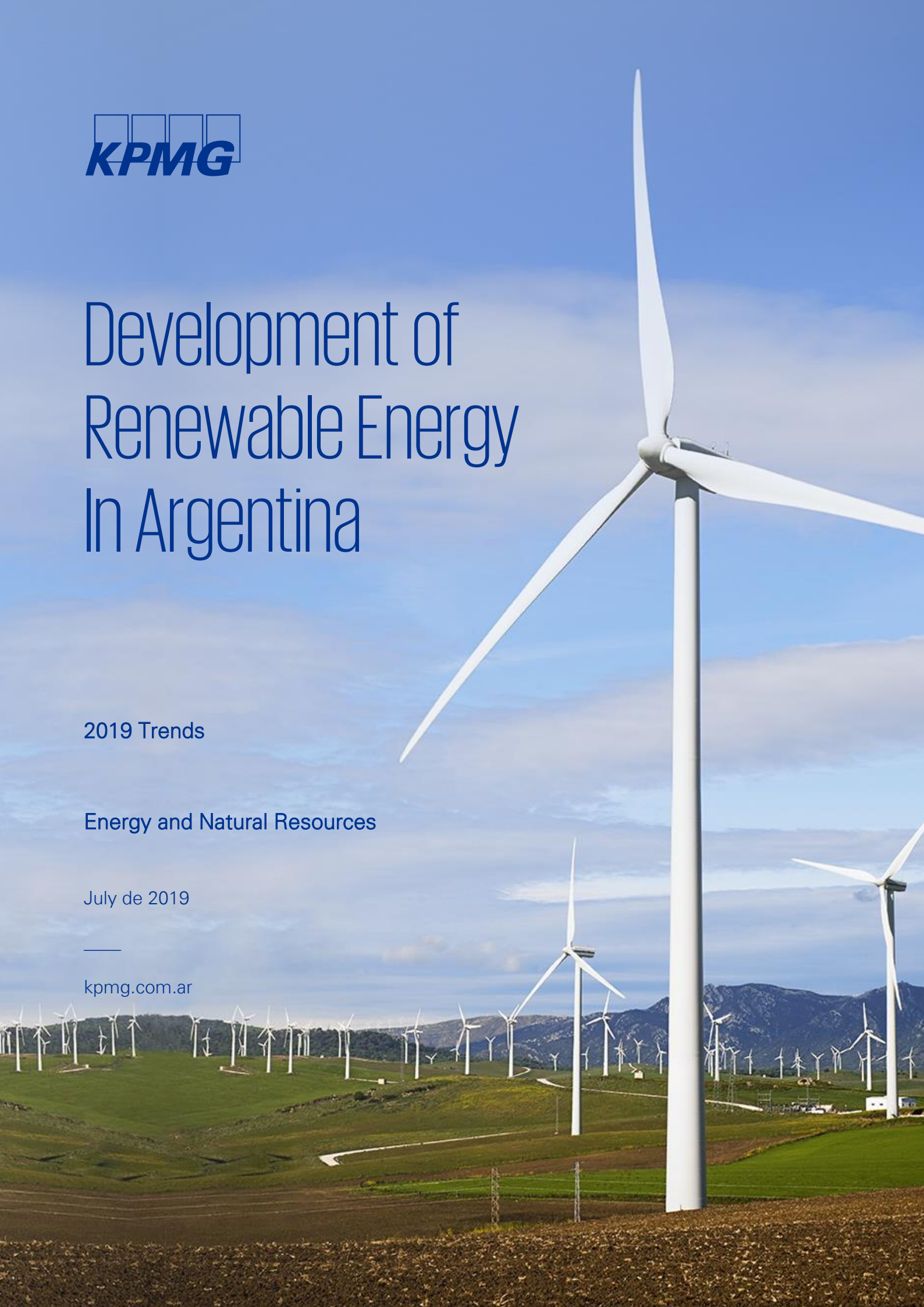

Development of Renewable Energy In Argentina

2019 Trends

Energy and Natural Resources

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Towards a renewable matrix

Renewable Energy (RE) share in the local energy matrix shows a slight increase. In 2018, it reached 4% of the total generating capacity. Although the current economic scenario is complex, the measures taken by the Government and the agenda of the sector offer good prospects for the development of these sources of energy and for the convergence with Law No. 27191.

Introduction

As explained in the report on renewable energy for 2018 (KPMG, 2018)[1], the incorporation of new sources of clean energy generation[2] into the energy matrix is still a matter of global interest not only because of their increasing importance as a business opportunity but also due to the harmful or detrimental effects of the progressive use of fossil fuel-based thermal or conventional sources on the environment. Although global investment in renewable energy had slowed down in 2016, mainly due to the drop in the costs associated with projects and the lower pace of investments in leading countries, such as China and Japan, the trend showed a change again in 2017. Indeed, in 2016, global investment had amounted to approximately US$ 330 billion, which accounted for a decrease of 8% compared to the total amount invested in the prior year; however, by the end of 2017, the levels recorded in 2015 were recovered, and global investment reached US$ 360 billion (+10%). Furthermore, the trend towards an increased renewable power generating capacity seen over the last years continued to strengthen during 2017 and 2018. While in 2016, renewable capacity added had reached 161 GW -recording a total global power capacity based on renewable energy of 2,017 GW-, in 2017, it was 11% higher (178 GW), thus accounting for an increase of 9% and recording a global renewable power capacity of 2,195 GW[3].

Out of the total renewable power reached in 2017, 50.8% was contributed by hydropower (-3.5 percentage points compared to 2016), 24.6% by wind power (+0.4 p.p.), and 18.5% by solar power (+3.3 p.p.), while the remaining 6.1% was distributed among bioenergy and geothermal and seawater energy. In general, according to the Renewables Energy Policy Network for the 21st century (REN21)[4], total renewable power capacity doubled in the decade 2007-2017, and the capacity of non-hydropower renewables (i.e. bioenergy or wind, solar, and geothermal energy, among other sources) increased more than six-fold.

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[1] "*Evolución de las Energías Renovables en Argentina*", KPMG in Argentina, March 2018.

[2] *Therefore, the group of energy derived from biofuels, biomass and waste, as well as energy resulting from geothermal, wind and solar sources and hydropower dams (≤ 50MW). In this paper, it is used as a synonym of Renewable Energy (RE).*

[3] *"Renewables 2018: Global Status Report"*. Renewables Energy Policy Network for the 21st century (REN21), 2018.

[4] *"Renewables 2018: Global Status Report"*. Renewables Energy Policy Network for the 21st century (REN21), 2018.

During 2018, in turn, although global investment in renewable energy showed a new decline compared to the prior year, it exceeded US$ 330 billion, well over the average recorded in last decade. Moreover, countries continued to show a preference for clean energy over fossil fuel-fired energy sources; therefore, renewable energy is still the energy source with the highest share in net additions to global power generating capacity. Regarding leading regions in terms of clean energy investments, China still ranks first, closely followed by the United States, Japan, India, and Germany. Most of these countries implemented renewable energy support policies to attract investment, develop employment levels, foster innovation, encourage greater flexibility in energy infrastructure and support the development of enabling technologies such as energy storage. In addition, state support has been fundamental to implement and develop this type of technologies, mainly through tax exemption and reduction policies, the granting of subsidies to reduce implementation costs, and the implementation of government programs involving public work bids for the development of these sources (e.g. the RenovAr program currently carried out in Argentina).

At the local level, it was not until the last years that Argentine renewable energy sources started to grow, mainly after 2015, with the enactment of Law No. 27191 (National Promotion Regime for the use of Renewable Sources for Electric Power) and the implementation of the RenovAr program in 2016. As a result, sound foundations for the true development of these sources have been built, taking into account foreign investors' interest in participating in the different bid rounds and the higher number of ongoing and under-construction projects.

Accordingly, this document is aimed at showing the journey that Argentina has made so far in the development of new energy sources, and the gradual evolution of total installed capacity (power or energy generating capacity) as well as the different issues faced by the sector due to the poor economic performance and the climate of uncertainty shown in a year in which the different political forces will participate in the electoral contest to run the country since December 2019.

I. Recent implementation of RE in Argentina

Law No. 27,191, passed by the Argentine Congress in 2015 with the aim of promoting power generation from renewable sources, specifically sets the goals to be attained in terms of renewable energy share in the electricity matrix and the period within which such goals are to be attained. Although the aforementioned law stipulated reaching 8% participation of renewable energy sources by the end of 2018, 12% in 2019, and 20% in 2025, the current economic situation, together with other external factors, make it difficult to achieve these goals.

Since the second quarter of 2018, the Argentine economy started to show certain signs of deterioration and, by the end of the year, it recorded a decline of 2.6% in GDP. The poor performance of the agribusiness sector, which faced the worst drought in the last 50 years, and its impact on the manufacturing industry and exports were determinant of such situation. Other critical factors include the devaluation of the peso against the dollar (which by the end of 2018 had averaged $ 1/US$ 38, accounting for an increase of 70% with respect to 2017), alongside the high interest and inflation rates (which discouraged investment and caused a sharp drop in wages in real terms that impacted consumption levels, respectively) and the government's decision to carry out a program to reduce public spending (mainly in terms of public investment in capital formation) with

the objective of regularizing accounts, eliminating the primary fiscal deficit and mitigating the distorting impact of monetary issuance on the prices. However, notwithstanding the domestic economic performance, the US Federal Reserve Board's decision of increasing the reference interest rate (in September 2018) and the increase in the country risk (which exceeded 700 basis points in December 2018) constitute other two major obstacles for investments, mainly due to the exorbitant cost they represent for external credit. In effect, besides the corruption events involving public works occurred during the 2003-2015 period -a situation that became widespread in early 2018 as "the corruption notebooks scandal"-, those two obstacles accelerated the government's decision to suspend the ambitious investment program for public work development under the public-private partnership (PPP) model in December 2018 and until otherwise stated. This had a direct impact on projects of vital importance for the energy sector (such as the projects for the renewal and extension of the national power grid, which today represents an obstacle for the new generating sources), and indirectly raised some doubt about already awarded RE projects under construction and the continuity of the RenovAr plan, which in 2019 will call for a third round of bids that would involve, in principle, 400 MW of additional power.

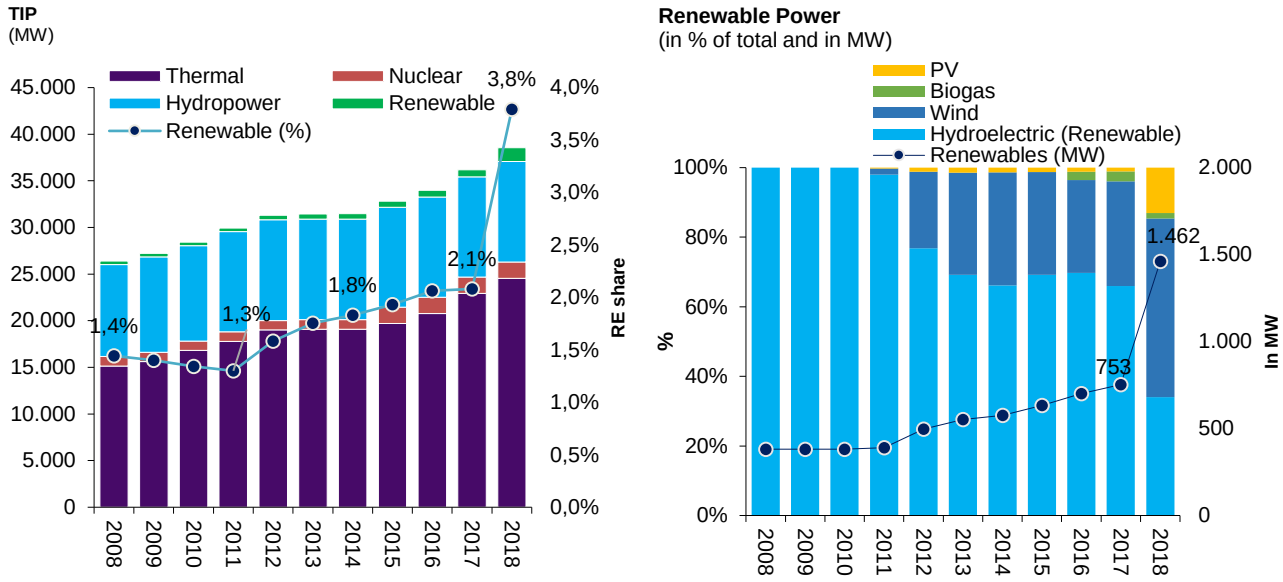
It is worth noting that, despite the increasing difficulties encountered, the RenovAr program, key to the implementation of Law No. 27,191, has managed to attract investors' interest. Indeed, this is supported by the data arising from the three rounds called. While in the first round 29 projects were awarded, which were aimed at adding around 1,142 MW to the total installed power, in the two following rounds (1.5 and 2), the number of projects awarded grew to 118 (+3,324 MW), exceeding official expectations. Overall, until the last round called (2017) under the RenovAr program, the number of projects aimed at generating clean energy reached 126, accounting for approximately 4,600 MW of additional power. At present, there are 30 operating power plants (11 wind, 10 photovoltaic, 5 biogas, 3 biomass, and 1 hydropower power plants), and 96 projects under construction, out of which between 60 and 70 are estimated to be completed during 2019[5].

In this framework, the share of renewable energy in the local electricity matrix (or in the total installed power) reached 4% in 2018. Although the goal set by Law No. 27191, which required four additional percentage points (i.e. 8%), was not reached, the growth recorded over the last two years (2017-2018) was above 90%, and renewable energy supply went from 753 MW (i.e. 2% of the total installed power) to 1,462 MW (4%), which represents a radical change in the traditional electricity matrix and a significant achievement (see *Figure No. 1*). For 2019, in turn, the law requires that 12% of renewable energy sources be reached, a goal that could be attained if most of the projects under construction become operative. However, once again, this goal appears difficult to attain taking into account the progress made so far and the obstacles presented, among other factors, by the economic situation and the current infrastructure conditions, mainly the power grid, which is now collapsed and needs to be extended if returns are to be brought on current and future renewable energy investments.

[5] "*¿Cómo está el programa RenovAr tras el vendaval del 2018*?", Ámbito.com, March 18, 2019.

Figure No. 1

Evolution of the Total Installed Power (TIP) and RE share 2008-2018



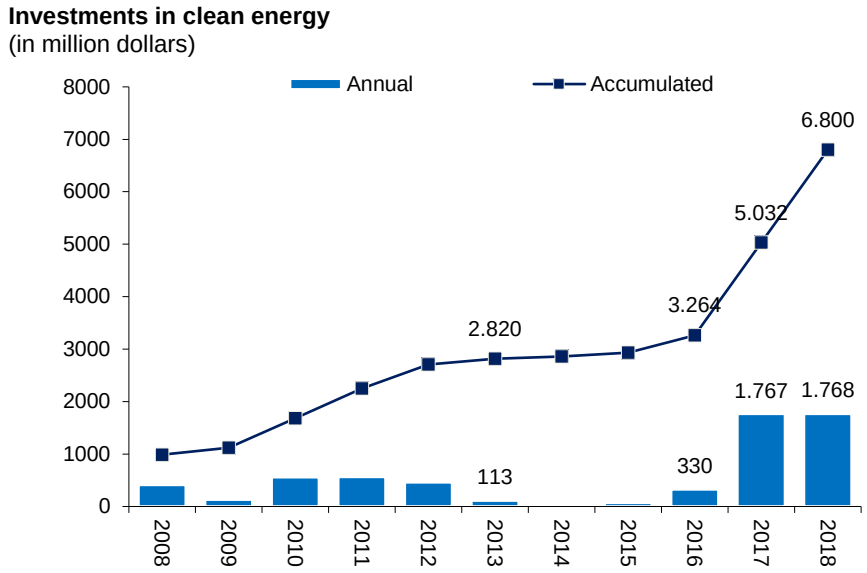
Prepared by us based on CAMMESA's data, 2019

Until a few months ago, the set of initiatives related to the expansion of the power transmission network had been suspended as a result of the discontinuance of the PPP investment program. However, such program has been recently re-launched by the government with the objective of calling a bid for the most expensive project in the energy sector: the construction of the extra-high-voltage transmission line (500 kV) between the substations of Río Diamante (Mendoza) and Coronel Charlone (Buenos Aires)[6]. Although the rush to improve the energy infrastructure is not in line with the conditions to boost such improvement, this event could be an important change in the trend if, as expected, awardees manage to overcome the obstacles to access financing posed by the high interest rates, the country risk and the unavoidable consequences of the corruption notebooks scandal, which are still not fully visible to date (this is the reason why many financial institutions still consider that the risk of financing public works is high, thus reducing the possibilities to obtain financing for this type of projects).

[6] It is the first of a series of projects conceived by the government to extend the capacity of the power transmission network, which is aimed at building over 3,000 km of high-voltage transmission lines. This first initiative provides for a construction phase of 3 years, with a cost of up to USD 700 million (including both public and private investment).

Figure No. 2

Evolution of annual and accumulated investment in clean energies in Argentina 2008-2018



Prepared by us based on Bloomberg New Energy Finance, Climatoscope, 2019.

Figure No. 2 shows the evolution of clean energy investment for the 2008-2018 period. As it may be seen, it is not until 2016, with the launch of the RenovAr program, that investments in this type of energy sources started to show a change of trend. In effect, between 2015 and 2016, the annual amount invested by the companies that had been awarded the different projects under the RenovAr program grew by 350%, and reached an accumulated amount of over US$ 3.2 billion. A further growth was recorded in 2017 with rounds 1.5 and 2 of the RenovAr program, taking accumulated investment to over US$ 5 billion. Although accumulated investment shows a new growth in 2018 as a result of ongoing projects (~US$ 7 billion), this was not a good year, since due to the different factors that affected economy, as explained above, no new rounds were conducted under the RenovAr program, some of the projects awarded were sold to third parties (which led to a secondary market for the sale of initiatives), and the deadlines for the completion and subsequent commissioning of works were not met.

Despite the foregoing, the third round under the RenovAr program is expected to take place in 2019. As previously explained, such round of bids is aimed at awarding 400 MW of additional power in medium-voltage networks[7] for projects with a maximum power of 10 MW (350 MW for wind and solar projects, which will compete for quotas and prices in the different regions; 10 MW for small hydropower projects, and 40 MW for bioenergy projects). The effective submission and award of bids will depend on the evolution of the economy over the next months (mainly based on expectations which, in light of the electoral year, will be closely tied to the political uncertainty) and on access to financing, a key element to allow for a continued development. It is also worth noting that, despite the existing conditions, the government has recently confirmed the launch of the fourth round of bids under the program by the end of 2019. This new round will cover an additional

[7] I.e., 13.2 *Kv*, 33 *Kv* and 66 *Kv*.

MW amount of renewable energy generation, and it might include works to improve the infrastructure of power transmission networks[8].

The relevance of this sector in terms of job creation and national industry share is also worth mentioning. It is well known that policies aimed at changing or diversifying the energy matrix towards RE, in addition to promoting the growth of certain economic activities (such as agribusiness, based on the boost provided by the production of biofuels) can encourage, if the market is large enough and offers the right incentives, the creation of a green industry; that is to say, an industry focused on the manufacturing of renewable-energy oriented equipment (for example, the manufacturing of equipment for wind and solar sources). At the same time, such policies also drive significant social and economic benefits, mainly associated with the reduction of imported components and the creation of new jobs or, going a step further, create the possibility of reducing carbon emissions, decentralizing energy generation and making energy prices more competitive, for example, through the promotion of self-generation based on RE. According to the information published by the Argentine Chamber of Renewable Energy (CADER), there is an increasing number of national components in renewable energy projects: from14% in the first round of the RenovAr program (2016) to 30% in the second round (2017)[9]. In short, this means that in Argentina, there is an abundant supply of national input and materials that explains the local promotion of renewable energy, mainly as far as it relates to wind and solar technologies. This is sufficient reason to expect that, in the future, the contribution of the national industry to the development of renewable energy sources continues to increase. Employment shows a similar pattern. According to the Energy Department (Renewable Energy Promotion), the renewable energy sector aims to create approximately 9,500 industrial positions, and other 3,000 positions in the maintenance and operation areas, even when competition may become really complex, mainly considering the supply of countries such as China, where, for example, the solar panel production sector enjoys important economies of scale and low costs compared to Argentina. This represents a future challenge.

Regardless of the impact that the current situation may have on the development of clean energy sources, or of the political issues, which during 2019 will have a specific weight considering the presidential elections to be held in October; the desire to continue making progress in renewable energy generation is driven not only by the legal framework provided by Law No. 27191, but also by the latent need to recover energy self-supply by prioritizing a diversified energy matrix in which fossil fuels, a resource certainly abundant in the Argentine soil (even more so with the current importance of unconventional resources and the international relevance of Vaca Muerta) have a declining share. With that objective in mind, the government has implemented a series of measures aimed at maintaining interest and investments in renewable energy development. In addition to the aforementioned law on the promotion of renewable energy for electric power generation (Law No. 27191), which offers important tax benefits, Law No. 27424 (Regime for the Promotion of the Distributed Generation of Renewable Energy), whose regulatory decree will be issued in 2019, and the Provincial Renewables Investment Attraction Index (IPAR after its Spanish acronym)[10], recently published by the Argentine Ministry of Treasure and Finance (MECON) and the

[8] "*El gobierno lanzará la Ronda IV del programa RenovAr antes de fin de año*", Telam, April 3, 2019.

[9] "*¿Cómo está el programa RenovAr tras el vendaval del 2018*?", Ámbito.com, March 18, 2019.

[10] According to its creators (MECON-UBA), the Provincial Renewables Investment Attraction Index is an instrument that measures both the degree of development of renewable energy sources in each provincial jurisdiction and the potential to attract future investments. This index

School of Economic Sciences of Universidad de Buenos Aires (FCE-UBA), are worth mentioning. Whereas Law No. 27424 is aimed at decentralizing electric power generation (from a large group of small sources) thus allowing for self-consumption and injection of the surplus into the network[11]; the IPAR index is aimed at *federalizing investment* in renewable energy, enabling agents or capital owners to evaluate which regions (provinces) are most suitable for this type of investment, while giving rise to competition among provinces to improve their position (ranking) and become more attractive. Indeed, according to the results published in the first edition of the IPAR[12], the provinces of Buenos Aires, San Juan, Córdoba, Chubut, Catamarca, and Mendoza are currently the most suitable or attractive for the development of these energy sources.

Considering that sooner or later the macroeconomic variables will show a more favorable and long lasting trend, such measures as the foregoing provide a solid basis for the generation of positive expectations, mainly in terms of competitiveness, since they urge both the central and the provincial governments to take the necessary actions in order to promote renewable energy growth and the construction of a cleaner energy matrix. This is particularly important if we consider that, based on projections made by the International Monetary Fund (IMF) about Gross Domestic Product (GDP), the total installed power could reach 50,000 MW by 2025, when renewable energy should represent 20% of such capacity (i.e., around 10,000 MW).

II. Final considerations

Along with the benefits that these energies represent in social and welfare terms, among which the most important are the possibility of offering energy in areas not connected to the electricity distribution system or where the network is not reliable and requires backup systems[13], RE is the best means to achieve a significant reduction in carbon emissions linked to economic growth. Likewise, the variety of sources from which clean energy can be generated allows for a greater decentralization of the system, thus enabling competition between energy generating sources and more competitive prices. In effect, this objective has been expressed explicitly in recent Law No. 27424 on Distributed Generation (DG). This Law has already been approved by Congress and only its regulatory decree is pending. As previously mentioned, the DG, in addition to promoting the necessary conditions for the decentralization of power generation, will enable small- (private users) and large- scale (industrial players) producers to consume self-generated energy and distribute the surplus to the network, thus promoting a shift of paradigm that will bring both economic and social benefits to the system (with more competitive prices and lower carbon emissions, for example).

However, 2018 was not the most favorable year. The economic situation was accompanied by external (increase in reference interest rates and devaluation of currencies in emerging

covers the analysis of regulatory, fiscal and institutional aspects in each jurisdiction as well as the evaluation of technology implementation, resource leveraging and infrastructure development.

[11] For more information, see "Impacto potencial de la nueva ley de Generación Distribuida en Argentina, a partir de Fuentes Renovables", KPMG in Argentina, June 2018.

[12] "*Indice Provincial de Atractivo Renovable* (IPAR). Edición 1", Energy Department, Renewable Energy and Energy Efficiency Office, March 2019.

[13] "Skills and Occupational Needs in Renewable Energy". International Labor Organization (ILO), 2011.

countries) and internal (country risk, judicial cause of the corruption notebooks in public works) factors that discouraged investment and resulted in the suspension of the most ambitious infrastructure investment program of the recent years (PPP) which, in a context of cuts in the public budget allocated to capital expenditure, sought to reduce the current deficit and continue with the development of public works. Although this event did not directly affect the renewable energy investment program (RenovAr), which has already held two rounds of bids and obtained around US$ 7,000 million in investments (or 4,600 MW of total power to be added), it did have considerable impact on the initiatives aimed at extending the power transmission system, which is fundamental to achieve the efficient supply of the electricity generated. In fact, although the existing conditions are not ideal, the relevance of these projects led the government to re-launch the call for bids for the construction of the extra-high-voltage transmission line between the substations of Río Diamante (Mendoza) and Coronel Charlone (Buenos Aires), being the most expensive project in the energy sector that would allow, at least in part, to improve the local power infrastructure in the short term.

Notwithstanding these obstacles, under the RenovAr program RE reached a contribution of 4% of the total installed power in 2018 (~ 1,460 MW), a figure that despite being below the objective set by the Law No. 27191 for that year, is encouraging and represents a change in trend that should be sustainable in the future. Accordingly, representatives of the Department of Energy (Renewable Energy Promotion) ensure that given the current circumstances, alternatives to the public-private participation program (PPP) are being sought with the aim of attracting new players and completing the works to improve and extend the electric power distribution system. This would allow for the continuity of the RenovAr[14] program in the medium term (with a fourth round, which the government confirmed by the end of 2019 and could be part of this new strategy or mechanism for the development and improvement of transmission networks) and place the levels of investment and renewable power installed in a path of convergence with the values stipulated in the legal framework.

[14] "*¿Cómo está el programa RenovAr tras el vendaval del 2018*?", Ámbito.com, March 18, 2019.

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