

# THE RULE OF LAW AND MEXICO'S ENERGY REFORM

**The New Legal and Regulatory Framework of the Mexican Electrical Sector: Possibilities of Inclusion of Small and Medium-sized Companies**

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Prepared for the study, “The Rule of Law and Mexico’s Energy Reform/Estado de Derecho y Reforma Energética en México,” directed by the Baker Institute Mexico Center at Rice University and the Center for U.S. and Mexican Law at the University of Houston Law Center, in association with the School of Government and Public Transformation at the Instituto Tecnológico y de Estudios Superiores de Monterrey, the Centro de Investigación para el Desarrollo A.C. (CIDAC), and the Faculty of Law and Criminology at the Universidad Autónoma de Nuevo León.

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## Study Acknowledgements

A project of this magnitude and complexity is by necessity the product of many people, some visible and others invisible. We would like to thank Stephen P. Zamora of the University of Houston Law Center and Erika de la Garza of the Baker Institute Latin America Initiative in helping to conceive this project from the start. We would also like to acknowledge the support received from Luis Rubio and Verónica Baz of the Centro de Investigación para el Desarrollo A.C. (CIDAC); Pablo de la Peña and Alejandro Poiré of the Instituto Tecnológico y de Estudios Superiores de Monterrey; and Oscar Lugo Serrato and Manuel Acuña of the Law School at Universidad Autónoma de Nuevo León. The collaboration between our institutions and the material and moral support were key to this project's success.

We would also like to acknowledge the logistical support and project coordination provided by Lisa Guáqueta at the Mexico Center, as well as the efforts of all of the authors that participated in this study and the many silent hands that helped put together workshops, events, and meetings related to this project. We also thank the peer reviewers, editors, style correctors, and translators, and Tirant lo Blanch.

This study is dedicated to Stephen P. Zamora, our friend and colleague and one of the driving forces behind this project, who passed away before the completion of this study.

## About the Study: The Rule of Law and Mexico's Energy Reform/Estado de Derecho y Reforma Energética en México

The 2013 changes to the constitutional framework and the summer 2014 enabling legislation in Mexico's energy industry represent a thorough break with the prevailing national narrative as well as the political and legal traditions of twentieth century Mexico. Mexico is about to embark on an unprecedented opening of its energy sector in the midst of important unknown factors, as well as a fiercely competitive and expanding international energy market. Mexico is one of the last developing countries to open its energy sector to foreign investment, and although there are important lessons that can be learned from other countries' experiences, this does not imply that the opening will be necessarily as successful as the government promises or that the implementation of the new laws will go smoothly. Almost certainly, after the enabling legislation goes into effect, important questions of law will emerge during the implementation, and unavoidably, refinements to the legislation will have to take place.

The book "Estado de Derecho y Reforma Energética en México," published in México by Tirant lo Blanch and written in Spanish, is the culmination of a major research effort to examine rule of law issues arising under the energy reform in Mexico by drawing on scholars and experts from American and Mexican institutions in order to bring attention to the different component parts of the new Mexican energy sector from a legal standpoint.

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## The Rule of Law, Guarantor of Economic Development

According to the annual Rule of Law Index, in 2014, Mexico was ranked 79 out of 99 countries; the most concerning aspects of its legal-institutional fabric are corruption and the lack of adequate security and civil and criminal justice systems. The ongoing criticism of the lack of the rule of law in Mexico makes it necessary to reflect on the causes and consequences of both the ineffective design of the law and citizens' noncompliance. The rule of law exists when the individuals or entities who make up a society are governed by—and subject to—the full force of the law in all their activities; in other words, a solid rule of law exists when a country is governed by the law and not by human beings. It is important to point out that all countries have a rule of law; however, there are weak states and strong states. When the rule of law is strong, according to Hayek, the laws and the State mechanism to ensure compliance with them are aimed at achieving legal security (González de Cossío 2012, 2). One of the greatest contributions by Hayek in this respect is that he questions the relationship between the rule of law and the free market from the perspective of an economist. According to Hayek, under a strong rule of law, individuals enjoy conditions that are appropriate for making predictions and intelligent decisions with respect to their investments, trusting that they will enjoy successful yields on their capital (Hayek 1944, 81).

In addition to Hayek, economists Samuelson, Nordhaus, Wolf, and Adam Smith agree that the economic goal of the State must contemplate the correction of market failures, establish goals of fairness through public policies, and achieve rates of macroeconomic growth and stability. In other words, contemporary thought subscribes to the view that the rule of law is a primordial element to create wealth and welfare, and that it will work to the extent that public goods are provided, negative externalities such as contamination and waste of resources are mitigated, clear rules are established, and a system to seek effective justice is implemented. Defining each of these characteristics is not the purpose of this essay. However, I do believe it is paramount to briefly restate the essence of what makes the rule of law functional and relevant for a working economy. A rule of law that combines these characteristics represents the key element in the wealth of nations.

This essay includes a summary of the reform, emphasizing the concept of “national content” as the clearest expression of the legislation's intent to include small and medium-sized companies (SMEs). Afterwards, I address the competitiveness of SMEs, which poses challenges to their inclusion in the production chain, as well as the new opportunities renewable energy technologies<sup>1</sup> offer for these types of companies to join the electricity generation system. Next, I summarize the implications of public policy that will affect the companies' participation in the electrical market, using the example of the Brazilian case in terms of implementing the “national content” concept in its legal framework. Finally, I present some conclusions regarding the viability of the new legal framework to include SMEs and, in particular, whether such inclusion is reasonable and relevant for strengthening the rule of law in Mexico.

## The Mexican Energy Reform and the Legal Framework for a New Electrical Market: Toward Competitiveness

The electrical industry is composed of generation, transmission, distribution, and trading of electrical energy as well as planning and control of the “National Electrical System” and operation of the “Wholesale Electrical Market.” It also covers the supply of primary consumables for the industry.<sup>2</sup> The electrical energy market in Mexico is worth 311 billion pesos, of which 58.5 percent represents the industrial sector, 25.4 percent the domestic market, and the remainder divided between agropecuary and business activities (Ministry of Energy 2015).

The activities of the electrical industry are of public interest, according to the new Electricity Industry Act (LIE); however, since the energy reform, generation and trading are considered services that are subject to rules of free competition, whereas electricity generation, transmission, distribution, and trading, and operational control of the National Electrical System are activities of public utility subject to obligations of universal public service.<sup>3</sup>

Over the past 30 years, on a global level, structural changes have taken place in the electrical sectors of many countries; these mainly consist of the transformation of monopolistic companies, generally administered by the States, into liberalized subsectors where private investment may compete, a change that creates efficiency and provides benefits for consumers, generally in the form of lower rates and higher quality and range of services. This means that the new regulatory designs have successfully identified the market failures of the monopolistic structures and in turn utilize technological changes and new models of measurement, which has permitted a deconstruction of the entire system to open up certain subsectors to competition and achieve efficiency. At the same time, these designs take into account State intervention in strategic activities whose natural monopoly status is *sine qua non*. Technological progresses—which permit significant cost reductions through economies of scale—thereby facilitate the efficient coordination of a greater number of participants in the electrical industry, in addition to incorporating environmental and safety regulations into baseline production costs, which was not considered within the regulatory framework prior to the reforms (Geneva 2014, 1).

The Mexican energy reform follows this trend and marks the end of a 76-year-long era of state monopoly over the exploitation of the country’s energy resources. For the electrical industry, the reform is focused toward a competition model in terms of wholesale<sup>4</sup> and retail electricity services.<sup>5,6</sup> It must be noted that, since the nationalization of the Mexican electrical industry (1960), a monopolistic structure was adopted establishing the Comisión Federal de Electricidad (CFE) and Compañía de Luz y Fuerza del Centro as the exclusive State electricity providers, the latter of which was liquidated in 2009. However, in 1992, different reforms were made to the since repealed Public Electricity Service Law, which established the role of independent energy producer (PIE) by which private investors could participate in the electrical industry—with their generation capacity and associated energy exclusively sold to the CFE, which represented the only buyer<sup>7</sup>—and the role of

independent producers for self-generation, a system under which a private company can generate its own electricity but not sell it, even though it may have excess quantities.

The LIE now permits trading—except for the sale of electrical energy by a final user to a third party—provided that the electrical energy is used within the end users’ facilities, as well as the sale of electrical energy from a third party to a final user, provided that the energy is produced through distributed generation within the end users’ facilities. Distributed generation—also known as *on-site* generation, embedded generation, decentralized generation, disperse generation, or distributed energy—basically consists of the generation of electrical energy through many small sources of energy in places as close as possible to the loads. The Energy Regulatory Commission (CRE) is the regulating body in charge of establishing the requirements and minimum amounts of electrical coverage contracts suppliers must enter into—regarding the electrical energy and associated products they will supply to the load centers they contract with—and will verify their compliance. In turn, basic services suppliers will enter into electrical coverage contracts exclusively through auctions conducted by the Centro Nacional de Control de Energía (CENACE). Productive State-owned companies (EPE), i.e., the Federal Electricity Commission (CFE) and its subsidiaries and provider affiliates, will guarantee electrical supply to the end users of a basic services supplier who is in liquidation until those users are transferred to a new one. In turn, after the reform and subject to the limits established by the LIE, any producer will be able to generate electricity<sup>8</sup> and any trader will be able to sell it<sup>9,10</sup> (Ginebra 2014, 1).

To achieve these goals, it was necessary to proceed with horizontal disintegration of electrical energy generation, transmission, distribution, and trading processes. Therefore, CENACE, previously a division within the CFE, was transformed into an independent operator and entity in charge of the entire network and the dispatching of electricity. It received material and human resources support to fulfill its powers from the CFE, by virtue of which, by the time the electrical sector will be fully opened up to competition in terms of generation and trading activities, a plurality of participants is expected. Likewise, both the Ministry of Energy (SENER) and the CRE have regulatory and supervisory powers regarding the wholesale electricity market; SENER is responsible for establishing the initial market rules, and the CRE is the body in charge of granting permits to participate in the wholesale electricity market.<sup>11</sup> According to the reform, the CRE is also responsible for setting the rates for the transmission, distribution, and sale of basic electricity services; establishing the general terms and conditions for market participants; issuing the model interconnection contracts; and administering clean energy certificates. Likewise, it will issue the model contract CENACE will enter into with the participants of the wholesale electricity market in its capacity as “independent operator of the electrical network” (Chadbourne 2014, 2).

Prior to the reform, numerous market failures led to a weakened rule of law. One example of this can be observed in the low levels of competition<sup>12</sup> Mexican companies have suffered over the years as a result of the high cost of electricity, an essential consumable for their operations. In this respect, the legal market regulations prevented industrial consumers

from being able to obtain electricity from sources other than the CFE, except when they had their own self-generation plant. However, despite the growing participation of private parties in this market, PIEs could not sell their electricity to any person except the CFE under a monopsony scheme. Therefore, the vast majority of SMEs in the country—which do not have the financial capacity to invest in or be part of a self-supply mechanism—depended on CFE services for the production of their goods (Centro de Investigación para el Desarrollo, A.C. 2013, 7).

On the other hand, as a result of the lack of the CFE's financial resources to carry out new investments, it did not generate sufficient capacity to cover the demand for electricity over the medium term, meaning that the legal regulations, which since 1960 have required the stewardship of the State as the only provider of electrical energy for the country, did not manage to fully cover the demand of all residents, including companies. Likewise, in this respect, it was clear that, without private generation, Mexico would not have sufficient electricity to satisfy its current demand. Between 1996 and 2012, Mexico increased its installed capacity by 28 GW, achieving 78 percent of this expansion through private generators. Over this period, the public installed capacity increased from 34.8 GW to 40.7 GW, whereas private installed capacity rose from 1.2 GW to 23.1 GW. Therefore, covering the missing demand requires increasing the capacity by 40.81 GW, which represents an investment of 1.34 trillion pesos—the equivalent of a 3.97 percent growth rate—during the subsequent 12 years (CIDAC 2013, 7).

One of the major novelties of the electrical reform is CENACE. Considering that the State will continue to generate electrical energy, this decentralized public entity joins the regulatory body as a guarantor of the operation of the national electric system by providing increased functionality. CENACE's responsibilities include overseeing the operation of the entire system in an impartial manner and permitting open and nondiscriminatory access to the electrical networks. This separation guarantees that the coordination of electrical plants is conducted using a criteria of minimum costs for the system; conflicts of interest are thereby eliminated, and improperly favoring a specific generation company is avoided. CENACE therefore provides greater certainty in terms of operational control over the system, and it supplies information regarding levels of production, transmission, and distribution, which ultimately leads to higher levels of security, reliability, quality, and continuity. Based on the foregoing reasons, throughout the entire preparation process for the electrical reform, care was taken to ensure that the reformed elements pointed toward the same goal: competitiveness.<sup>13</sup>

Likewise, the reform paves the way for SENER, carriers, or distributors to form partnerships or enter into contracts with individuals (on behalf of the nation) to finance, install, maintain, manage, operate, and expand the infrastructure necessary to render the public service of electrical energy transmission and distribution in the areas established for such purpose. According to the LIE, carriers and distributors are obligated to interconnect the electrical power plants with their networks, as well as the load centers that request to be connected, under conditions that are not improperly discriminatory, whenever it is technically feasible. The market rules establish the criteria, and CENACE determines the



specific characteristics of the infrastructure required and also exempts electrical power plants and load centers from certification.

Insofar as the participation of SMEs is concerned, the Mexican legal framework, through the Public Sector Purchasing, Lease, and Services Act (LAASSP), establishes their inclusion in public contracting procedures. According to such regulations, the Ministry of Economic Affairs issues the rules to govern programs whose purpose is to promote the participation of national companies in public biddings for the supply chain. According to the LAASSP, the agencies and entities can conduct biddings in which only SMEs may participate, within the technical and financial limits and thresholds set forth in the free trade agreements to which Mexico is a party, which have a chapter regarding public sector purchases. Likewise, the regulation permits the granting of additional points to SMEs that utilize technological innovation to produce goods. In addition, the federal executive branch is authorized by law to determine the agencies and entities that must set up mixed supply consulting commissions, depending on the volume, characteristics, and importance of the purchases, leases, and services that are contracted. Such commissions may, *inter alia*, promote actions to foster more contracting with SMEs as well as encourage other companies to consume goods or services produced or provided by such businesses. Notwithstanding the consideration of the participation of SMEs in the LAASSP and its possible link to new laws for the energy sector, the debate during the legislative process that gave rise to the constitutional reform and the secondary laws focused on efforts to include the national industry as a fundamental part of the production processes it seeks to incentivize, based on the new legal framework. The interests of the business associations, which were the main promoters of the concept, focused on including percentages of “national content” in the laws to guarantee the entry of Mexican companies in the energy sector and make the benefits of the energy reform more visible—not only in terms of tax collection through new projects, but also in matters of employment, technological transfer, and human capital development—in such a manner that the new laws and their consequent application would have a positive effect on the well-being of the population and would strengthen the rule of law, according to the perspective previously mentioned in this essay.

### **The Inclusion of “National Content” under the Energy Reform**

The concept of “national content” in Mexico’s energy industry was included under the LIE for the purpose of guaranteeing better levels of competition, the formation of regional and nationwide production chains, and the development of talent, innovation, and technology. The CRE, in turn, is authorized to approve the creation of “integrated systems” as well as determine the incorporation of new infrastructure in accordance with public policy on energy issued by SENER.

For the electrical industry, the Ministry of Economic Affairs (SE) was selected to define strategies for industrial development of local production chains and direct investment, with special attention given to SMEs.

**Figure 1.** Responsibilities assigned to the Ministry of Economic Affairs regarding “national content” and the development of the energy reform

Strategy	Tactics
Identify the industrial subsectors and the regions where the strategy will be focused, aligned with the electrical industry demand.	Commission studies to identify the existing products and sectors in the market as well as their providers.
Integrate, administer, and update a catalog of national providers, considering their development needs.	The National Register of Providers for the energy sector will be created based on the list of companies already working with PEMEX and the CFE, as well as information from private directories produced by chambers of commerce and state governments.
Implement programs for developing national providers and contractors.	Identify business opportunities.
Promote the closing of gaps in technical capacities with representatives from the Ministry of Economic Affairs, the CRE, academia, industry and the private sector.	Prepare assessments to detect gaps.
Promote national and foreign investment in the performance of permanent activities in Mexico’s electrical industry or in the provisions of goods and services related to this industry.	Promote partnerships between Mexican and foreign companies.
Promote the transfer of technology and knowledge.	Establish methodologies to measure and verify the degree of “national content” in the electrical industry.

Source: Author’s own work, based on the Electricity Industry Act (LIE).

According to the reform, a Public Trust to Promote the Development of National Providers and Contractors of the Energy Industry must be created, which will be administered by Mexican development banks. Likewise, by law, SENER and the CRE must give preference to purchases of domestic goods, contracting of national service providers (including for training), and hires of Mexican nationals in both technical and managerial roles.

Although the LIE does not require a minimum percentage of “national content,” it establishes that SENER will set the minimum percentages for supplies under the respective contracts and establish a methodology to measure the degree of “national content” regarding national goods and services, Mexican unskilled or skilled labor, domestic labor training, and infrastructure investment at the local and regional levels.

After the promulgation of the energy reform, the debate around the “national content” strategy that would be followed used as its main reference the Brazilian model, which establishes criteria for the selection of projects and parameters for the different financing mechanisms. The idea is that, in a competitive environment, Mexican companies would compete and have access to cheaper and more flexible financing credit, with rates and repayment periods that might make them highly competitive. Generally speaking, foreign companies enjoy more favorable credit terms. For example, during the promulgation of the energy reform, the British government emphasized that Mexico’s energy reform creates opportunities for British companies due to the degree of foreign content allowed in contracts. According to communication by the British government, “the Mexican ‘national content ratio’ is lower than that specified in Brazil or Norway (both around 50 percent). This emphasizes the opportunities (that) the reform will create for suppliers from Great Britain, in particular small and medium-sized companies.” The statement also highlighted the advantage companies will have to access to up to 26 billion pesos, between funds available through both the British bank HSBC and the Mexican Development Bank (Nafin and Banobras, mainly), to finance private projects related to the energy sector.

According to the reform, to create an incentive for private participation in the generation of electrical energy using renewable sources, the main field in which SMEs could participate, different institutions such as CRE, the CFE, and SENER are mandated to grant incentives such as:

- An energy bank that permits producers to accumulate excessive energy under rules of self-supply to be used in the future or to be sold to the CFE.
- Preferential energy transmission rates. Charge Mex\$0.14/kWh for efficient cogeneration transmission service, instead of the standard Mex\$0.30 to Mex\$0.40/kWh transmission rate charged for energy based on traditional sources.
- Net metering, which applies to small-scale projects (up to 10 kWp for homes and 30 kWp for companies) and consists of offsetting the cost of electricity used with energy contributed to the national network.
- A new methodology of considerations for payment to renewable energy generators. Establishes the maximum and minimum prices the supplier (CFE) will be able to award in contracts for electricity generation, subject to

rules for small and independent producers, as well as the consideration (remuneration) to be paid to the companies that win the contracts. This will enable transparency and offer certainty and a reasonable profit to parties interested in generating electricity by using renewable sources.

## The Dilemmas Regarding the Role of SMEs

According to the World Bank, SMEs in developing countries can generate significant growth and jobs as long as they take advantage of opportunities offered by clean technologies, which may reach up to US\$1.6 trillion. Latin America and Africa are among the largest potential markets, worth US\$349 billion and US\$235 billion, respectively. SMEs are recognized throughout the world as basic drivers of job creation. In this respect, the World Bank emphasizes that countries must take key measures in terms of policies to fully utilize their growth potential and create widespread benefits and solutions for urgent development priorities, such as access to clean and affordable energy, drinking water, and agricultural practices that are climate friendly (World Bank 2015).

Within the national economic landscape, SMEs represent 99.8 percent of all formal companies in Mexico and employ 72.4 percent of the population, meaning they generate seven out of every 10 jobs in Mexico (Organisation for Economic Co-operation and Development 2013).

**Figure 2.** Type of companies in Mexico and their contribution to employment and GDP

Type of companies	Number of companies	% of all companies	Percentage of jobs	Contribution to Gross Domestic Product (GDP)
Microcompanies	3,829,100	95%	40.6%	15%
Small companies	138,500	3.4%	14.9%	14.5%
Medium-size companies	31,600	0.8%	16.6%	22.5%
Large companies	7,900	0.2%	27.9%	48%

Source: Ministry of Economic Affairs (2014).

In the second half of the 1990s, the topic of SMEs gained importance within the scope of industrial promotion programs. In the case of Mexico, the federal government has launched different initiatives to promote the creation and development of SMEs. Even though these policies have produced results—Mexico has the highest rate for startups among the members of the Organisation for Economic Co-operation and Development (OECD 2013)—the majority of these companies in fact have low levels of competitiveness and a high level of mortality, with most of them only surviving for one year on average.

Paradoxically, as indicated by the World Bank, SMEs provide most employment opportunities to the population and participate in practically half of all national production. Considering the clear relationship between company size and productivity, the crucial question is: to what extent can SMEs be integrated in the country's development plans? In this respect, what aspects would need to be addressed to make it reasonable to integrate them in the national development project?

As we can see, among all companies in Mexico, SMEs carry a disproportionate share of the economically active population. This explains the importance of reviewing whether these companies currently have any actual opportunities to investment in the reform of Mexico's electrical sector, and to design the best strategy to support them.

Researcher Eloísa Treviño of the Autonomous University of Nuevo León conducted an in-depth analysis of the endogenous administration factors of SMEs that determine the growth of their profits, focusing on data regarding companies located in the city of Monterrey and its metropolitan area. Among the findings, the researcher determined that three weaknesses affecting SMEs have the greatest impact on their expected profits: i) the need to improve their administrative capacity; ii) the lack of adequate systems to control price quality in terms of SMEs' degree of communication with their clients and their perceptions regarding their competitors' actions; and iii) their low capacity to innovate and create new technology (Treviño 2013, 71-74).

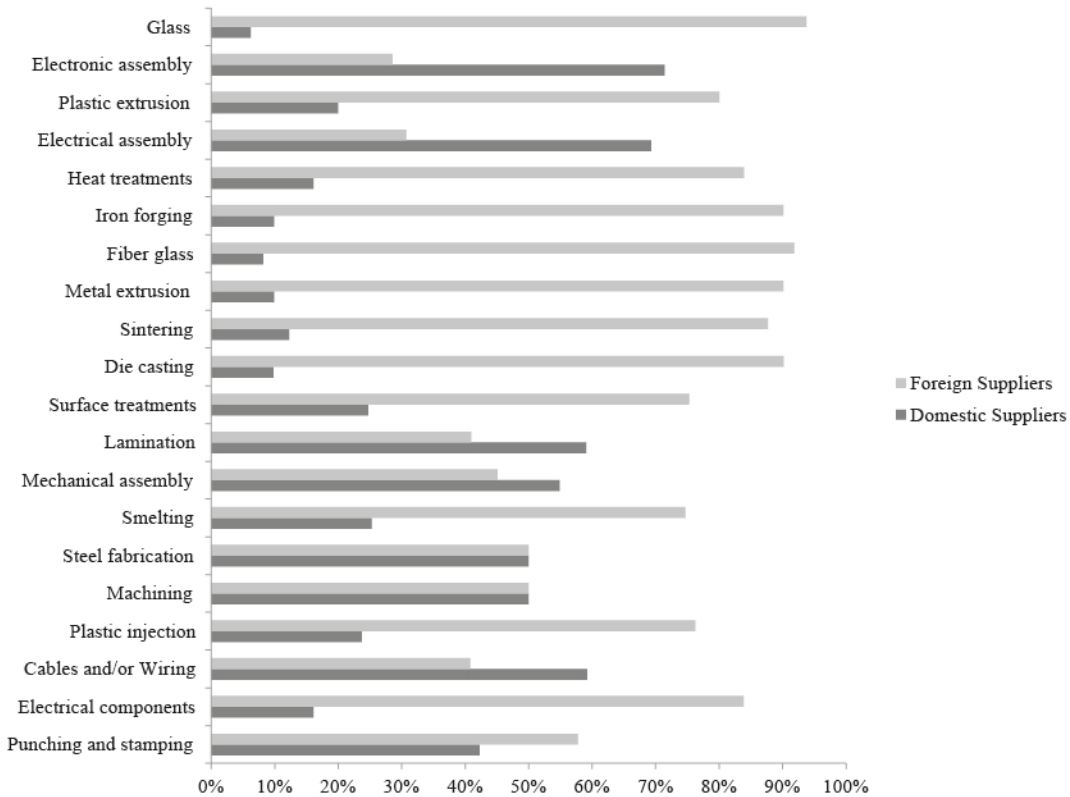
### **Creation of a Chain of Providers and a Distributed Generation Market**

In Mexico, the electrical sector utilizes a series of processes, among which machining, smelting, metal manufacturing, assembly, stamping, plastics injection, aluminum injection, and secondary processes are noteworthy. All of these services are mainly located in the states of Coahuila, Nuevo León, Mexico, Chihuahua, Puebla, Tamaulipas, Durango, Tlaxcala, and the Federal District.

Overall, there are 1,060 specialized economic units in the electrical sector. Most of them are located in the Federal District and the states of Mexico, Nuevo León, Jalisco, and Baja California. In 2012, the sector employed 127,252 people. The leading multinational companies include ABB Group, Eaton Corporation, Furukawa Electric Co., ACME, Amphenol, Belden Inc., Cooper Industries, General Electric Company, Hammond Manufacturing, Schneider Electric, Siemens, Thomas & Betts, Mitsubishi, and WEG Electric Corp. Furthermore, Mexico has national companies that manufacture intermediate products such as cables, wires, and transformers. Of these, outstanding companies include Condumex Inc., Prolec GE, and Voltran (ProMexico 2013).

However, even though there are large players in the electrical sector like the ones mentioned above, the investment possibilities for SMEs are still quite broad. As shown in the graphic below, 42 percent of the sector's total demand in 2013 was satisfied by domestic providers. The following figure shows the main elements of the manufacturing production chain in the electrical sector.

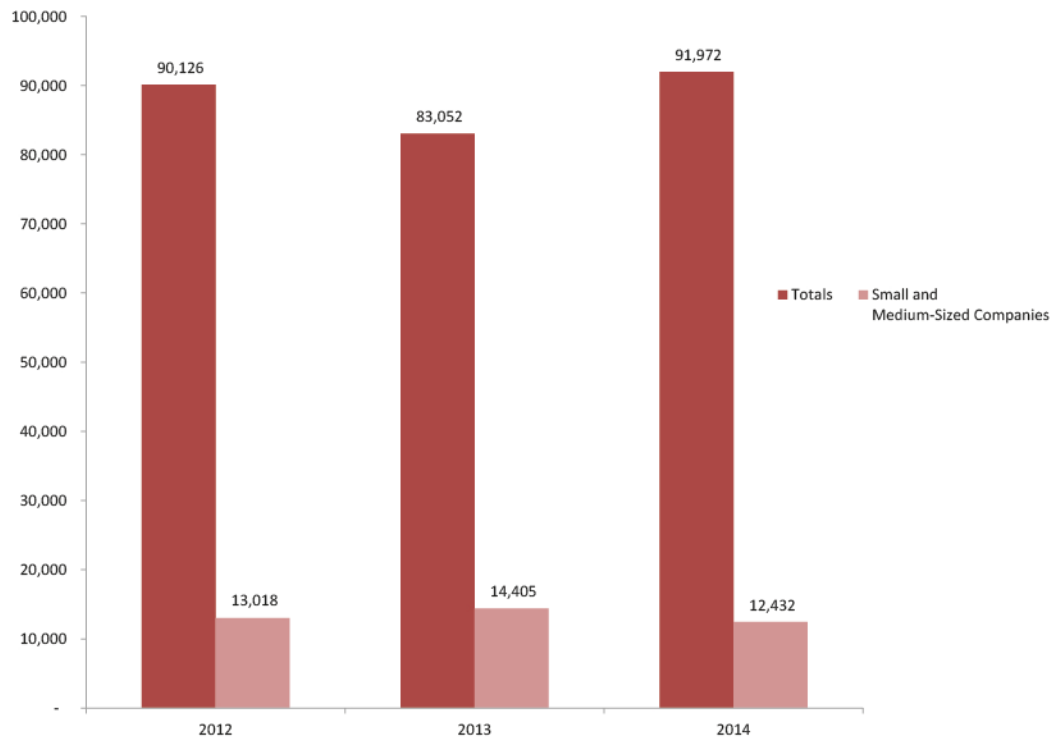
Figure 3. Origin of supply for the electrical sector production chain, 2013



Source: Author’s own elaboration using information by ProMéxico (2013).

In 2012, total electricity production amounted to \$28.843 million. It is estimated that electrical industry production will grow—driven, to a great extent, by the energy reform—at an average annual rate of 7.9 percent between 2013 and 2020. Insofar as wind and geothermal energy are concerned, only 3.2 percent and 2.1 percent, respectively, of the country’s potential capacity are utilized.

Figure 4. Purchases by the Federal Electricity Commission, 2012-2014 (million pesos)



Source: Author's own work based on information from Compranet (data until September 2014).

On the other hand, the development of renewable energies could utilize the extensive experience and industrial platform of the electricity generation and distribution equipment sector, in particular with regard to equipment manufacturing. This field of activity has a broad supply chain, distribution chains, and support programs; coupled with low industrial costs and highly qualified labor, these factors can be utilized to redirect production toward equipment for renewable energies and permit the development of the manufacturing industry.

In spite of being a very young industry in Mexico, the renewable energy sector has grown favorably over the past few years: it mainly increased the production of wind energy and, recently, has promoted more solar power. The Mexican market is broad and attractive, not only because of its extensive potential in terms of wind, solar, geothermal, water, and biomass resources, but also because of the opportunity to manufacture equipment for the sector by utilizing the country's vast experience in terms of manufacturing equipment for the electricity generation and distribution industry.

Figure 5. Installed capacity for electricity generation, by technology (MW)

	Installed Capacity in Operation	Authorized Capacity under construction	Additional Installed Capacity 2013-27			Total
			Public Service	Self-Supply	Distributed Generation	
Wind	1,638	3,332	3,519	7,066	395	15,950
Solar	76	976				
- Photovoltaic			36	2,199	1,273	3,508
- Thermosolar			14	29	1	44
Biomass	661	120	-	539	402	1,722
Geothermal	823	169	180	40	57	1,269

Source: Author's own work using statistical data from the Federal Electricity Commission (CFE)/Energy Regulatory Commission (CRE).

To satisfy total demand for electrical energy through 2027, the CFE estimates that an additional 47,503 MW will be required for the National Electrical System (SEN). The public sector is planning to install 8,470 MW in renewable energies, which represents 17.8 percent of the electrical network's national total. Transnational companies that provide equipment and execute projects consider Mexico an attractive destination to invest in the renewable energy sector. Likewise, Mexican companies have diversified business in this sector with small-scale projects and the manufacture and trading of equipment, showing that the inclusion of SMEs in this respect is indeed possible.

Figure 6. Number of electricity generation plants using renewable energies, 2013 (MW)

State	Wind	Geothermal	Biomass	Solar	Total
Oaxaca	2,707		33		33
Baja California	539	570		37	37
Veracruz	40		268		268
Coahuila	501		33	37	70
Tampaulipas	500		13		13
Sonora	2			386	386
Nuevo León	324		28		28
San Luis Potosí	200		81	33	114
Jalisco	50		66	84	150
Baja California Sur	1	10		236	236
Other	106	308	258	212	470
<b>Total</b>	<b>4,970</b>	<b>888</b>	<b>780</b>	<b>1,025</b>	<b>12</b>

Source: Author's own work using statistical data from the CFE and the CRE.



One of the great challenges SMEs face on a global level is access to initial financing and survival during their first stage of growth. With respect to this market failure, governments can help by creating incentives through specific policies with a range of practical tools that help support SMEs in areas such as innovative financing mechanisms, businesses acceleration and entrepreneurship, market development, technological improvements, and the legal and regulatory framework.

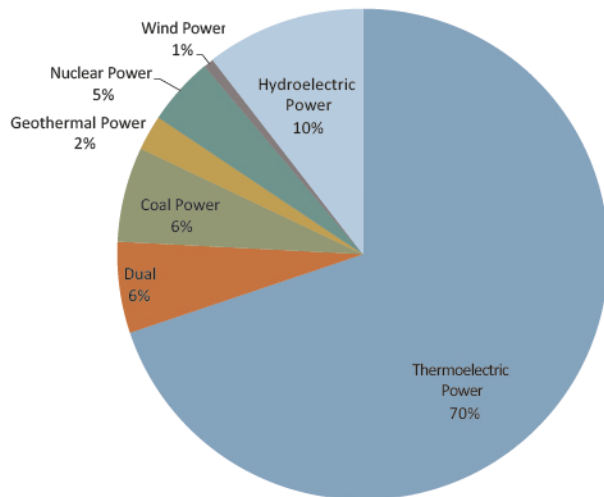
According to the Mexican government, the implementation of the energy reform must achieve its goals on the basis of one crucial issue: project financing. At the end of September 2014, the Ministry of Finance and Public Credit (SHCP) announced the establishment of energy sector funds to provide investors with different financial instruments that will support the development of the sector, permit increased public participation in investment projects, and expand the electrical supply network to cover rural and marginal areas. Within this set of four funds, the Public Trust to Promote the Development of National Providers and Contractors of the Energy Industry deserves to be mentioned. This fund was established under the laws of the electrical and hydrocarbons industry to promote the development and competitiveness of local and national providers and contractors through financing mechanisms and training, research, and certification programs. The fund likewise strives to close gaps in terms of technical capacity and quality, paying special attention to SMEs, and it has assets worth 200 million pesos and a budget of 300 million pesos for 2015.

Likewise, the SHCP also established the Universal Electrical Service Fund in 2014, as set forth in the LIE. Accordingly, any excess funds will come from the surpluses generated through efficiency or optimal management of the electrical market as well as from donations and contributions by third parties. The fund's resources are intended to finance providers and distributors of basic services in rural communities and marginal areas to ensure that all homes throughout the country have access to electricity at the lowest cost, and that the benefits and flexibility provided by renewable energies are utilized.

In this respect, and based on the regulatory framework, the inclusion of SMEs in the electrical sector as providers of consumables in all links in the supply chain, mainly in the generation subsector, seems to be viable over the coming years. Both the LIE as well as the Energy Transition Act create an opportunity for SMEs to become integrated into the market based on the expansion and modernization of general distribution networks, which will allow them to enter into contracts between individuals for infrastructure installation and management. The success of these business models will depend on the development of multiple factors, mainly financing and attention on improving the internal capacities of SMEs. The inclusion of the "national content" concept in the LIE and its subsequent regulation notwithstanding, what will truly drive SMEs as participants in economic development will be their competitiveness and capacity to serve as substitutes to imports in areas where they appear to be the best option in terms of price and quality of products and services.

Currently, electricity generation in Mexico greatly depends on natural gas as a consumable, considering that, even though electricity can be generated through multiple processes, the most economic method has been through combined-cycle power plants that use natural gas.

**Figure 7.** Gross energy generation by technology



Source: Author's own work using statistical data from the CRE (2013).

In 2010, Mexico had the second-highest investment growth rate in renewable energies in the world, reaching 548 percent, which is significant, but not sufficient. Even with such an astounding growth rate, when considering the period 2007-2012, Mexico is not among the top 10 countries in terms of investment growth in this type of energy. Paradoxically, the most significant area of opportunity for the inclusion of SMEs in the electrical sector, in addition to their potential integration into the supply chain for renewable energy development, is in electricity generation, considering that the costs of renewable energies—except in the case of photovoltaic energy—are already competitive compared to other sources of electricity generation, even electricity produced by combined gas-turbine cycles. By 2020, it is expected that virtually all sources of renewable energy will be competitive; as a matter of fact, electricity generation through wind energy will be even cheaper (CIDAC 2013, 19).

The expansion of the renewable energy sector has depended, mostly, on two components: self-supply and Independent Energy Producers (PIEs), segments in which the participation of SMEs was not feasible: the costs of investment, operation, and maintenance rendered their participation unviable. The forecast of development growth for electricity generation based on renewable sources for self-supply producers is very revealing. The largest growth occurred for wind and solar photovoltaic technology, which are the two technologies with the greatest decrease in costs with respect to other sources of electricity generation. Article 1 of the Law for the Use of Renewable Energies and Energy Transition Financing

(LAERFTE), which already existed prior to the energy reform, establishes that its goals are the regulation of the utilization of renewable energy and clean technology sources to generate electricity for different purposes than the provision of the public service of electrical energy; according to its Article 2, the utilization of renewable energy sources and the use of clean technologies is considered a matter of public utility and will be carried out within the scope of the national strategy for energy transition, through which the Mexican State seeks to promote effectiveness and energy sustainability as well as reduce the country's dependency on hydrocarbons as the primary source of energy.<sup>14</sup> Despite the intention stated in the law, there are significant impediments for Mexico to successfully transition toward a more diversified energy matrix. Among the most important obstacles, we will mention the following:

- A. Limited knowledge regarding available technologies as well as their respective benefits and costs;
- B. A limited electrical transmission infrastructure, which prevents electricity produced via renewable energies from being supplied to remote locations and also creates storage difficulties;
- C. A regulatory framework that still grants a competitive advantage to fossil fuel energy sources through inefficient and perverse subsidies; and
- D. A limited supply of financial instruments for the development of renewable energy projects.

It remains clear that, to trigger Mexico's potential as a renewable energy producer, something more than a strategy to promote its use is required (CIDAC 2013, 35). However, one mechanism that actually was included in the reform—taking other countries as a reference—and could drive the investment of SMEs in the electrical sector is certificates of clean energies. This provision will go into effect in 2018 and will strive to diversify energy sources through establishing minimum purchase and sale percentages for public biddings and direct sales, with which the market participants must comply.<sup>15</sup> Regulated properly, this tool will be suitable to achieve a more diversified energy matrix, considering that the intention is to create a market in which the State will establish a minimum percentage for energy generation using clean sources<sup>16</sup> each year, which generators or distributors must meet (Mexican Institute for Competitiveness 2014).<sup>17</sup>

Public policy definitely would have to find a way to internalize, in a more efficient manner, the social and environmental costs incurred through the use of fossil fuels by restructuring energy subsidies and making transparent any temporary subsidies of capital goods for renewable energies, including for competitive SMEs. Unfortunately, there is no statistical information that allows us to identify the percentage of SMEs that, today, are already included in the current and scheduled capacity for electricity generation through renewable sources. However, their inclusion is becoming increasingly frequent in different developing countries. According to the World Bank, clean technology has emerged as an important market over the past decade alone. Over the next 10 years, it is calculated that US\$6.4 trillion will be invested in developing countries. Out of the total market in such nations, SMEs will be able to access around US\$1.6 trillion, according to the report. China, Latin America, and Sub-Saharan Africa are the three main markets in the world in terms of

SME development in renewable energy. The potential sectors for investment are the treatment of residual waters, land-based wind energy, solar panels, electric vehicles, bioenergy, and small hydroelectric projects (World Bank 2015, 6).

### **The Brazilian Experience in Terms of its Regulation of “National Content”**

Brazil, the largest country in Latin America, has primary energy coming from different sources: oil, gas, coal, and hydraulic energy. Over the past 10 years, renewable sources have represented between 45 and 48 percent of total energy production. The diversification of the Brazilian energy matrix is the result of a policy that started 30 years ago with goals anchored in energy security. Brazil built two avenues for its reform: the implementation of programs to stimulate the diversification of energy sources, and the opening of the energy sector to private investment. (Magaldi et al. 2014, 100). Until the start of the 1990s, the Brazilian State was responsible for electrical energy generation and distribution. All companies in the sector were public companies and integrated vertically. Rates were subsidized, and foreigners were not allowed to participate in the sector. Since the mid-1990s, the government has promoted the liberalization and deregulation of the sector, which changed the traditionally interventionist model.

In 1993, rate subsidies were eliminated, and in 1995, all energy sectors, including electricity, were opened up to private capital. As a result, 19 electricity companies were privatized, and bidding on new energy generation projects was permitted. The role of independent energy producer was created, free access was provided to transmission and distribution systems, and large consumers were free to elect their energy providers. However, the results of these reforms were not complete. In 2000, electricity consumption exhibited an upward trend that could not be satisfied by the generating capacity at that time. Brazil suffered a blackout in 2001 that affected almost its entire economy, making it clear that the challenge was to finance the expansion of the energy system by attracting investment, in particular from foreign entities, for electricity generation and transmission activities (Magaldi de Sousa 2014, 100).

For some authors, such as Jorge Suárez, Brazil is the best example of the failure of including national companies, since it imposed strict laws regarding “national content.” As a result, six years after being the most promising market where everyone wanted to invest, today, production is stagnating, and Petrobras carries excessive debt. Foreign investors view this market with enormous precaution, since, considering the limitations in terms of local content, it is much more attractive to invest in U.S. shale gas or in Canadian bituminous sands. According to a study by the consulting company Booz & Co., Brazilian providers in the petroleum services industry charge 55 percent more than similar international companies. Furthermore, the early investors are being affected by the growing financial costs in Brazil, as local interest rates are increasing. Likewise, according to the opinion of Brazilian academics, this law has fostered corruption and the establishment of expensive privileged providers, which has made the local energy industry less competitive (Magaldi et al. 2014, 102).

## Conclusions and Recommendations

The electrical sector is important for a broad spectrum of activities that affect the living conditions of any country. This transversality impacts the growth of all economic sectors in the country. A nation depends on the supply of electricity under competitive conditions that guarantee the greatest incorporation of added production value for the entire economy and improvement in the population's living conditions. For these reasons, the energy reform in the electrical industry was urgent and unavoidable. In this respect, the connection between the reform and the rule of law impacts two dimensions: on one hand, the reform of the electrical system's legal framework establishes guidelines that, based on the industrial structure of the electrical sector, will result in changes that will lower electricity prices, which will increase the competitiveness of all sectors, including SMEs, whose production and distribution costs will be reduced. Thus, the reform will have a positive impact on economic development and will strengthen the rule of law by establishing conditions that are suitable for growth. On the other hand, although the reform states clear intentions of including the participation of Mexican companies in certain production chains, among them SMEs, the mechanism of integration based on quotas and an industrial policy of "national content" could create an incentive for artificial or unsustainable inclusion over the long term. In other words, the public policy of "national content" is a way to promote and support SMEs, but to be effective, it must make sure to address endogenous factors that currently delay or eliminate the competitiveness of SMEs. The problem created by an indiscriminate "national content" policy is that it may lead to the sort of consequences that have already been observed in Brazil. Therefore, State assistance could actually focus on promoting training for SMEs to increase their professionalism and decrease their high degree of mortality—one SME shuts down every two years, and only one survives more than a decade.

SMEs represent small but important progress in the economic system and generate the vast majority of new jobs worldwide. In this respect, the inclusion of SMEs in the production chains is a clear reflection of the strengthening rule of law. A country without energy is a country without a future, and a nation without electrical policies in favor of SMEs would not be socially viable, because they also contribute to social peace.

Perhaps the adoption of standards for state support based on size may be the most appropriate solution. For example, following the recommendations of economist Rodrik, a focused incentive through public policies for medium-sized companies could have a multiplying effect on the share of GDP contributed by SMEs. Likewise, differentiated support for micro and small companies could set the basis to prepare them for sustained growth for the purpose of successfully increasing the number of mid-sized companies. Let's not forget about the great inventions developed by SMEs: any large company started out by being a small or medium-size company—clear examples include Microsoft, Apple, and now the fracking and photovoltaic generation companies—and they represent an economic element that is too important for the government to exclude from its energy policy, something that would even lead to social unrest.

As emphasized by Gabriel Zaid (1995 and 2009), SMEs have clearly pointed out that regulatory cost is, by far, the most choking factor for them. At the same time, over the course of several years, Mexico has been working on creating and modifying laws that create an incentive for the use of renewable energies to decrease dependency on fossil fuels, reduce greenhouse gas emissions, and trigger economic growth. However, even though there has been a clearer vision of the industrial organization of the electrical sector since the energy reform, there are enormous challenges for the successful and effective implementation of legal reforms that will lead to tangible results for SMEs.

The following recommendations listed below were gathered during the course of this research, which included study time, but also interviews with micro-entrepreneurs in the energy sector:

- More clarity is required regarding the new electricity transmission and distribution lines that will be constructed to provide certainty to investors and create opportunities for the inclusion of SMEs in production chains.
- The Mexican regulatory framework has promoted—up to a certain point—the development of the renewable energy industry. Nonetheless, there are still barriers hindering their complete adoption. It is urgent to eliminate bureaucratic barriers with respect to obtaining permits for electricity generation and interconnection contracts. (Lujambio 2015).
- An Official Mexican Standard for the construction, operation, and maintenance of both distributed generation as well as intelligent networks (IMCO 2015) must be designed. In a case study, create a new Official Mexican Standard (NOM) that exclusively addresses the topic of energy generation through the handling of residues or residual biomass. The current NOM 81 requires the establishment of residue management plans, but it is not explicit in terms of the use of residues to generate energy and does not create sufficient incentives to implement this type of renewable energy in public organizations.
- It is necessary to reformulate the entire energy subsidy mechanism in Mexico to review the actual costs of fossil fuel-based energy production and investment opportunities when reallocating subsidies to focus on the distributed generation industry (CIDAC 2015).
- The restructuring of energy subsidies should be completed by a transparent and strategic public spending process for the purpose of implementing temporary subsidies to purchase capital goods and fund training to trigger investment by SMEs.
- Given the complexity of the “national content” policy, it is recommended to take steps to ensure that its instrumentation does not create a backlash in terms of market development. Conducting a detailed study of the Brazilian experience can enable the Mexican government to avoid the same errors. Excessive state participation could trigger adverse effects and weaken the rule of law through overregulation.

## The New Legal and Regulatory Framework of the Mexican Electrical Sector

- Until the present, only nine states in the country have laws on matters of renewable energies. It would be desirable for all 32 states to cover these topics in their regulatory frameworks. The legal vacuum some states have regarding permits, licenses, etc., will inhibit investment.
- It is necessary to assess the potential of installing electrical power generation plants using residual biomass (organic solid residues). Its potential is immense and would resolve two problems at the same time: a substantial improvement in terms of handling solid residues that currently saturate cities' sanitary landfills, and a considerable decrease in volumes of greenhouse gas emissions.
- Revise the agreement establishing rules for the application of the “national content” requirement in public works contracting procedures, which the federal government entered into on July 15, 2003, under the North American Free Trade Agreement. The study of such rules regarding “national content” may shed light on what must and must not be done with respect to the current policy in the energy sector.
- Reformulate the strategy for financing SMEs for energy projects following the best practices established by the World Bank to attract a greater number of candidates for such funds (World Bank 2015, 92).
- Design new legal-fiscal and commercial mechanisms in accordance with the needs of SMEs to create a greater incentive for innovation and less company mortality.
- Incorporate the effects of the new regulation on SMEs in a mechanism for monitoring and tracking the electrical reform.

## Bibliography

- Bierzwinsky Raquel, David Jiménez, and Javier Félix. 2014. A New Electrical Market in Mexico. Available at: [http://www.chadbourne.com/files/Publication/5ba2ec78-a5d3-424f-9037-e1902c7ec575/Presentation/PublicationAttachment/0f31597d-698e-4557-9253-06225665c4f8/Nuevo\\_Mercado\\_Electrico\\_Mexico\\_0914.pdf](http://www.chadbourne.com/files/Publication/5ba2ec78-a5d3-424f-9037-e1902c7ec575/Presentation/PublicationAttachment/0f31597d-698e-4557-9253-06225665c4f8/Nuevo_Mercado_Electrico_Mexico_0914.pdf).
- Bingham, Tom. 2010. *The Rule of Law*. London: Penguin Books.
- Centro de Investigación para el Desarrollo, A.C. Development Research Center. 2013. *Mexico Unsafe Energy-Wise*. Mexico, Federal District: CIDAC. Available at: [http://cidac.org/esp/uploads/1/Mexico\\_Inseguro\\_energicamente\\_final\\_280813.pdf](http://cidac.org/esp/uploads/1/Mexico_Inseguro_energicamente_final_280813.pdf).
- . 2013. *Renewing the Energy Future of Mexico*. Mexico, Federal District: CIDAC. Available at: [http://cidac.org/esp/uploads/1/Renovando\\_el\\_futuro\\_energe\\_tico-100913.pdf](http://cidac.org/esp/uploads/1/Renovando_el_futuro_energe_tico-100913.pdf).
- . 2015. *Modifying Electrical Subsidies to Guarantee Effectiveness of the Sector. This is Possible*. Mexico City, Federal District: CIDAC.
- . 2013. *Spotlight on Domestic Competitiveness. Proposals for a Reform of the Mexican Electrical Sector*. Mexico City, Federal District: CIDAC.
- . 2013. *Rules of the game: State ranking in terms of regulatory improvement*. Mexico City, Federal District: CIDAC. Available at: [http://www.cidac.org/esp/uploads/1/Ranking\\_estatal\\_en\\_mejora\\_regulatoria.pdf](http://www.cidac.org/esp/uploads/1/Ranking_estatal_en_mejora_regulatoria.pdf).
- De Rozensweig Francisco. 2007. *The electrical sector in Mexico: development, regulation, and trends*. Mexico City, Federal District: Porrúa.
- El Universal. 2014. Creation of funds accelerates energy reform: The Treasury. *El Universal*, Oct. 5. Available at: <http://www.eluniversal.com.mx/finanzas-cartera/2014/fondos-reforma-energetica-1043667.html>.
- Gallegos, Rodrigo and Saúl Rodríguez. 2015. *Towards the transformation of the Mexican electrical market: distributed generation*. Mexico City, Federal District: Mexican Competitiveness Institute, Civil Association.
- Garduño, Rafael, José Ibarra and Rafael Dávila. 2013. “The measurement of competitiveness in Mexico: advantages and disadvantages of the indicators,” *International Magazine of Statistics and Geography* 4(3): 28-53. Available at: [http://www.inegi.org.mx/RDE/RDE\\_10/Doctos/RDE\\_10\\_Art2.pdf](http://www.inegi.org.mx/RDE/RDE_10/Doctos/RDE_10_Art2.pdf).
- Ginebra, Xavier. 2014. “The energy reform in electricity matters.” *El Mundo del Abogado* Available at: <http://vlexdirect.com/es/reforma-energetica/mx>.



- González de Cossío, Francisco. 2011. *The rule of law: a (desperate) call for action*. Available at: <http://www.gdca.com.mx/PDF/varios/EL%20ESTADO%20DE%20DERECHO.pdf>
- . 2012. “The rule of law, economically.” In *Economic Analysis of the Law. Legal Encyclopedic Work*. Mexico City, Federal District: Porrúa, 155-196.
- Hayek, F.A. 1944. *The Road to Serfdom*, Chicago: The University of Chicago Press.
- International Institute for Administrative Development. 2014. *Global Yearbook of Competitiveness 2014*, Geneva: IIDA.
- Lujambio, José María. 2015. “Regarding the Green Agenda,” *Mexican Energy Law* 2: 13-18.
- Magaldi de Sousa, Mariana and Claudia Vanessa Maldonado Trujillo. 2014. *The integration of public policies for development*. Mexico City, Federal District: Centro de Investigación y Docencia Económicas.
- Ministry of Economic Affairs. 2003. “Agreement establishing the rules for the application of the requirement of ‘national content’ in public works contracting procedures entered into by the agencies and entities of the Federal Public Administration, Mexico.” Official Gazette of the Federation. Available at: [http://dof.gob.mx/nota\\_detalle.php?codigo=692915&fecha=15/07/2003](http://dof.gob.mx/nota_detalle.php?codigo=692915&fecha=15/07/2003).
- Ministry of Energy. 2013. *National Energy Strategy 2013-2027*, Mexico City, Federal District.
- Ministry of Energy. 2012. *Forecast of the Electrical Sector 2013-2027*. Available at: [https://www.gob.mx/cms/uploads/attachment/file/62949/Prospectiva\\_del\\_Sector\\_Electrico\\_2013-2027.pdf](https://www.gob.mx/cms/uploads/attachment/file/62949/Prospectiva_del_Sector_Electrico_2013-2027.pdf).
- Organization for Economic Co-Operation and Development. 2013. *Studies on SMEs and Entrepreneurship: Mexico*. Paris: OECD.
- Pricewaterhouse Coopers, S. C. 2014. Summary of the Decree issuing the Secondary Laws in Electrical Matters, Mexico City, Federal District.
- ProMexico. 2013. *Map of Investment. Electrical Sector*. Mexico City, Federal District.
- . 2012. *Map of Investment, Renewable Energies*. Mexico City, Federal District.
- Quintero, María Luisa, Silvia Padilla Silvia, and Luis López. 2015. *Micro, small, and medium-sized companies in the economic, cultural, and technological development of Mexico*. Mexico City, Federal District: Porrúa.

- Rodrik, Dani. 2004: "Industrial Policy for the Twenty-First Century." John F. Kennedy School of Government, Harvard University. Available at: <https://www.sss.ias.edu/files/pdfs/Rodrik/Research/industrial-policy-twenty-first-century.pdf>.
- Sánchez, Axel. 2014 10 companies which will compete with the CFE. *El Financiero*, September 29, <http://www.elfinanciero.com.mx/empresas/10-empresas-que-competiran-con-la-cfe-en-la-venta-de-electricidad.html>.
- Sustainability in Terms of Energy and Environment (SUEMA). Personal interviews with Ing. Jahir Mojica, General Director; Lic. Brian Urrutia, Director of Business Development, and Lic. Kattia Gutiérrez, Legal Director.
- Treviño Ayala, Eloisa. 2013. *Endogenous Factors in Mexican Small and Mid-Sized Companies which impact growth of profits*. Mexico: Autonomous University of the State of Nuevo León <http://eprints.uanl.mx/3730/2/1080256826.pdf>.
- World Bank. 2015. *Building Competitive Green Industries: The Climate and Clean Technology Opportunity for Developing Countries*. Washington D.C.: World Bank. Available at: <http://www.bancomundial.org/es/news/feature/2014/09/24/new-report-identifies-major-clean-tech-market-opportunity-for-small-businesses-in-developing-countries>.
- . 2014. *Doing Business in Mexico 2014*. Washington, D.C.: World Bank and International Financial Corporation.
- World Economic Forum. 2014: *Global Competitiveness Index 2014-2015*. Geneva: World Economic Forum. Available at: <http://www.weforum.org/issues/global-competitiveness>.
- World Justice Project. 2014. *WJP Rule of Law Index*. Available at: <http://data.worldjusticeproject.org/>.
- Zaid Gabriel. 2009. *Oppressed Entrepreneurs*. Mexico City, Federal District: Editorial Debolsillo.
- Zaid Gabriel. 1995. *We need entrepreneurs who create entrepreneurs*. Mexico City, Federal District: Editorial Océano.

## Endnotes

<sup>1</sup> Mexico's goal is to limit the share of fossil fuels in electricity generation using "clean energies," which are defined in the LIE, although it is currently being debated nationwide since it leaves the door open to include other sources and technologies that are not renewable, such as carbon capture and sequestration. Likewise, there is no clear criterion in this respect, and future definitions remain at the discretion of the Ministry of Environment and Natural Resources (SEMARNAT) and the Ministry of Energy (SENER). For the purposes of this essay, we will refer to renewable energies as one of the derivations of the electricity sector.

<sup>2</sup>Article 2, Electric Energy Act (LIE).

<sup>3</sup>Article 4, LIE. According to the Supreme Court of Justice of the Nation, the concept of public utility must not be restrictive, but rather broad, so that the State can cover the population's social and economic needs. Therefore, it is reiterated that, generally, it covers three causes: a) the public cause, whenever the good is directly intended for a public service or job; b) the social cause, which immediately and directly benefits a specific social class and indirectly any collectivity; and c) the national cause, which satisfies the country's need to adopt measures to confront situations affecting it as a political or international entity (Supreme Court of Justice of the Nation 2004).

<sup>4</sup> According to the reform, the law divides the participants in the wholesale electricity market into different categories: generators, suppliers, traders, basic supply users (with total consumptions of less of 3 megawatts), qualified users (with total consumptions of more than 3 megawatts), carriers, and distributors. Generators, suppliers, and qualified users can be converted into direct participants in the wholesale electricity market by signing respective contracts with Centro Nacional de Control de Energía (CENACE), which subsequently grants a bond in favor of such users. Each such participant must inform CENACE of the electric power plants or load centers it intends to incorporate in the network. The Energy Regulatory Commission (CRE) will establish the regulation for qualified users and suppliers of basic services and qualified services. The Federal Electricity Commission (CFE) will remain the main public electricity service company in Mexico.

<sup>5</sup> With respect to trading, the law covers one or more of the following activities: i) Provide electrical supply to final users; ii) Represent exempt generators on the wholesale electrical market; iii) Carry out the transactions referenced in Article 96 on the wholesale electrical market; iv) Enter into the contracts referenced in Article 97 with generators, traders, and qualified users who participate in the market; v) Purchase transmission and distribution services based on regulated rates; and vi) Purchase and transfer connected services not included in the electrical market via CENACE.

<sup>6</sup> This model introduces competition in terms of generation, promoting effectiveness, which generally represents the largest part of final users' electricity bills. The opening toward new investors, which entails foreign investments, is particularly noteworthy. This model has been used in other countries as a mechanism to transition from a monopolistic structure to a system with greater opening toward competition (Ginebra 2014).

<sup>7</sup> The Investment Projects with Deferred Expenditure Registration (PIDIREGAS) mechanism—created between 1995 and 1996 and officially launched in 1997—which financed investment projects in the electrical, petroleum, and natural gas sectors, deserves to be especially mentioned. This mechanism permitted annual amortization of investments over a period agreed upon beforehand between the government and the companies, with public resources allocated under the Budget of Expenditures of the Mexican Federation.

<sup>8</sup> Except for nuclear energy, which remains reserved as a CFE activity.

<sup>9</sup> The regulatory design allows generators to carry out trading activities, except for electrical supply. The CFE will continue to be the supplier of basic electricity service for residential users as well as for small and medium-size users on a regulated rate basis. Energy trading mainly consists of the purchase and sale of electricity as well as clean energy certificates. Exempt generators can only sell their electric energy and associated products through a supplier or dedicate their production to isolated supply. However, authorization from the CRE is actually required to import or export electric energy under the isolated supply rule. In such cases, the permits cover financing, installation, maintenance, management, operation, expansion, modernization, safety, and preservation of the particular networks that deliver the production to the national transmission network, the general distribution networks, or for the purpose of self-supply (Article 17, LIE).

<sup>10</sup> Accelerated depreciation for energy projects allows exempt generators with electric power plants that are interconnected to a distribution circuit containing a high concentration of load centers to operate under the distributed generation mechanism, which now has open access to the general distribution networks as well as the markets to sell their production. SENER has stated its interest in fostering the granting of credits and other mechanisms for financing distributed electric clean power generation plants. Electric energy consumers can now enter into agreements regarding energy compensation (net metering) with service suppliers. In these cases, the CRE is also in charge of issuing the contract models that will be used and establishing the payment methodologies.

<sup>11</sup> The CRE is in charge of granting permits for electric power plants with a capacity exceeding or equal to 0.5 MW and electric power plants of any size represented by a generator on the wholesale electricity market. Likewise, authorization from the CRE is required to import electric energy coming from an electric power plant abroad and connected exclusively to the National Electrical System. Electric power plants of any

capacity that are exclusively used for one's own purposes in emergencies or in cases of electrical supply interruptions do not require any permit.

<sup>12</sup> Traditionally, the measure of competitiveness indicates an economy's capacity to create value through its companies and workers.

<sup>13</sup> According to De Rozenzweig, the basic components of a competitive electrical industry are the following: i) competitive electrical markets; ii) supply and trading; iii) parallel markets of tools to mitigate price volatility; iv) regulation of monopolistic activities; v) indiscriminate access to transmission and distribution networks; vi) segmentation of activities: a) vertical disintegration, through legal or administrative separation (separation includes: generation, transmission, distribution, and supply of electric energy) and b) horizontal disintegration through the reduction of the participation of dominant companies in the industry, particularly in terms of concentrated generating capacity.

<sup>14</sup> Law for the Use of Renewable Energies and Energy Transition Financing (LAERFTE) provided SENER with different guidelines to observe in the preparation of the Special Program for Use of Renewable Energy. These directives include the following: i) The promotion of social participation in the design and evaluation of the instrument; ii) The establishment of specific objectives and goals as well as strategies and actions to accomplish them, considering the diversity of sources; iii) The inclusion of necessary infrastructure construction so that generation projects can be interconnected with the National Electrical System, a key aspect for the proper transportation of energy generated to remote regions (this aspect must receive special attention since the installation of infrastructure to permit the generation of renewable energies requires a comprehensive institutional effort); iv) The necessary congruence with other laws and programming instruments; v) The inclusion of strategies for rural electrification; and vi) The consideration of the net economic benefits of renewable energies.

<sup>15</sup> The reason for this mechanism emerged as a strategy to create an incentive for energy generation based on clean energies to reach the power generation goals established in the Law for the Use of Renewable Energies and Energy Transition Financing as well as the General Climate Change Act, both of which were promulgated in 2012.

<sup>16</sup> This explains the importance of clearly defining "clean energies" and closing the door for the discretionary definition of the term by SENER and SEMARNAT.

<sup>17</sup> After analyzing the operation of the English market for "clean energy certificates" over the past 12 years, the Mexican Institute for Competitiveness (IMCO) noted how its implementation involved a total overhaul of energy generation: between 2002 and 2011, generation through renewable sources tripled in the United Kingdom. The results show that the land-based wind power generation increased by 700 percent, while wind production at sea went from 0 to 5,125 GWh/year (IMCO 2014).