

The Short-lived Electricity Reform in Mexico and the Expected Aftermath

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Abstract

The 2013 Energy Reform in Mexico led to lower wholesale electricity prices, an increase in renewables in the energy matrix, and lower GHG emissions. Changes will fade under the counter-reform proposed by President López Obrador.

Introduction

Since the nationalization of the Mexican Electricity Industry in 1960 and until the Constitutional Reform of 2013, the Federal Electric Commission (CFE) was in charge of power generation, either through its own resources or with private investment. However, the only buyer of that energy was CFE, a de facto monopoly, who in turn was responsible of transmission and distribution networks. This is shown in Figure 1, that also illustrates self-supply could be for the generator's own use or for other users.

The power company CFE charged a tariff for the service that they calculated and was then established by the Ministry of Finance. Often this tariff did not cover operating costs and therefore a subsidy scheme was required, where domestic and residential rates were subsidized by more than 50%. This low cost to some users was absorbed by commercial and industrial consumers that paid higher tariffs, above those in the US, Mexico's main trading partner, reducing Mexico's competitiveness. This price structure brought problems to CFE because year after year they operated with losses. This, together with the projected increase in demand and the lack of capital to make the required

investments in generation, transmission and distribution led to the urgent need for a new model in the electricity sector.

The 2013 Energy Reform

The goal of the Energy Reform was to create competition in the power market to lower prices and reduce the burden on government resources by allowing private investment. Under the reform, CFE now competed with private generators to enter contracts with users, through figures created by the reform, such as Qualified Supplier and Basic Supplier Services that now represented consumers in the Wholesale Electricity Market (WSEM). The transactions made in this new market were made through the Spot Market which is operated by the National Energy Controller (CENACE by its acronym in Spanish) or through bilateral transactions (which must also be notified to CENACE). This new structure of the electricity sector is shown in Figure 2.

Transmission and distribution remain the responsibility of the CFE, which charges for this service through rates within the WSEM, and was regulated by the Energy Regulatory Commission (CRE by its acronym in Spanish). The reform also sought to incorporate

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renewable energy power plants to reduce greenhouse gas emissions and local air pollutants, and produce cheaper electricity.

Some Background

Since 1960, when private sector companies were nationalized, Mexico entered into a model of public monopoly. This led to higher power prices and to productive inefficiencies or inefficiency X. This resulted from the

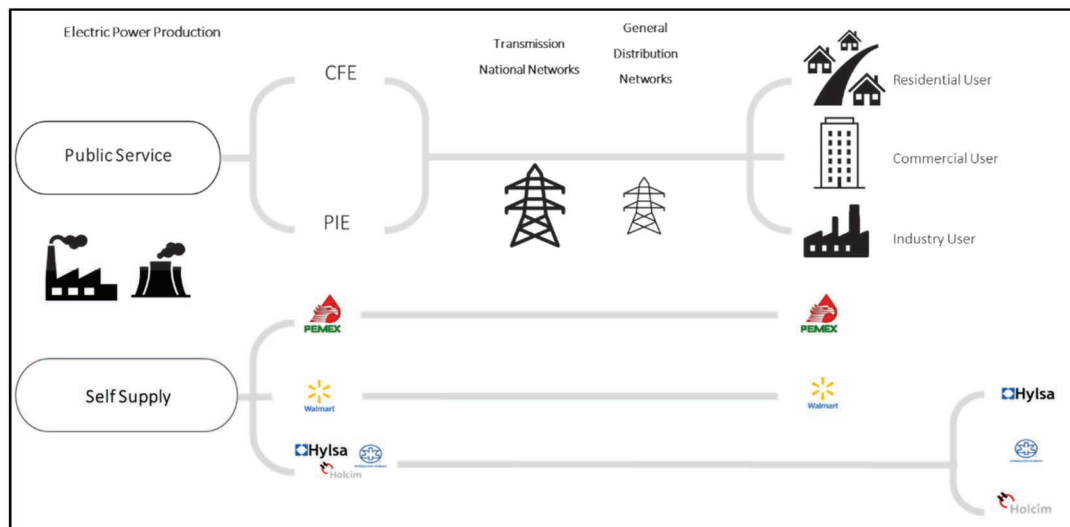
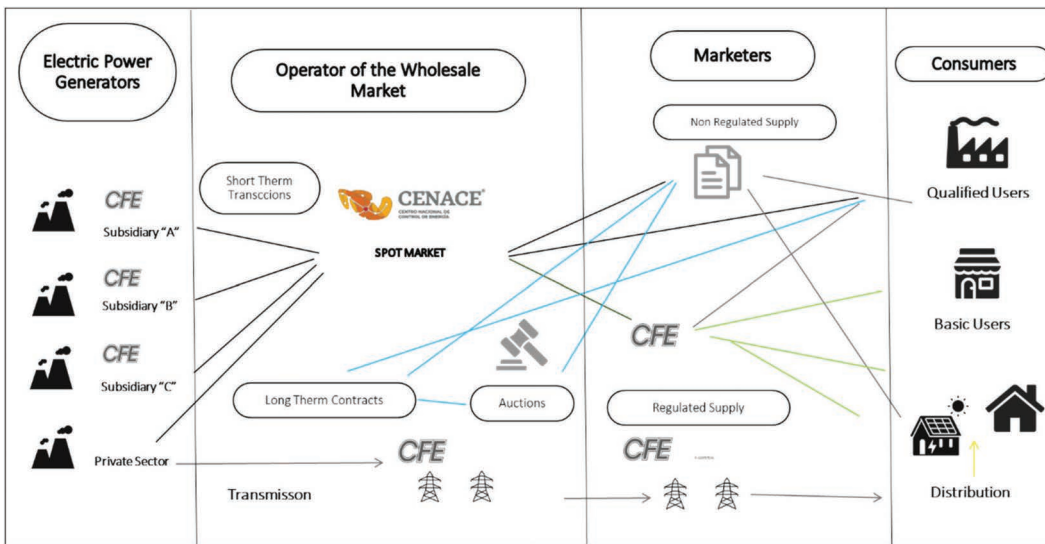


Figure 1 Electric Industry Structure before the 2013 Energy Reform
Source: Prepared by authors.



highly capital-intensive market, it is open to the entry of new participants through a cost-based market model, where producers (generators) make their electricity offers based on their variable costs, in this case determined by the cost of the fuel for power generation.

In this new wholesale market scheme, the independent operator (CENACE) programs generation of individual plants through an economic dispatch. This means that the power plants

Figure 2 Electric Industry Structure after the 2013 Energy Reform
Source: Prepared by authors.

absence of incentives to reduce costs and improve management due to the absence of competition. This drove the costs of CFE above the costs of a competitive firm, and the state monopoly model did not allow either production costs or final prices to decrease. This market structure was supported by those who thought that public goods and services must be a monopoly since they are considered strategic and priority sectors in public agendas. Additionally, economic theory states that private monopoly has an objective function of profit maximization. In contrast, the public monopoly will not seek the maximization of profits and the price of the monopolist will be marked by its costs, that is, its benefits can be equal to or less than zero. In the case of Mexico, prices in the energy sector in both state (public) monopolies, CFE and PEMEX are even below costs, leading to a need for subsidies due to high production costs and the interest of the government in keeping prices low.

The 2013 Energy Reform, and in particular that of the power sector, was paradigmatic since it questioned the prevailing market structure and made a bet for competition within the sector.

In the case of the electricity sector, the reform brought competition into the market, although not of perfect competition given the

that produce and inject energy into the system on the day of operation will be assigned in ascending order of costs. The intersection between supply and demand will set the price of energy (or local marginal price), thus seeking to generate the incentives for the incorporation of more efficient power plants, which will provide the consumer the best available price.

Thus, under the reform and following the figure of economic dispatch, electricity prices should fall as the cost of production with renewables is reduced and as renewables increase their share in power generation.

Indicators

There are different indicators that allow an evaluation to be made of the development and performance

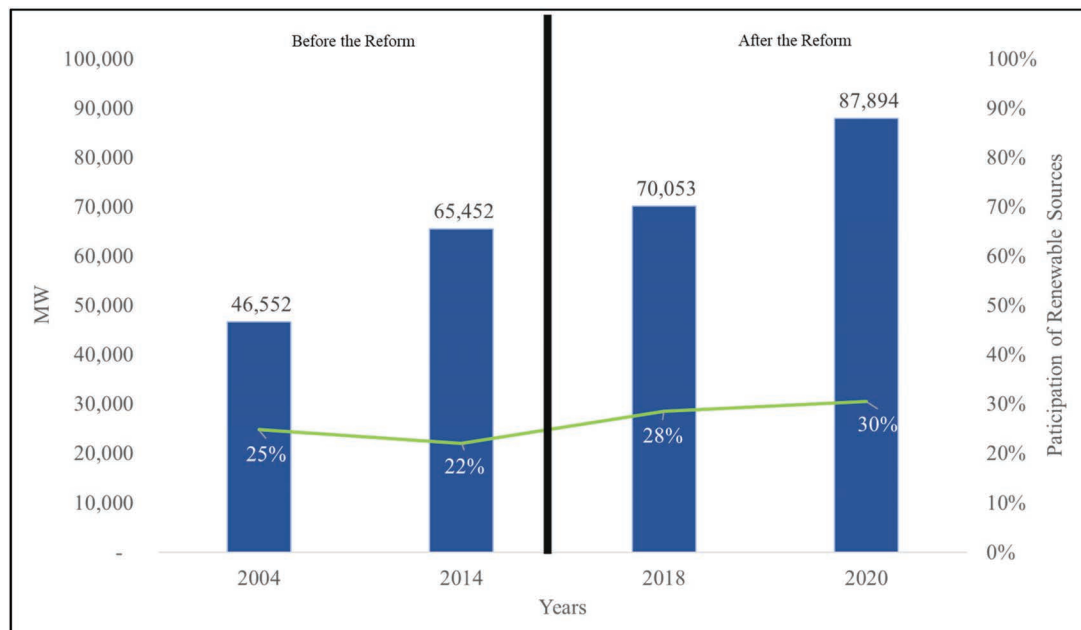


Figure 3 Installed Capacity and Renewable Energy Participation
Source: Prepared by authors based on SENER's data.

of the Mexican Wholesale Electricity Market. We review four in the remainder of this note: installed capacity, prices, and greenhouse gas emissions, and the financial situation of CFE.

Installed Capacity

On the one hand, we have the supply of energy, which is a determinant for prices within the market. A good proxy for this variable is Installed Capacity, that had a growth rate of 34% between 2014 and 2020. In addition, not only more generation was installed but more renewable energy plants were put in place, increasing from 22 to 30% of generation capacity, as seen in Figure 3. However, during that same period, the participation of CFE went from 83 to 51% in the sector. This means that most increase in installed capacity was built by private participants, who entered due to the reform.

Now, more Capacity with more renewable energy supply has two impacts: lower prices and a decrease in greenhouse gas emissions.

Prices

One of the indicators that can be used to evaluate the evolution of the electricity sector in Mexico after the 2013 reform, are the Local Marginal Prices, because they reflect the intersection between electricity demand and supply of power in the country.

According to the Independent Monitor of the Electricity Market, the fact that capacity has been expanded with lower fuel costs from renewable energy has been one of the determinants in the decrease in Local Marginal Prices (LMP). The historical behavior of LMP, taking as reference the prices in the Day Ahead Market of the Price Node "Querétaro Potencia", which is used as the reference node of the National Interconnected System, is presented in Figure 4.

However, domestic electric tariffs remain high. This, to the eyes of many, proves that the Energy Reform failed. The question that

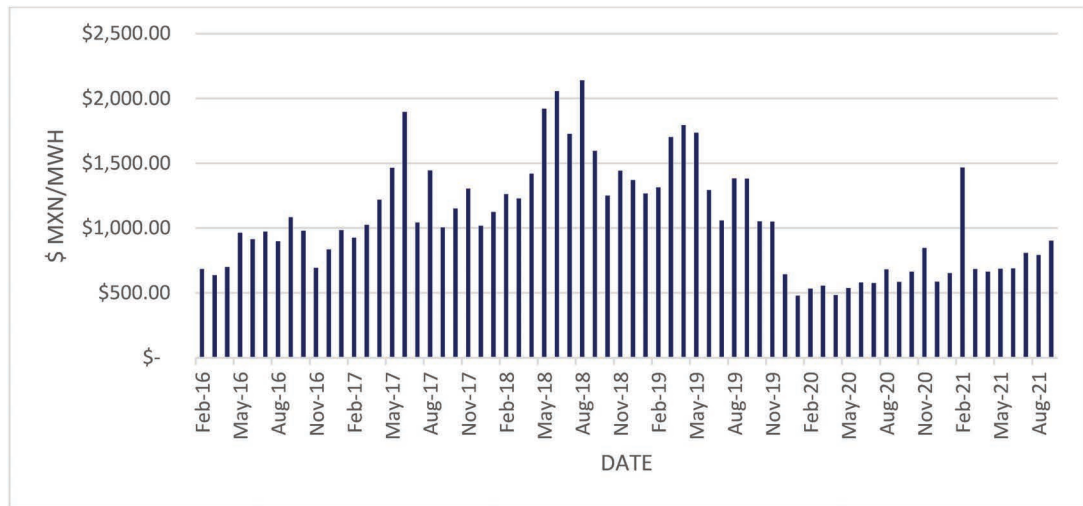


Figure 4 Historical behavior of the Local Marginal Price in Querétaro Potencia
Source: Prepared by authors based on CENACE's data.

arises is, if more efficient power plants have been incorporated and local marginal prices have been lower, why haven't the tariffs to consumers come down? There are two parts to this answer. First, as shown in Figure 5, most of the energy that the Basic Services Supplier (SSB due to its Spanish acronym) count on, belongs to the Legacy Contracts, power plants owned by the CFE and those who had signed contracts with the CFE long before the reform took place. These power plants are old and inefficient.

On the other hand the cheapest energy available was awarded with the Long-Term Auctions that barely have any capacity because they disappeared in 2019. Something similar happens with the energy purchased in the Mexican Electricity Market (MEM), that even though the prices are low their share is not enough to supply the needs of Basic Users. It is worth mentioning that according to the Electric Industry Law (LIE by its

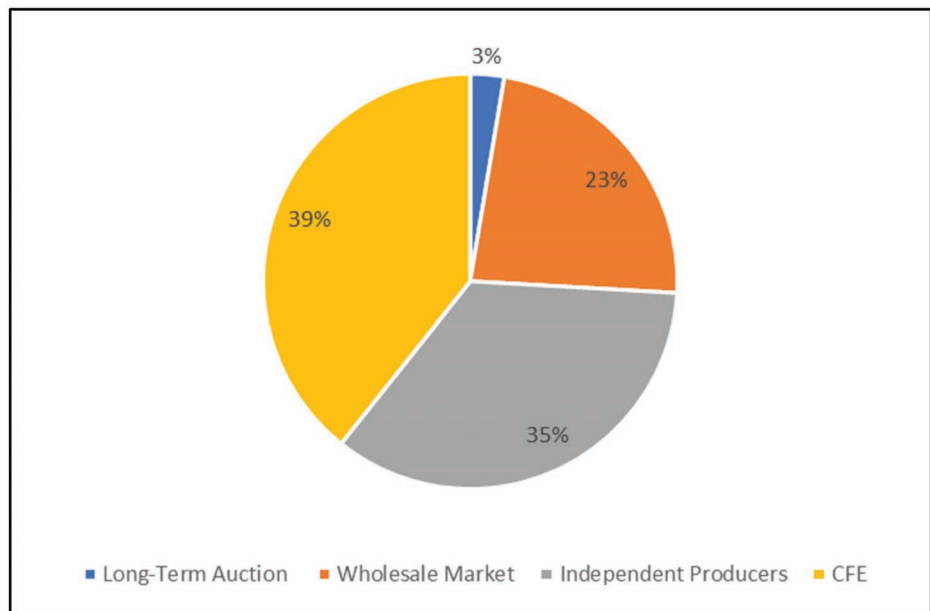


Figure 5 Basic Supplier Energy Matrix 2019
Source: Prepared by authors based on CFE's data base (2021).

Spanish Acronym), the SSB have to buy the least part of its energy in the MEM. Given the cancellation of the Long-Term Auctions, CFE has chosen to breach that mandate.

The second part of the answer is that the SSB charges a regulated tariff, set by the Energy Regulatory Commission, and ratified or modified by the Ministry of Finance under non-transparent criteria so this final tariff price may not reflect the improvement in efficiency by CFE. The spirit of the reform was to reduce the costs of electricity generation for all participants, and to CFE in particular as its generation costs were lower due to the incorporation of more efficient energy and the removal of the more expensive power plants. This should be reflected in the tariffs.

It is important to highlight that since the beginning of the administration of President López Obrador, the removal of old power plants stopped and were instead refurbished, resulting in additional costs for CFE and keeps in operation expensive and polluting technology. During the process, the impact of the reform may not be reflected in the domestic tariffs, but it might in the amount of subsidy by the Federal Government, because if the costs are lower the amount of subsidy necessary should decrease to maintain tariffs at similar levels. Thus, the future behavior of electricity tariffs seems uncertain because of the government's intention to strengthening CFE.

Greenhouse gas emissions

Climate change has been an issue that has gained relevance in the international agenda. Both of the Paris Accord and of the Sustainable Development Goals have concrete commitments endorsed by Mexico. Historically, electricity generation has been responsible for an average of 30% of total CO₂ emissions, and they come from the burning of fossil fuels (Figure 6).

At the beginning of the Energy Reform, total emissions of CO₂ from electricity production were growing steadily, however, the trend from 2016 has changed, as Figure 6 shows.

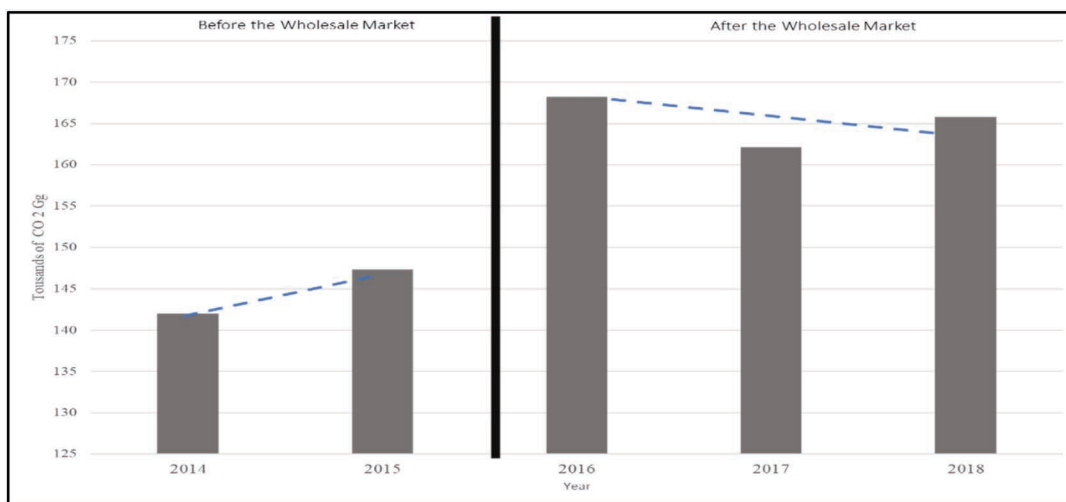


Figure 6 Mexico's Historical Emissions of CO₂

Source: Prepared by authors based on INECC database (2020).

Nevertheless, recent investments have been towards refurbishing gas-powered power plants such that by 2020, 56% of the total installed capacity in Mexico is fossil fuels based. Looking to the future, if power plants that produce with natural gas were replaced by solar and wind capacity, emissions will decrease, and with the Reform of 2013, substitution was expected to occur progressively.

Finances

Despite of what most people think about the Reform, the financial situation of CFE was improving. This is because turning a vertical integrated company into an horizontal integrated one, new business areas opened, such as the sale of fuel to third parties. Production costs have remained at levels similar to those seen before the reform, however, the revenues increased. This diversification has allowed to go from experiencing losses until 2016, to reporting profits during the next 5 years after the Wholesale Market opened as shown in Figure 7.

Thus, the monopolistic structure prior to the implementation of the Reform was not only harming the consumers (commercial and industrial users), but also to CFE due to high production costs from using outdated technologies to generate electricity. The characteristics of this market denoted the need to eliminate or reduce inefficiencies given by the structure of the sector. To cover for inefficiencies, subsidies were offered, which generated even greater deterioration in CFE's finances.

Under the Energy Reform, several results were achieved: production increased, energy sources diversified, there was a change in trend in emissions, marginal prices fell, and new business areas such as carbon markets and the sale of fuel to third parties allowed for positive financial results.

Reform Initiative 2021

Notwithstanding the aforementioned gains of the initial instrumentation of the reform, the current government has taken action against the new market

structure during 2020 and 2021. The first action was the cancellation of long-term auctions. In late September 2021, the Executive filed a counter-reform proposal that seeks to change the economic dispatch and prioritize the CFE plants, even if this implies higher costs and more local and greenhouse emissions. It also goes against renewable energy, making it difficult to comply

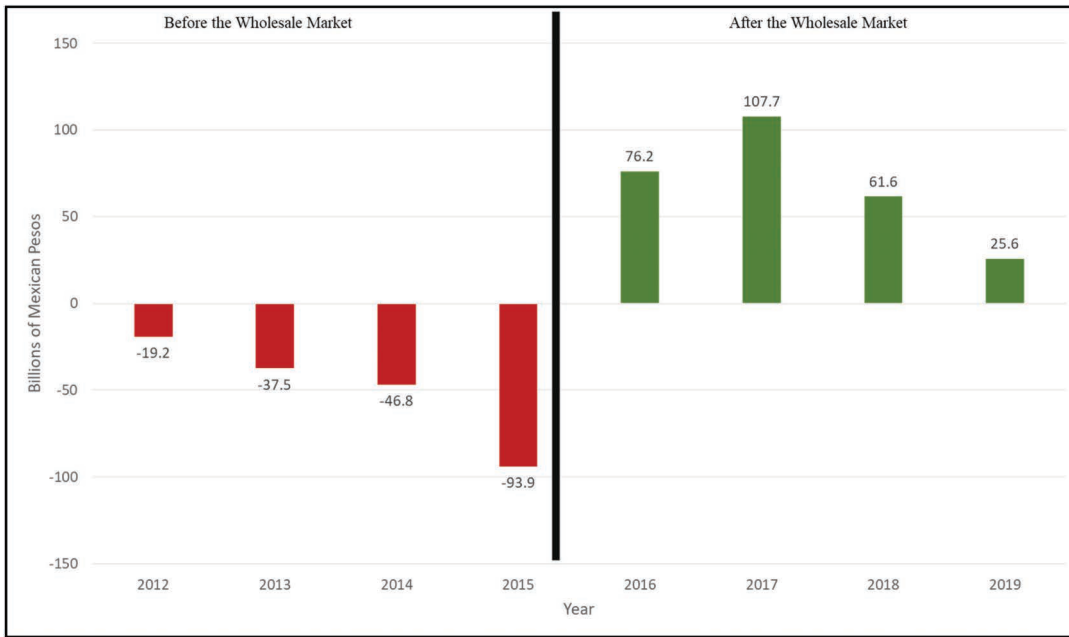


Figure 7 CFE's Annual Finance Report
 Source: Prepared by authors based on CFE's data base (2021).

with international commitments emissions-wise. Prices of power have increased the financial effects on CFE and on federal public expenditure are yet to be seen.

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