Reflections on the energy sector in Mexico

In this article, a series of reflections on the policies that have been implemented in the energy sector in Mexico are presented, covering possible outcomes and repercussions of recent policies on the country's development and the people's wellbeing.

ENERGY SECURITY

The concept of energy security, and its implications for the governance of the energy sector, has significantly evolved in Mexico in the past 25 years. Through the mid-1990s, energy security was grounded in the self-sufficiency ideology, crafted after the state intervention in the oil industry in 1938, and reinvigorated after the nationalization of the electricity sector in 1960. Based on this ideology, governance of the energy sector meant that state monopolies controlled energy production, transformation, distribution, and final use. Petróleos Mexicanos (Pemex) in the oil subsector and the Federal Electricity Commission (CFE) in the electricity subsector (along with Compañía de Luz y Fuerza del Centro, at that time) were critical to the successful strategy of the dominant political party of the era, the Institutional Revolutionary Party (PRI), in ruling the country. Moreover, Pemex and CFE worker unions were key for corporate capitalism to thrive in Mexico. Self-sufficiency and the subsequent national pride were also embedded in Mexican society, particularly in the generations that currently rule in Mexico.

In the late 1990s and early 2000s, during the Ernesto Zedillo (1994–2000) and the Vicente Fox (2000–2006) administrations, energy security evolved to include affordability and timeliness as prominent objectives to be met. Tensions arose between those supporting (and benefiting from) the self-sufficiency ideology, and the new energy administrators focused on economic efficiency of the state-owned monopolies, with the latter prevailing. During Felipe Calderon's government (2006–2012), the concept of clean energy and environmental protection was added to the energy-security mix; renewable energies were emphatically promoted. It was during Enrique Peña Nieto's administration (2012–2018) that a comprehensive energy-security concept, including affordability, timeliness, environmental protection, and clean energies—with the aim of increasing Mexico's competitiveness—was finally codified in laws and regulations. Such significant change included the open participation of the private sector as a competitor of the state-owned productive enterprises.

The election of Andrés Manuel López Obrador in 2018, signified an involution of the energy-security concept and of the way its consequences for the country's development and people's wellbeing are assessed. López Obrador and the Ministry of Energy (Sener) are returning to the energy-security concept that prevailed through the mid-1990s, based solely on self-sufficiency and minimizing the economic, environmental, and health consequences. Energy transition, defined as a process aimed at departing from a hydrocarbons-based economy to a clean economy based on renewable and other clean energies, is no longer part of the government's strategy, or at least it is not visible.
THE OIL SUBSECTOR

Pemex has long been the largest company in Mexico; for many years, it was the largest company in Latin America. Pemex, unlike the CFE, has been a technologyfollower rather than a technology driver, and its contribution to the Mexican economy in the pre-North American Free Trade Agreement (NAFTA) years was critical to public finances. The diversification of the Mexican economy, carried out heavily by the emerging manufacturing sector, has largely diminished Pemex’s role in the economy, thus hampering incentives to increase its competitiveness.

The two main objectives that President López Obrador has mandated for Pemex are (a) increase oil production to 1.8 Mbpd and (b) reduce the country’s dependency on foreign gasoline. For the first goal to be met, and consistent with the self-sufficiency paradigm, new private participation in oil production and first-hand gasoline sales have been curtailed, while existing contributions and permits are being questioned and hindered through administrative and regulatory means. To date, the Mexican government has invested vast amounts of resources, leading to an average oil production of 1.7 Mbpd in 2020 (Pemex, 2021). Debt qualifiers, both in Mexico and abroad, have vehemently questioned the adequacy of the strategy put forth in Pemex.

To meet his second objective, López Obrador has decided on the construction of a new refinery, the seventh to be added to the National Refining System (NRS). Environmentalists have indicated that the new refinery is a clear signal that Mexico is abandoning its legal commitments to attain a clean environment. From the engineering and economic points of view, the need for, size of, and location of the new refinery have also been challenged. Main objections have arisen after an analysis of the operations of the other six Pemex-owned refineries. The lack of maintenance and the use of higher quotas of heavy oils, not considered in their original design, have contributed to a current average efficiency of the NRS of 38% (Del Río & Rinkenbach, 2019). Although the government has pledged public investments to improve maintenance, low efficiencies are still present. The old, obsolete NRS leads to low-quantity and poor-quality fuels. To further complicate Pemex’s future, half of the refineries have implemented technologies to refine bunker oils. The consequence has been a recent and very significant increase in bunker oil production, but Mexican bunker oil has a large content of sulfur and heavy metals. To make things worse, Pemex does not have enough bunker oil storage capacity, since it did not originally plan to produce it in such amounts.

Paradoxically, Pemex has found in CFE the perfect client for allocating the bunker oil, which in turn is burned to generate electricity in old and poorly maintained thermal power plants. To counteract the detrimental effects of burning bunker oil in old-fashioned power-generation plants, it has been proposed that integral gasification combined cycle (IGCC) plants should be constructed. Another option would be to export bunker oils to countries where IGCC plants are in operation. The United States has several of these plants that could use Mexican bunker oil. Getting rid of this oil depends merely on the political will to implement such a strategy, which has obvious health and environmental benefits.

The idea of modifying Pemex from an oil-based company to a comprehensive energy company has mostly been abandoned. Projects aimed at reducing flaring in oil wells (which average 289 MMpcm in 2019, according to Sener, 2020) and at implementing cogeneration in Pemex plants were halted. Moreover, the strategy to produce natural gas in Northern Mexico has been put aside (Montemayor, 2019). The consequences of this erroneous decision were apparent in mid-February 2021, when natural gas from Texas ceased to be imported to Mexico, due to weather conditions and the decision of the Texas government to guarantee supplies for local heating and power generation. López Obrador would seem not to consider Mexico’s dependency on foreign natural gas, approximately 70% of the total (Sener, 2020), as a relative factor, which runs contrary to and inconsistent with his desire to depend less on foreign fuels such as
gasoline. At present, dependency on natural gas from abroad for both energy generation and industrial applications is even more significant than it is for gasoline as a percentage of total consumption (Montemayor, 2019).

López Obrador's policies have negatively affected the independent regulators created or strengthened as a consequence of the 2013 energy reform, namely, the National Commission of Hydrocarbons, and the Safety, Energy and Environment Agency. In these institutions, management has been steadily replaced by people loyal to the ideology and with limited expertise in the field.

**THE ELECTRICITY SUBSECTOR**

The CFE is often mentioned as responsible for Mexico's technological takeoff. The need to build new dams, consistent with global best practices, led to the creation of construction and consulting companies and of research and development centers, within the CFE and at the National University of Mexico. Further investments in power generation allowed value chains to be implemented in the country for hydro, nuclear, geothermal, and combustion plants. Until the 1990s, the CFE concentrated all procurement, construction, and operation activities. Little attention was paid to the company's efficiency, since there were no competitors.

From the Zedillo to the Peña Nieto administrations, the electricity subsector in Mexico evolved much faster than its oil counterpart. Performance-based contracts were signed between the CFE management and its union, thus establishing a pathway for improving CFE's economic and technical efficiency. The lack of public funds at the end of the 1990s, and in the following years, forced the CFE to rely more on private energy generators. The CFE would pay a monthly fee for available plant capacity and an energy tariff that included fuel prices. It became a very profitable scheme for the CFE, one later extended to privately owned generating plants approved for energy exports. Maintenance and construction planning of the CFE infrastructure were strengthened in those days.

During Peña Nieto's government (2012–2018), to foster competition, the CFE was partitioned into several companies, with no truly rational approach. Doubts about this process arose, and people claimed that the CFE partition was meant to benefit the new players from the private sector rather than to improve the CFE's efficiency and competitiveness. In any case, it was clear that the CFE needed to better its competitiveness. After the implementation of Peña Nieto's energy reform (2013–2014), 10 times more workers were needed in a CFE combined-cycle plant than in a similar privately owned plant. It was obvious that strides made in the past to increase CFE's efficiency had been implemented too late and were insufficient.

As part of the energy reform, public biddings for clean energies were largely successful. Prices were the most competitive in the world at the time, since only energy was purchased, and backup was not required. Mexican and foreign companies invested large sums for the development of natural-gas-powered combine-cycle plants, and of solar and wind generating plants supported on 15-year contracts. The CFE had to cope with maintaining the margin of safety in power generation at reasonable levels. New power plants, both permanent and intermittent, led to improved resiliency and strengthened the transmission grid. The CFE ran a profitable business by selling electricity to final users at a price five times higher than its cost. Dispatch was based on economic merits, not on ownership. Significant departures from the state monopoly were seen in the separation of the National Center for Energy Control (CENACE), an independent agency in charge of coordinating the electricity market, and the creation of the National Center for the Control of Natural Gas (Cenagas), also as an independent entity.

During President López Obrador's 2-year tenure thus far, efforts have been deployed to stop and roll back Peña Nieto's energy reform. The energy regulator, the National Regulatory Commission (CRE), has also suffered setbacks as an independent agency geared toward
economic efficiency. Through administrative executive orders, the intent was to put an end to or to hinder legally binding permits and contracts. Response from stakeholders has been to sue the government. At the time of writing, Mexico's Supreme Court has ruled in favor of the plaintiffs.

November 2020 marked a significant point of departure in the way the CFE hydroelectric dams were managed. In the midst of the hurricane season, the government decided to generate base energy from hydroelectric dams, disregarding the flooding of cities and towns in the states of Chiapas and Tabasco, including the capital city of the latter, Villahermosa. Furthermore, López Obrador issued an operations policy aimed at dispatching energy from CFE-owned hydroelectric plants to block purchasing power from private generators. As a final consequence of this directive, a new law for the electric industry was later proposed; this topic and its consequences are discussed below.

Geothermal energy represents one piece of evidence of inconsistency in the government discourse related to self-sufficiency and nationalistic pride. Together with the United States, Indonesia, and the Philippines, Mexico (through the CFE) was among the top four generators of electricity through geothermal plants in early 2000s. A lack of understanding about geothermal energy as a base and a clean source led the Fox, Calderón, and Peña Nieto administrations to avoid investing in further exploration and production. Since the CFE geothermal plants were a source of national pride in the 1980s and 1990s, the current government would be expected to promote this energy source. Unfortunately, the topic has been put aside.

Similar to what has occurred in Pemex, the highest-qualified CFE personnel have been disbanded or have opted for retirement. There is an obvious lack of interest in the company's operations and in the improvement of technical and economic efficiency. The performance-based contracts mentioned above have been rolled back. Moreover, the age of retirement, which had been extended, has now been returned to pre-energy-reform times, putting added pressure on the CFE's finances.

THE ENVIRONMENT AND CLEAN ENERGIES

During Calderón's administration, awareness of climate change, the need for adaptation and mitigation, and the role of the energy sector in greenhouse gas emissions were emphasized. The successful United Nations Climate Change Conference (COP 16) gathering in Cancún was a victory for Mexican environmentalists and policy makers. Mexico's commitments were included in related laws and norms, and a mandatory target of 35% of energy being generated from clean sources (including nuclear energy and hydroelectricity) by 2024 was established. Peña Nieto later lessened this emphasis on the environment, although he did not abandon it entirely.

Contrary to his predecessors, López Obrador has not made the environment a top priority for his administration. In less than 2 years, three ministers of the environment have been appointed, with distinctly different backgrounds and interests in the topic. As a testament to López Obrador's shallow commitment to the environment and to fighting climate change, not only did his government back the controversial construction of the seventh refinery at Dos Bocas in 2020, but it also published Mexico's National Determined Contributions (Semarnat, 2020). The targets committed to are the same the country had agreed upon for 2024, but the date for compliance has been extended to 2030.

Based on the self-sufficiency ideology that supports his energy-security concept, López Obrador is de facto minimizing the long-term benefits of clean energy for the economy, health, the environment, and competitiveness. Whether it is a conscious, data-driven decision or the result of ideological considerations is unknown, but most probably the latter.
THE NEW ELECTRIC INDUSTRY LAW

In early January 2021, President López Obrador surprised the energy sector, both domestic and foreign, by sending Congress a new law for the electric industry. The possible effects of this law on the country's medium-term competitiveness, on people's health, and on the environment shook the political landscape and prompted warnings in foreign markets and among trade allies. Congress approved the law in early March. It is expected that affected parties will challenge it in courts.

The new law is designed to roll back the energy reform in the electricity sector. The very complex issue of power generation, dispatch, and transmission, from both a technical and an economic standpoint, is presented in oversimplistic terms in the background section of the bill. Nationalistic concepts are used to provoke emotions based on pride in the self-sufficiency of energy sources and their transformation, widely popular among López Obrador's supporters. Also in the background, the lack of government trust in the private sector is clear. Furthermore, the law takes back important, yet insufficient, improvements that had been achieved in transparency and legal certainty. It ignores the badly needed investments in transmission grids. Also, Clean Energy Certificates, the objective of which is to promote new clean energies by transferring costs to consumers via tariffs, are expected to be used much less than before. Instead of using hydro energy for peak consumption, while maintaining an ecological flow in dams, the new law would require this energy to be dispatched first, regardless of its cost.

In short, the objective of this new law is to recover the state monopoly through the CFE. The intent is to rescue the CFE by giving it preference in energy sales and by charging private plants—a large sum one may presume—for the use of its transmission and distribution grids. It can be argued that such changes will not contribute to rescuing a company with internal inefficiencies and rigidities for a rapid respond to the market. Instead of these new bills being introduced, the CRE and CENACE should have been strengthened to counteract the real increasing power of private companies. What is needed is more state regulation, not the prohibition of private competitors.

Several unintended consequences of this law are (a) an increase in pollution; (b) higher electricity and gasoline costs, or higher subsidies; (c) a violation of the Paris Accord; the United States, Mexico, Canada Agreement (USMCA); and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP); (d) higher debt; (e) a plunge in national and foreign investments; and (f) erosion of accountability, transparency, and legal certainty, among others.

WHAT LIES AHEAD

President López Obrador won by a landslide on a public campaign aimed at eradicating corruption and reducing social inequalities and poverty. His diagnosis was impeccable; his political opponents, through their actions or omissions, made his speech stronger. In his books published for his previous electoral campaigns, López Obrador had presented and advocated for the policies he has consistently been implementing from the presidency. Therefore, no one can argue that his stance on energy was unknown or surprising.

López Obrador is a savvy politician whose prime objective is to be one of the greatest political figures enshrined in Mexican history. He knows that the Mexican people bestow their long-term respect on presidents who have avoided currency devaluations, unemployment, and high inflation rates. As long as his policies, particularly regarding energy, do not affect the current currency rate, do not contribute to unemployment, and do not mean an increase in consumer prices, he will maintain, and probably entrench, his course. A relevant question
is whether national and foreign pressure from North American and European countries will make a dent in his policies.

Ideally, zero-emission targets should be reassumed in the medium term. New transmission lines and a strengthening of the existing grid are urgently needed. Incentives to change consumption habits are necessary, especially in the transportation sector. New investments and developments in precision climatologic predictions, energy storage, and backup must be implemented. A medium- to long-term plan aimed at workforce development and retraining, and at research and innovation in energy and climate change, should be carried out. It remains to be seen whether Mexico shall be in a position to convert these challenges into opportunities for a sustained and inclusive prosperity of its people, something the upcoming mid-term election, in June 2021, will show.

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