, the World Bank agreed a loan to the Argentinean Government amounting to USD two hundred million to support the implementation of phase II through the Energy Ministry and the provinces (Loan Agreement, 2015).

Regarding climate change, the Macri administration declared its commitment to tackle climate change at COP21, as a first demonstration of the country's changing position. Following presentation of the Third Communication on Climate Change and the respective Intended Nationally Determined Contributions (INDCs) in October 2015, the Argentinian delegation at COP21 fell under the mandate of the outgoing Kirchner administration. Subsequently, the new government elected in December 2015 sent national deputy and former Green activist, Carlos Villalonga, to join the delegation and to announce Argentina's transition to become more closely aligned with the fight against climate change (Earth Journalism Network, 2015). This change in Argentina's position was confirmed by its ratification of the Paris Climate Change Agreement on 20 September 2016 (Télam, 2016b). Argentina is thereby committed to revise its intended nationally determined contributions (INDCs) and increase its ambition to reduce its greenhouse gas emissions. Revision of the INDCs should be completed before 2018 (Villalonga, 2016).

Additionally, following the visit of President Obama to Argentina at the beginning of 2016, the US and Argentina committed to cooperate on scaling-up renewables, including through US assistance on electricity market reform, system optimisation and integration of renewable energy within the power grid. The countries will carry out further work through the United States – Argentina Binational Energy Working Group and the State Department's Power Sector Program (The White House, 2016).

Argentina is a member of the International Renewable Energy Agency (IRENA), having signed the Statute on 26 January 2009. Argentina was among the first South American countries, together with Uruguay and Ecuador, to become a member of IRENA.

Since the second half of the 2000s, the country has been involved in international cooperation in the nuclear energy sector. In 2010, Argentina and Russia signed the first nuclear cooperation agreement on the

possibility of using Russian technology in the country, and in 2015 both governments signed a framework agreement to cooperate in constructing small-scale power plants, with Russian financing. In June 2012 the government signed a nuclear cooperation agreement with China, to conduct studies for a fourth nuclear power plant financed by China, and to transfer fuel fabrication and other technology. Subsequently, the Argentinean state-owned nuclear utility (NASA: Nucleoeléctrica Argentina SA) and the China National Nuclear Corporation intensified their cooperation, including operations and technology. In line with this agreement, the parties are also considering a joint strategic partnership to develop nuclear reactors in Latin America, under which Argentina would become a technology platform to supply Latin American countries with nuclear technology incorporating Chinese goods and services. In November 2015 NASA signed a commercial contract with the China National Nuclear Corporation to build Argentina's fourth nuclear plant, and an agreement for a further reactor. The projects are worth USD fifteen billion, and China will finance 85 percent of the costs. In June 2016 a further agreement was signed with the China National Energy Administration, confirming these arrangements and specifying early 2017 and 2019 for the construction (World Nuclear Association, 2016). In the nuclear field, the Macri administration is more focused on cooperation with China than on advancing the agreements with Russia.

With regard to fossil fuels, Argentina aims to regain its position as a fossil fuel exporter by developing its shale gas resources. For that purpose, in 2013, YDF, the state-owned oil and gas company, began to sign joint ventures with the large foreign oil companies Chevron, Petronas and Dow Chemicals. It is continuing to look for further partners on shale projects (Forest, 2015). According to IHS Markit and Platts (2016), there is still a concentration of several large operators in Vaca Muerta, whereas the country needs a large number of smaller and newer companies to expand its shale production and become a net exporter. Argentina has agreed with the US to promote safe and responsible development of unconventional gas and oil resources, including improving environmental outcomes, through the Unconventional Gas Technical Engagement Program and the United States – Argentina Binational Energy Working Group (The White House, 2016).

Best practices for a global transition towards sustainable energy?

So far, Argentina's energy policy may be an example of exactly what countries should not do in order to develop a sustainable and healthy energy system. Regarding the emerging policy development in renewables and energy efficiency as well as electricity tariff reform, it is too soon to observe best practices for other countries.

The lessons that can be learned from the Argentinean experience relate to rural electrification. In Argentina, a small fraction of the population still lacks access to electricity. In 1999 the Renewable Energy in the Rural Market Project started to address this problem in two provinces, being quite successful in the sense that it has been extended to several provinces and has lasted over time, now entering a second phase. This has been mainly due to the involvement of the private sector for the provision and maintenance of the electricity service, unlike in many other countries (CADER, 2016; GNESD, 2016). Furthermore, this model of competition has allowed the reduction of subsidies required for the electrification of rural communities (GNESD, 2016).

In addition, the Argentinean experience shows that the intervention of the national government in the electricity market creates an incentive for voters to make ever-increasing social demands, expecting low-priced and subsidised energy, and for the government to meet these demands. This political mechanism of reproduction may engender a path dependency in the electricity system, thereby becoming especially difficult for private actors to invest in new innovative sources such as renewable energy or energy efficiency (Jimeno, 2015).

Nevertheless, recent policy changes within the renewable sector, and the decision to reduce electricity subsidies, confirm that, even if the previous institutional setting of the electricity system constrained the development of renewable energy in the past, politics is not static. Although it is still not possible to confirm whether policy changes will be effectively introduced, it can be observed that the window of opportunity has already been opened and several conditions are in place to drive a path change in the electricity system.

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