

NEW ENERGY MODEL, MARKET FAILURES AS A BASIC PRINCIPLE OF REGULATORY LEGITIMACY

Guillermo ZÚÑIGA MARTÍNEZ*

SUMMARY: I. *Introduction*. II. *Regulatory policy as a response to energy market dysfunctions*. III. *Conclusion*. IV. *Bibliography*.

I. INTRODUCTION

The energy industry is a risky industry. Without a doubt, agents require strong technical, economic, and financial to be able to perform successfully in the markets ranging from hydrocarbon exploration and extraction activities to electricity transmission and distribution activities considered strategic and reserved exclusively for the State in the text of the Mexican Constitution, to the recently liberalized midstream and downstream activities like transportation, storage, distribution and commercialization of petroleum products, or the generation and commercialization of electricity. However, in this context, what role is left for the government? The answer to this question has much to do with the construction of an environment in which property rights are clearly defined, contracts respected and enforceable, and the public interest is considered in the face of investments that, by their very nature, seek to maximize private profits. It is in this last area where it is important to design regulatory policies and instruments with enough strength and adaptability to weather the ups and downs of a volatile industry and reconcile these different types of interests.

The situation acquires a particular dynamic when advances in technological and business processes in the energy industries give rise to increasingly complex markets, and where international experience has demonstrat-

* Law Degree from the Instituto Tecnológico Autónomo de México. Master's in Economic Regulation from the London School of Economics, and Master's in Law from the University of Chicago Law School. Commissioner of the Energy Regulatory Commission.

ed that they should not be allowed to operate in the kind of governmental vacuum typified by *laissez faire* attitudes.

Given this, it becomes imperative for the State to intervene, rather than withdrawal, with such a level of sophistication featuring the emission of quality regulations that meet the objectives of ensuring the public good without sacrificing the advantages of the entry and operation of new economic agents.

Specifically, the field of regulatory policy design is responsible for solving precisely these problems in markets where their structure leads to inefficient equilibriums, where there is the potential for abuses by predominant players, production restrictions or rent extraction from consumers, to mention a few issues.

Broadly speaking, just as the markets are in continuous evolution, the style of State intervention has also developed internationally to break away from high levels of State interference (nationalization being the most extreme expression of such behavior),¹ and give way to a regulatory policy that embodies four main criteria:

1. That there are clearly established principles and rules.
2. That these rules are contained in a high-level legal instrument, at least in one piece of legislation.
3. That their implementation is carried out by specialized, technically solvent agencies and designed to be resistant to the pursuit of political agendas.²
4. Strict adherence to the circumstances and contexts of the mechanisms intrinsic to market management are not enough to guarantee proper operation. These are well-known market failures and must be given priority attention.

Regulatory policy must first answer the question “why regulate?” It is a question of utmost importance primarily because different motivations for regulation must necessarily result in different institutions and regulatory designs. Secondly, the motivations will give us a scale by which we can evaluate regulatory policy and institutional design.³

¹ Foster, Christopher, *Privatization, Public Ownership, and the Regulation of Natural Monopoly*, New Jersey, Blackwell, 1992, pp. 70-95.

² Majone, Giandomenico, “Regulation and its Modes”, in Majone, Giandomenico (comp.), *Regulating Europe*, New York, Routledge, 1996, pp. 9-27.

³ Decker, Christopher, *Modern Economic Regulation. An Introduction to Theory and Practice*, Cambridge, Cambridge University Press, 2015, pp. 13-35.

In Mexico's case, the energy model designed in the second half of the 20th century began to present clear deficiencies that did not address the energy needs of the country. It was necessary, therefore, for the country to update it using the best international practices. The energy context that gave rise to the so-called Energy Reform, presented to Congress by the Federal Executive on August 12, 2013, can be found in the preamble of said reform. In summary, the 2013 landscape in the hydrocarbons sector was the following:

- A fall in oil production despite the increasing rate of investment. This is reflected in the depletion of the Cantarell oil field.
- The drawback of a single State-owned agency assuming all the risks inherent to the exploration and extraction of hydrocarbons, principally those in non-conventional fields such as those located in deep waters.
- The growing dependence on foreign forces to satisfy demand for natural gas.

The situation in the electricity sector in 2013 was as follows:

- An electrification rate of less than 93.5% for settlements with fewer than 2,500 inhabitants.
- Rising financial losses incurred by the State monopoly, the Federal Electricity Commission, which registered at 77 billion pesos in 2012 alone, notwithstanding the high rates, even considering government subsidies.
- The commitment made in the 2012 General Law on Climate Change to achieve a target of 35% of electricity generation from clean sources.

This context forced the Mexican government to consider alternative regulatory models that would make up for the shortfall in investment in the sector, with their respective risks, which would simultaneously allow: 1) to strengthen the public finances of Pemex and the Federal Electricity Commission; 2) by reducing production costs and not by merely hiking up the rates to the detriment of consumers; and 3) without this meaning an increase in subsidies, which were often regressive (benefitting the higher-income population more) and preventing those resources being used for other programs.

This reform implied that the regulatory scheme had to face the challenge of creating distinct incentive designs to correct the failures in the now liberalized markets, which, in the end, is the final technical justification that legitimizes any regulatory action. Given the background and objectives set out above, the option was to choose a reform that would transition from sectors with vertically integrated State monopolies along almost all of its production chain to a model that would allow private participation while preserving the State's stewardship in dealing with sectors of great importance. This made it possible to attract capital to cover the investment deficit and innovative cost-cutting technologies, as well as to convert sectors with subsidized monopolies into sectors with economic activity that provided revenues for the State through taxes, duties, fees, tariffs, and shared profits. And all this, while still preserving the government's ability to provide subsidies if deemed convenient or necessary. With the new energy model, Mexico changed the nature of its governmental presence in the energy industry from one of direct State control to one of regulation.

However, opening the sector to private participation should not mean that the State will abandon the sector. As already noted by Friedrich Hayek in his book *The Road to Serfdom*, “[p]robably nothing has done so much to damage to the liberal cause as the wooden insistence of some liberals on certain rough rules of thumb, above all the principle of *laissez faire*”.⁴ The energy sector is one in which various market failures can be found to justify State intervention, especially from the moment in which said market is being designed through laws and their corresponding administrative provisions. The goal of this paper is to define the principal failures in the current energy market and how these are being addressed by regulatory bodies.

II. REGULATORY POLICY AS A RESPONSE TO ENERGY MARKET DYSFUNCTIONS

The new model that Mexico adopted in 2013 gave greater authority to the Energy Regulatory Commission (CRE), the National Hydrocarbons Commission (CNH) and the National Agency for Industrial Safety and Environmental Protection (ASEA), which were given the power to regulate energy markets. This was done by elevating the first two to the constitutional level through the figure of Coordinating Regulatory Bodies in Energy Matters, a

⁴ Hayek, Friedrich A., *The Road to Serfdom. Texts and Documents*. Unión editorial, 1944, available at: <https://www.elcato.org/sites/default/files/camino-de-servidumbre-libro-electronico.pdf>.

provision established in the Decree that both amends and adds various provisions to the *Political Constitution of the United Mexican States*, in matters regarding energy, and in particular, Article 28 of the Constitution.

The CRE, the CNH and the ASEA now enjoy the necessary autonomy to implement the regulatory policies the energy markets need to achieve efficient results. The CNH and the CRE were even granted legal personality, the power to use the income derived from the contributions and considerations established by law, as well as a new way of appointing their Governing Body, with the participation of the Senate. Such changes were necessary to ensuring greater independence in their actions.⁵

With a view to applying the guiding principles of a regulatory State, the abovementioned bodies specialize in addressing the failures of a market as deep and complex as the energy market. Likewise, it was necessary to guarantee that these bodies would not respond to political interests but would generate a stable environment of healthy competition among market players, driven exclusively by technical criteria.

Although current legislation deals with these problems, the following shows how the coordinating regulatory bodies have responded and taken concrete actions to correct the main failures observed in the energy market, which can be grouped into four categories: monopolies, asymmetric information, negative externalities and insufficient supply.⁶ All this shows how the legal and regulatory machinery has evolved from the Constitution and federal laws to the regulations emanating from regulatory bodies and, step by step, has favored a more efficient and competitive national energy market.

1. *Presence of players with monopoly power or dominance*

Due to high risks and sunk costs, the old institutional design of the European model bundled all the sectors of an industry under the wing of State monopolies that were responsible for implementing energy policy and responding to economic development needs, among other goals subject to change according to the political priorities of the then current government.

⁵ This is established in the 12th and 13th provisional articles of the *Political Constitution of the United Mexican States*, and in Chapters II and III of the Law of the Coordinated Regulatory Bodies in Energy Matters published in 2014.

⁶ Majone, Giandomenico, "From the Positive to the Regulatory State: Causes and Consequences of Changes in the Mode of Governance", *Journal of Public Policy*, New York, num. 2, vol. 17, May-August 1997, pp. 139-167.

In Mexico's case, this model was embodied in the creation of the two most important State-owned companies: the Federal Electricity Commission (CFE) and the Mexican oil company Petroleos Mexicanos (Pemex).⁷

Consequently, one of the main concerns for the national energy market to function properly was regulating Pemex and CFE on changing their legal status to State Productive Enterprises (EPEs), which had to compete on equal terms with new private participants in the national market in the transaction of goods and services that had already been opened up to deregulation.⁸ It was therefore necessary to break up their previously vertically integrated divisions and agencies into different companies to encourage the participation of new actors competing with the EPEs.⁹ Some critics of the Energy Reform view these changes as excessive since they significantly limit EPEs' capacity to operate.¹⁰

All of this aimed at generating a competitive environment to promote innovation, efficiency and increase the number of market options where the users and customers can punish and reward economic agents according to their performance in the market. However, fragmenting the market and restructuring CFE and Pemex to be able to compete along their respective productive chains is insufficient to meet the goals of our new

⁷ To simplify the explanation given here, we are not delving into the creation of *Luz y Fuerza del Centro*, a State-owned electricity supply company that was liquidated in 2009 and whose responsibilities were turned over to the CFE.

⁸ The 2013 reform modified Articles 25, 27 and 28 of the Constitution, deregulating a series of activities, such as: a) storage, transportation, distribution and commercialization of oil and its derivatives; b) surface exploration, treatment and refining of oil, and c) generation and commercialization of electrical energy, among other activities. Meanwhile, strategic activities, which are exclusive to the State, are defined as: a) planning and control of the national electricity system; b) transmission and distribution of electricity, and c) hydrocarbon exploration and extraction. However, it should be emphasized that private participation on behalf of the State is allowed through contracts for items "b" and "c".

⁹ "La fortaleza de Pemex como eje rector de cualquier reforma energética", Cárdenas Gracia, Jaime (coord.), *Reforma energética. Análisis y consecuencias*, México, Tirant Lo Blanch, UNAM, 2015, pp. 207-221, a paper presented by Javier Jiménez Gutiérrez, in which he points out that there are risks for the national oil industry if Pemex is not strengthened. The author notes that improving the administration of the EPE would place the oil company on equal footing to compete with the new foreign arrivals entering the industry as a result of the liberalization of the oil industry.

¹⁰ Víctor Rodríguez Padilla points out that the Energy Reform implies major risks for Pemex. In particular, the author points out "that the government will not allow the public company to grow or prosper. It will become a marginal participant in the market, investing only where the private sector does not want to", in *Energy Reform in Mexico. Minimize the State to maximize private business*, Mexico, Cámara de Diputados, LXVIII Legislatura, pp. 264-267.

energy model. Consequently, the CRE has intervened by issuing administrative rules that, among other functions, seek to limit the pervasive interference of EPEs.

By way of example, it is worth noting that the regulation issued by the CRE stresses the prohibition of unduly discriminatory treatment. In the case of CFE, the General Administrative Provisions (DACG) regarding open access to the National Transmission Network and General Distribution Networks oblige carriers and distributors (CFE Transmission and the various companies of CFE Distribution, respectively) to grant, on receiving instructions from CENACE, “effective and not unduly discriminatory open access to provide service services in the National Transmission Network and the General Distribution Networks”. Likewise, one of the strongest regulatory powers that the CFE has to limit the market power of these EPEs is the approval of the costs and rates that can be imposed on their service users. Examples of these are approving maximum rates for transporting and distributing natural gas through the pipelines, the rates of transmission and distribution of electricity for CFE Transmission and CFE Distribution or the methodology used to determine the firsthand sale prices in storage terminals approved for Pemex Transformación Industrial.

It should be emphasized that the presence of monopolies is not limited to the influence CFE, and Pemex have over the market. Similarly, there may be monopolies, oligopolies or signs of them in other branches of the energy sector by companies other than EPEs, which are of prime concern for the regulatory bodies. For example, in the market for Liquefied Petroleum Gas (LPG), the CRE detected signs of collusion and unfair practices, which have been investigated and even been the subject of complaints to the Federal Economic Competition Commission (COFECE), which has already begun an investigation.

And in the pursuit of fragmenting concentrated structures, conditions have been created for new entrants into regulated activities. An interesting case under development is the business model of selling LP gas at convenience stores. Such permits seek to diversify the way gas is supplied, breaking possible monopolies and creating more and different options.

The described developments show the importance of creating an environment of economic competition that encourages the participation of a wide range of players, who are constantly trying to improve and gain ground in the market while empowering consumers with options and better services.

2. *The rise of negative externalities*

Externalities arise when the actions of producers or consumers have costs or benefits for themselves or for third parties, without them actually paying the price of the transaction. The simplest examples in the sector are negative externalities due to contamination in the production of hydrocarbons or electrical energy using fossil fuels or the network externalities that emerge on deploying a pipeline system to transport hydrocarbons, or the National Transmission Network and General Distribution Networks.

Not taking them into account will cause inefficiencies in the market since negative externalities translate into undesired costs but are assumed by agents who do not benefit from them. Consequently, the role of regulators is to impose such measures so that the negative externalities are shouldered by the market players. To do so, ASEA has taken on the fundamental role as regulator in the hydrocarbons sector so that the players will take on said risks.¹¹ This agency is in charge of ensuring industrial safety, operational safety and environmental protection as multidisciplinary areas aimed at

...preserving the integrity of personnel and facilities, as well as protecting the environment through technical guidelines to identify, reduce, evaluate, prevent, mitigate, control and manage risks in the Hydrocarbons Sector from the preliminary and design stages to the operational stage, as well as in the final stages of closure, dismantling and abandonment.¹²

Along these lines, ASEA must approve, at the technical-operational level, the projects of permit holders who wish to carry out regulated activities.

In addition to authorizing such projects, ASEA, as part of its operational strategy, supervises, inspects and verifies industrial designs and processes as well as projects already underway.¹³

¹¹ *Reforma energética y cambio climático, cit.*, pp. 119-137. The speaker, Marisol Anglés Hernández, points out that the Energy Reform shows a total dissociation from and disinterest in the environmental and social implications for Mexico. Likewise, the author points out that the process of globalization has broken down the most solid structures of the rule of law through the co-optation of the top echelons of power, where big capital is the priority State issue and the interests of most of society have been expelled from the public sphere.

¹² Orellana, Alfredo, *GPS Energía*, Mexico, Tirant lo Blanch, 2018, p. 113.

¹³ Ricardo Massa Roldán points out that, despite the fact that the above-mentioned programs are robust in relation to international best practices, there is an asymmetry in the implementation of such programs. Therefore, the Agency should work on adapting them as regards the activities of exploration, extraction, transformation, production, transportation and storage of hydrocarbons in the Mexican hydrocarbons sector. See Elizondo, Alejandra

For authorization, ASEA needs a technical evaluation, and permit holders are required to implement the industrial safety, operational safety and environmental protection management system (SASISOPA).

The environmental impact of hydrocarbons is not limited to the productive chain of this sector but can also be extended to the electricity sector in the form of generation by conventional thermoelectric power plants. At present, in many cases there are greater incentives for producing and using fossil and polluting energies.¹⁴ This is important when determining the type of generation technology as a new and efficient natural gas power plant can release up to 60% less carbon dioxide into the atmosphere than a conventional coal-fired power plant.¹⁵ The environmental impact of renewable sources such as solar and wind is even less.

In this sense and with the aim of meeting the goal of consuming 35% of Mexican electricity from clean sources by 2024 —as mandated in the General Ecological Balance and Environmental Protection Law— the Electrical Industry Law (LIE) created Clean Energy Certificates (CEL) which cover the production of 1 MWh of electrical energy coming from clean sources. This market, described in greater depth in the Market Rules, lays out the obligations of non-polluting consumption, committing large users and energy suppliers, including those who supply energy to public and private households, to acquire a certain proportion of their electricity from clean energies or by acquiring CELs.

This market creates incentives for clean electricity production since the generators offer their CELs in the market, thus earning additional income, while obligated participants¹⁶ pay the cost of the environmental externalities. It is important to point out that the CEL market opened in 2018 and by May 2018, the CRE had already granted close to 1.5 million CELs certifying production of clean energy.

and Dussauge Laguna, Mauricio I. (eds.), *ASEA: un nuevo modelo de institución del Estado mexicano*, México, CIDE, 2018, pp. 89-114.

¹⁴ Baron, Richard, “Renewable Energy: A Route to Decarbonisation in Peril?”, Organization for Economic Cooperation and Development, Paris, June 2013. Available at: <https://www.oecd.org/sdroundtable/papersandpublications/Background%20Paper%20RTSD%20June%202013.pdf>.

¹⁵ National Energy Technology Laboratory, “Cost and Performance Baseline for Fossil Energy Plants”, vol. 1; *Bituminous Coal and Natural Gas to Electricity*, DOE/NETL-2010/1397. United States Department of Energy, November 2010.

¹⁶ Article 123 of the LIE defines Obligated Participants as: Suppliers; Qualified Market Participant Users; End Users that are supplied by isolated supply; as well as the licensees of Legacy Interconnection Contracts that include Load Centers whose total consumption is not fully covered by Clean Energies, whether they are public or private.

One of the ways Basic Service Providers can acquire a CEL is through the electrical hedges they are obliged to sign through the Long-Term and Medium-Term Auctions organized by the National Energy Control Center (CENACE), pursuant to Article 53 of the LIE. Through the first three Long-Term Auctions held between 2015 and 2017, more than 20 million CELs have been awarded annually.¹⁷ This will contribute to increasing the consumption of energy that comes from clean sources, which in 2017 stood at 21.1% of total energy consumption.¹⁸

Sectoral regulation should not be limited to efficient use of resources and the creation of economic markets working in harmony but should necessarily incorporate social variables. Regulatory bodies, therefore, have an obligation to coordinate among themselves to create rules that put society and individuals at the center of their decisions.

3. *High level of asymmetric information*

For a competitive market to function and flourish properly, both consumers and suppliers of products and services must have within their reach the information necessary to make informed decisions. Consequently, the State must work to ensure that everyone has access to sufficient, complete and accurate information. But this raises two problems that are of particular concern to regulators.

First, it is necessary to empower the user and offer them as many tools as possible so that they can make informed and well-reasoned decisions. They must be aware of the different options as well as their prices. Given this need to democratize information, the CRE has implemented actions that go hand in hand with innovation and information technologies, including the creation of mobile applications like Gasoapp and AmiGas LP. These offer multiple services in real time such as: comparing prices among suppliers, comparing official prices and sale prices; filing complaints, making reviews, and finding nearby suppliers, among many other functions. All of this with the goal of generating greater awareness of our power as users. While the previous example shows an instance of asymmetry that users can actively resolve, the CRE is also responsible for solving problems of asymmetric

¹⁷ This can be gleaned from the outcomes of the three auctions, information for which is available for download on the National Energy Control Center microsite “Long-term auctions”, available at: <https://www.cenace.gob.mx/paginas/publicas/mercadooperacion/subastaslp.aspx>.

¹⁸ SENER, *Programa de Desarrollo del Sistema Eléctrico Nacional 2018-2032*, México, 2018, p. 23.

information that, because of their level of technicality, would be very costly for users to gather enough information. Hence, several technical guidelines that specify the quality of services have come into being. NOM-016-CRE-2016,¹⁹ for example, is the first technical standard issued for the open fuel market. It regulates the quality of petroleum products and establishes the verification requirements to ensure that consumers do not receive products that damage their vehicles or equipment. Similarly, the Grid Code²⁰ for the electricity industry, as its name indicates, contains the criteria for the efficiency, quality, reliability, continuity, safety and sustainability of the national electricity system. The obligations set out in several of these provisions are established for the suppliers and one of their objectives is precisely to avoid the damages that asymmetric information may cause consumers.

Another asymmetry that arises, but applying to suppliers of products and services, is lack of concrete knowledge of the size of the market. One of the most important tools to address this problem is the open season procedure. This is a process, sometimes obligatory, by which potential users are allowed input into the next infrastructure design for the transportation or storage of oil or natural gas since the high costs and economies of scale make it complicated and probably inefficient for each user to build their own. So, through this measure, users can learn beforehand of the development of a new project or the expansion of an existing one and request the use of the facilities by paying a fee for this.

In the case of new facilities, open seasons serve to resize the infrastructure, thereby allowing better use of economies of scale and avoiding incomplete markets. Likewise, this process should be carried out each time there is available capacity due to disuse, as well as for new projects and the expansion of existing projects.

It is through this process that in 2018 Pemex Logística offered storage capacity in terminals and transport pipelines in the North and North Pacific systems, by which the US company Andeavor was again awarded capacity on winning an open season for the second time. As a result of this

¹⁹ Secretaría de Gobernación, Acuerdo de la Comisión Reguladora de Energía que modifica la Norma Oficial Mexicana NOM-016-CRE-2016, Especificaciones de calidad de los petrolíferos, con fundamento en el artículo 51 de la Ley Federal sobre Metrología y Normalización, *Diario Oficial de la Federación*, México, June 2017.

²⁰ Secretaría de Gobernación, Disposiciones Administrativas de carácter general que contienen los criterios de eficiencia, calidad, confiabilidad, continuidad, seguridad y sustentabilidad del Sistema Eléctrico Nacional: Código de Red, conforme dispone el artículo 12, fracción XXXVII de la Ley de la Industria Eléctrica, *Diario Oficial de la Federación*, April 8, 2016.

process, Andeavor can currently use 16 storage terminals and 13 pipelines, which previously had been limited to use by State productive enterprises.²¹ These actions are aimed at optimizing the use of existing infrastructure by a greater number of users.

4. *Supply of services that would not be supplied by market, or if so, would not be supplied in a sufficient amount*

As noted before, the energy industry is characterized by a high degree of complexity, costs and risks. Consequently, the fourth and final failure observed in the energy market for the purposes of this paper is the possible exclusion of some social sectors facing low financial returns, which drives companies to focus their investments in more profitable sectors or regions, leaving certain users vulnerable.

This problem is handled in different ways. For example, in the electricity market, the State works under the principle of universal service, based on social rather than economic motivations, where the basic service provider is obligated, with few exceptions, to provide service to whoever requests it. Here too we can include the creation of the Universal Electricity Service Fund (FSUE), which will focus on taking this basic service to the 1.4% of Mexicans who still do not have access to electricity in their homes.

With an investment goal of 12 billion pesos by 2021, the FSUE has implemented important actions: at the end of 2017, it launched the first invitation to the CFE, allocating some 1.2 billion pesos to take electricity to more than 200,000 Mexicans in 27 states of the country. Following this was a second call for isolated systems with an investment of close to 1 billion pesos. The goal is to close the year with an electricity coverage of 99% of the population.²²

While this does not represent a dysfunctionality generated by market agents, it is in the State's interest for economic and industrial development to translate into benefits for society as a whole. Therefore, this type of gov-

²¹ Staff Oil & Gas Magazine, "Andeavor gana temporada abierta del norte y pacífico norte", *Oil and Gas Magazine*, Mexico, July 2018, available at: <https://oilandgasmagazine.com.mx/2018/07/andeavor-gana-temporada-abierta-del-norte-y-pacifico-norte/>.

²² SENER, "El Fondo de Servicio Universal Eléctrico (FSUE), tiene como objetivo alcanzar para 2018 el 99 por ciento de la cobertura eléctrica nacional", Secretaría de Energía, México, November, 2017, available at: <https://www.gob.mx/sener/articulos/el-objetivo-del-fondo-de-servicio-universal-electrico-es-alcanzar-para-2018-el-99-por-ciento-de-la-cobertura-electrica-nacional?idiom=es>.

ernment intervention is necessary in cases where the supply of basic services or services that are important to ensure social development in all regions of the country are not guaranteed.

III. CONCLUSION

To consolidate a new, effective and efficient energy model, it was necessary to anticipate the challenges that the energy industry posed. This meant developing Mexico's own vision of regulatory policy, which was achieved by strengthening technical and impartial institutions focused on repairing the flaws in the energy market. Five years on, the efforts have borne fruit.

We are already witnessing the entry of new competitors who are taking on the former State monopolies. We have the example of the fuel market, where mid-2018 saw more than 46 new gasoline service station brands in the country, and with even more positive projections, as more and more companies are looking forward to joining the Mexican market, thereby creating a competitive environment that brings greater confidence and power to consumers.

Similarly, in the fuel market, the opening of the market has allowed users to find ways of supplying themselves, in the absence of capacity to transport oil products. The permits granted to railroad companies are a successful example of this. It should be noted that between 2016 and 2017, the volume of fuel transported by the railroad system rose 22.5% in the case of diesel and 33.8% for gasoline. Kansas City raised its transportation fuel volumes in that period by 77% and 59% for diesel and gasoline, respectively.²³ Thus, railroad companies are competing with their networks against Pemex's pipeline networks.

The knowledge of the different features of the energy model has resulted in its wider use. It is worth noting that under the new Wholesale Electricity Market, one of these features encourages large consumers to enter into agreements with electricity suppliers with the aim of setting more competitive prices. To cite an example, this allowed the Mexico City's Mass Transport System (STC) Metro to save 100 million pesos in only one year, by signing an agreement with a clean energy supplier.²⁴

²³ Secretaría de Comunicaciones y Transportes, *Anuario Estadístico Ferroviario 2017*, Agencia Reguladora del Transporte Ferroviario, México, July, 2017, available at: https://www.gob.mx/cms/uploads/attachment/file/344646/ARTF_Anuario_Estad_stico_Ferroviario_2017.vf.pdf.

²⁴ Gobierno de la Ciudad de México, "Adjudica STC, por primera vez, un contrato de suministro eléctrico para sus principales centros de carga; cumple con su compromiso...".

Lastly, in the same way, the social and environmental aspect is at the center of the discussions and regulations. The right to consultation of indigenous peoples implies taking their needs and concerns into account in the design of energy projects. From 2014 to 2017, 14 consultations were held in 83 indigenous communities in 11 states of Mexico. Today, in the state of Yucatan alone there are seven projects in the indigenous consultation phase, all of which are proceeding within the boundaries of the law.²⁵

The role played by the regulatory bodies has been fundamental to the implementation of the national energy model. The failures of such a complex market have been offset by strengthening institutions that are kept away from political tensions and private interests and are centered on the technical and legal application of the model. After five years of this new way of regulating the market, the results are plain to see, which shows the importance of these bodies as entities with technical, operational and management autonomy, charged with guaranteeing the rule of law, and monitoring the development of a competitive energy market that works for the benefit of the people and companies in Mexico.

Energy Reform forced the Mexican State to redesign its energy market. As mentioned above, this redesign has shown tangible results in the form of benefits to consumers, from the smallest households to the largest industrial companies. Likewise, the benefits have been seen reflected in the State Productive Enterprises. However, this does not mean that there is no room for improvement. As Nobel laureate in economics Alvin E. Roth notes, market design is not static. We need to understand how markets work in order to be able to intervene in them, redesign them and fix them when they do not work properly.²⁶

IV. BIBLIOGRAPHY

BARON, Richard, “Renewable Energy: A Route to Decarbonisation in Peril?”, Organization for Economic Cooperation and Development, Paris, June 2013.

Newsletter, Mexico, February 2017, available at: <http://www.comunicacion.cdmx.gob.mx/noticias/nota/adjudica-1ta-por-primera-vez-un-contrato-de-suministro-electrico-para-sus-principales-centros-de-carga-cumple-con-su-compromiso-de-uso-de-energias-limpias>.

²⁵ Moguel, Yoisi, “Parque eólico Dzilam, Yucatán iniciará operaciones en septiembre”, *El Financiero*, Mexico, July 2018, available at: <http://www.elfinanciero.com.mx/economia/parque-eolico-dzilam-yucatan-iniciara-operaciones-en-septiembre>.

²⁶ Roth, Alvin E., *Who Gets What—and Why?*, Boston, Mariner Books, 2016, pp. 217-231.

- CÁRDENAS GRACIA, Jaime (coord.), *Reforma Energética. Análisis y consecuencias*, Mexico, Tirant lo Blanch, 2015.
- CENTRO NACIONAL DE CONTROL DE ENERGÍA, *Subastas de largo plazo*, CENACE, available at: <https://www.cenace.gob.mx/paginas/publicas/mercadooperacion/subastaslp.aspx>.
- DECKER, Christopher, *Modern Economic Regulation. An Introduction to Theory and Practice*, Cambridge, Cambridge University Press, 2015.
- ELIZONDO, Alejandra and DUSSAUGE LAGUNA, Mauricio I. (eds.), *ASEA: un nuevo modelo de institución del Estado mexicano*, Mexico, CIDE, 2018.
- FOSTER, Christopher, *Privatization, Public Ownership and the Regulation of Natural Monopoly*, New Jersey, Blackwell, 1992.
- GOBIERNO DE LA CIUDAD DE MÉXICO, “Adjudica STC, por primera vez, un contrato de suministro eléctrico para sus principales centros de carga; cumple con su compromiso de uso de energías limpias”, *Newsletter*, Mexico, February 2017, available at: <http://www.comunicacion.cdmx.gob.mx/noticias/nota/adjudica-stc-por-primeravez-un-contrato-de-suministro-electrico-para-sus-principales-centros-de-carga-cumple-con-su-compromiso-de-uso-de-energias-limpias>.
- HAYEK, Friedrich A., *The Road to Serfdom*, Unión Editorial, 1944, available at: <https://www.elcato.org/sites/default/files/camino-de-servidumbre-libro-electronico.pdf>.
- MAJONE, Giandomenico, “Regulation and Its Modes”, in MAJONE, Giandomenico (comp.), *Regulating Europe*, New York, Routledge, 1996.
- MAJONE, Giandomenico, “From the Positive to the Regulatory State: Causes and Consequences of Changes in the Mode of Governance”, *Journal of Public Policy*, New York, Cambridge University Press, No. 2, vol. 17, May-August 1997.
- MOGUEL, Yoisi, “Parque eólico Dzilam, Yucatán iniciará operaciones en septiembre”, *El Financiero*, Mexico, July 2018, available at: <http://www.elfinanciero.com.mx/economia/parque-eolico-dzilam-yucatan-iniciara-operaciones-en-septiembre>.
- NATIONAL ENERGY TECHNOLOGY LABORATORY, “Cost and Performance Baseline for Fossil Energy Plants”, vol. 1; *Bituminous Coal and Natural Gas to Electricity*, November 2010. DOE/NETL-2010/1397. United States Department of Energy.
- ORELLANA, Alfredo, *GPS Energía*, Mexico, Tirant lo Blanch, 2018.
- RODRÍGUEZ PADILLA, Víctor, *Reforma energética en México. Minimizar al Estado para maximizar los negocios privados*, Mexico, Cámara de Diputados, LXVIII Legislatura.

ROTH, Alvin E., “Who Gets What-and Why?”, Boston, Mariner Books, 2016.

SECRETARÍA DE COMUNICACIONES Y TRANSPORTES, *Anuario Estadístico Ferroviario 2017*, Agencia Reguladora del Transporte Ferroviario, Mexico, July 2017, available at: https://www.gob.mx/cms/uploads/attachment/file/344646/ARTF_Anuario_Estadistico_Ferroviano_2017.vf.pdf

SECRETARÍA DE GOBERNACIÓN, “Ley Federal sobre Metrología y Normalización”, *Diario Oficial de la Federación*, Mexico, June 2017.

SECRETARÍA DE GOBERNACIÓN, “Ley de la Industria Eléctrica”, *Diario Oficial de la Federación*, April 8, 2016.

SENER, Consultas Previas, Libres e Informadas a Comunidades y Pueblos Indígenas en el Sector Energético, Mexico, Secretaría de Energía, 2018, available at: <https://www.gob.mx/sener/acciones-y-programas/consultas-previas-libres-e-informadas-a-comunidades-y-pueblos-indigenas-entorno-a-proyectos-energeticos>.

SENER, “El Fondo de Servicio Universal Eléctrico (FSUE), tiene como objetivo alcanzar para 2018 el 99 por ciento de la cobertura eléctrica nacional”, Secretaría de Energía, Mexico, November 2017, available at: <https://www.gob.mx/sener/articulos/el-objetivo-del-fondo-de-servicio-universal-electrico-es-alcanzar-para-2018-el-99-por-ciento-de-la-cobertura-electrica-nacional?idiom=es>.

SENER, *Inventario Nacional de Energías Renovables*, Mexico, SENER, 2017, available at: <https://dgel.energia.gob.mx/inere/>.

SENER, *Programa de Desarrollo del Sistema Eléctrico Nacional*, Mexico, SENER, 2018, available at: <https://www.gob.mx/cms/uploads/attachment/file/331770/PRODESEN-2018-2032-definitiva.pdf>

STAFF OIL & GAS MAGAZINE, “Andeavor gana temporada abierta del norte y pacifico norte”, *Oil and Gas Magazine*, Mexico, July 2018, available at: <https://oilandgasmagazine.com.mx/2018/07/andeavor-gana-temporada-abierta-del-norte-y-pacifico-norte/>.