# Private Vs. Public Investment In The Mexican Utility Company: A Case Study

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**ABSTRACT**

*How should the strategies and regulations of the Mexican laws be designed in order to trigger a country to go from a non-sustainable energy economy towards a sustainable energy economy? This paper proposes a classroom debate of the reformed Law of Public Electricity Service in Mexico (LSPEE, 1992: Ley del Servicio Publico de Energia Electrica), which, in 1992, opened new opportunities for private investment in the Mexican utility industry. The legal reforms allow the private sector to invest, operate, and be owners of part of the public utility system in Mexico, mainly, for power generation. Evaluating the dilemmas of the past, students are encouraged to debate present and future reforms considering political, economic and financial frameworks with a sustainable development approach and to evaluate the role of foreign and private investment in public utilities around the world.*

**Keywords:** Mexican Utility Industry; Sustainable Development; Foreign and Private Investment

## INTRODUCTION

During the administration of Mexico's President Carlos Salinas de Gortari in 1992, it was possible to reform the Law of Public Electricity Service in Mexico (LSPEE, 1992), which gave way to private investment in the electrical industry in Mexico. This legislation reform allows private shareholders to invest, operate, and be owners of the infrastructure for some of the processes of providing electricity in Mexico, mainly, for power generation.

Starting in the year 2000 the increase of the installed capacity of electricity from the Independent Energy Producers (*Productores Independientes de Energia—PIEs*) is triggered to a faster speed than the installed capacity of electricity with public resources from the public utility company called Federal Electricity Commission (*Comision Federal de Electricidad—CFE*). In the case of individual self-sufficiency, electrical generation has increased in a greater proportion compared to the installed capacity, which reveals a higher utilization of this private installed capacity and a generation of electrical energy that remains unattended by the CFE.

Does this mean that the decentralized institution of the public electricity sector (CFE) is possibly decaying? Mario Govea Sanson (Soberon, 2009) rises in the assembly of the Chamber of Deputies, in representation of the Mexican Electrical Syndicate and speaks of his proposal to the Mexican Congress—"I call upon the cease of operations of PIE scheme, by revoking the reforms of the LSPEE of 1992." The members of the Chamber of Deputies were surprised… it was then, when the President of the Chamber of Deputies spoke and answered him…

## RENEWABLE ENERGY AND CLIMATE CHANGE

The availability of cheap and high quality electrical energy is a characteristic of a country whose population enjoys a high quality of life. Aware of this reality, the governments, decided to build the electrical plants required by their economic and demographic growth. History reveals us that governments achieved the challenge of building electricity generating plants as well as the necessary systems for its transformation and distribution among the population. As of the 1970's, due to the findings of oil fields within Mexican territory, Mexico developed a strategy of overconfidence on oil dependency, aside from considering it an endless resource. The electricity plants built around that time used fossil fuels as the main source of energy, due to their abundance and availability.

But today, there's uncertainty and indecision as to where the energy development in Mexico should go. The fact that oil resources are becoming scarce and/or oil prices are unstable, as well as the climate change phenomenon induced by the $CO_2$ emissions (greenhouse gases) due to the burning of fossil fuels, are unequivocal signs that pressure all countries of the world towards adopting a new model of economic and energy development that can be less dependent on fossil fuels or non-renewable resources. This could render the definite support for the development of renewable energy resources, which are extremely abundant in Mexico. Is it time to change the worn out energy model of the past and find a higher energy diversification model through the development of renewable energies?

Countries like Spain, Germany, and Denmark, have already taken the lead with their concrete objective of having 20% of the energy used coming from renewable resources by the year 2020. Undoubtedly, the world is shifting towards a greater use of renewable resources. Shell International Limited has estimated that the possible scenario for the year 2060 would be that the world would depend more on renewable energy resources than from non-renewable resources such as oil.

Given the new geopolitical trend in the generation of electricity during the XXI Century, the Mexican Secretary of Energy (*SENER*) urged the implementation of the Independent Energy Producer (*PIE*) project, which consists in allowing the private sector to generate its own electricity.

The SENER visualized the possibility that buildings could be able to generate their own electricity, or at least most of it, and even sell the excess electricity produced by PIEs to the CFE using renewable technologies. This brought up the concept of ***"distributed generation"***, where the user goes from consumer to producer of electricity, avoiding the unmeasured growth of electric plants powered by fossil fuels and the depletion of non-renewable fuels.

According to Best et al. (2007), under this scheme of ***distributed generation***, the "old" consumer and user, which is now a producer, will switch from a passive to an active role, by diversifying the electricity generation technologies and implementing energy savings and efficient energy use programs to optimize its electricity generation system. This could generate a more conscious and self-aware user who understands the intrinsic value of the energy resources, the difficulty of generating electricity, and the need to diminish the environmental damage caused by the generation of electricity.

Best et al. (2007) also states that even though our "old" national electrical system is reluctant to adopt new generation, transformation, and distribution schemes, the use of renewable energies is an undoubted reality, and year after year, the projects applying the use of new technologies are multiplied. All this is happening, despite the scant governmental support provided as well as the uncertainty of Mexican laws, which were created within the context of fossil fuel (non-renewable energy) electricity generation.

Wilson (1981) affirms that ***"time is our most precious resource. It should be used as wisely as energy."*** This is especially true because renewable technologies must now be incorporated into the national electricity network within the next 10 to 15 years. The "**fixed energy sale price system**" for the electricity produced with the use of renewable energies guarantees the auto producers of electricity the right to sell their production to the public utility company (CFE), who will distribute the electricity through its electricity network and receive a remuneration established by the law.

As a result, on October 28 of 2008, the Mexican Chamber of Deputies approved the Law for the Exploitation of Renewable Energies, and published it in the Official Diary of the Federation (*Diario Oficial de la Federacion—DOF*) on November 28 of 2008. This law suggested the creation of a trust that will allow renewable resources to increase their participation in the total electricity generation without considering the large hydroelectric plants. This law was designed to work as a catalyst to increase renewable energy production taking advantage of the great technical potential that Mexico possesses in renewable energies.

The defenders of this strategy visualize the promotion of renewable energies with private investment also for the rural sector; thus, generating electricity for both social and productive activities.

## LEGISLATIVE EVOLUTION OF THE ELECTRICTY INDUSTRY IN MEXICO

The Mexican Constitution (Article 27) establishes that not only the primary energy resources are property of the nation, but also its production, transformation, and trading is property of the State. This has been enforced historically throughout the country by means of establishing State monopolies such as the one in the electricity industry performed by the public utility company called Federal Electricity Commission (*Comision Federal de Electricidad—CFE*).

The CFE is in charge of the total generation, distribution, selling, importing and exporting of electricity. These activities are considered to be like public service, except for the self–sufficiency activities of the State-owned oil company Petroleos Mexicanos (PEMEX), other large private companies, and those which have small energy generators for emergencies.

Nevertheless, CFE's extreme position has suffered significant changes during the last years, just like Bauer (2007) of the Physics Institute of the UNAM (Universidad Autonoma de Mexico) explains. He states that these changes are due to the fact that Mexico needs to deal with the scarcity of financial resources for the development of the electricity sector derived from its dependency of public finances.

Indeed, *on December 1992 the LSPEE (1992) was reformed where the 3rd Article of the Law allowed private entities such as PIEs or self-sufficient associations to generate and produce electricity in a small scale.* However, at that time, there was no specified process to apply this reform; thus, the reform could not be implemented then.

As a result, in 1995, President Ernesto Zedillo postulated the creation of what we know today as the Energy Regulatory Commission (CRE) with the purpose of regulating the presence of the private sector in the electricity industry.

The CRE started promoting the investment opportunities for generating electricity among the private sector and helping the Federal Government to redirect their financial resources from this industry to other top priority objectives like education, security, health, highways, etc.

The main change of the 1992 Law consisted in redefining the concept of Public Service, which was solely reserved to the State, but excluding: a) the generation of electricity for self–sufficiency and cogeneration, and small scale (capacity of less than 30MW); b) the generation of electricity by PIEs to sell it to the CFE; c) the generation of exports, derived from the cogeneration, independent production, and small scale production of electricity; d) the imports of electricity from individuals or corporations for their own use; e) the generation of electricity for emergencies derived from blackouts or electricity interruptions of the public utility company. Nevertheless, the CFE maintains total control of the planning of the national Mexican electricity system (Bauer, 2007).

Bauer (2007) does not consider this represents a minor governmental interference, because in order to achieve that participation, the CFE really undertakes the investment risks. Indeed, throughout the 25-year contract, the producers receive compensation for the installed capacity, even when the CFE doesn't operate their plants. Additionally, the CFE has to continue paying the agreed price even if the electricity were produced at a lower cost due to technological developments or other factors (Quintanilla & Bauer, 2006).

It is also expected that the self-supply and the cogeneration of electricity to grow substantially, based on the authorization to PEMEX and the granted permissions to private investors by the CRE.

With a global warming awareness all around the planet, a new law that allows private investment in renewable energies was created in 2008: Law of Promotion of the Renewable Energies (*Ley para el Aprovechamiento de Energias Renovables y el Financiamiento de la Transicion Energetica, 2008*). The governmental objective is that the private investment in the electricity industry will allow major public investment in Mexico's high-priority needs.

The World Bank (WB) has also played an important role in this situation throughout its financing policy as a key strategy to promote renewable energies. Sarahi (2009) thinks that the WB has used the financing policy as an

instrument to promote the transnational privatization of the electricity sector. The WB's scheme has been: to assure the supply of energy for as many as possible, as well as clean and cheap, also as much as possible. WB's objectives are: *Fiscal* by liberating public finance spending in State enterprises; *Economic* by increasing productive efficiency; *Social* because it releases funds for social security and protects public finances from future crisis; and *Environmental* by promoting non-polluting renewable energy.

Indeed, the WB is playing an important role by providing funding to private companies producing electricity from renewable sources, because they already lobbied before the WB itself to grant them green bonds (carbon bonds) in their favor (Dieck-Assad F., 2010). Thus, the private producer of renewable energy gets their first income due to their participation in the electricity market by selling their produced electricity at market price to the CFE. Since the income received by the private producer is not enough to make their investment project in renewable energy profitable, they need an additional income that is obtained through the sale of carbon bonds or green certificates (by burning $CO_2$) whose value is fixed in terms of supply and demand for these certificates in the Stock Market. Once the producer manages to sell the carbon bonds associated with his production, the amount of this income plus the income generated from the sale of energy to the CFE, represent the total income with which the producer of renewable energy makes his investment project profitable.

Some authors (Saxe, 2009) say that Mexico is only a simple manager of carbon bonds in favor of the private sector and fail to provide any benefit to the country, to the CFE, to the Electrical Research Institute of Mexico, or to any national sector. They justify their statement by citing the example of Costa Rica where all the income generated from the sale of Green Bonds are intended to promote research and development in renewable energy technology. Meanwhile, Dieck-Assad F. (2010) states that the carbon bonds have allowed the private sector to make their operation more sustainable. Is it appropriate to continue supporting the private sector making its operation more profitable by the sale of Carbon Bonds, or should a law be enforced, where every generated green bond should be destined for public research in Mexico?

## FINANCIAL IDENTITY OF THE CFE

The CFE is the public utility company that officially controls the generation of electricity in Mexico. CFE's project to generate electricity in combined-cycle plants (based on natural gas) was very successful as the use of natural gas (fossil fuel) for electricity generation processes, makes the plants more environmentally friendly.

The Institutional Revolutionary Party (PRI), with relative majority in Congress, said that an amendment to Article 27 of the Mexican Constitution, which would give legal certainty to already existent private investment, and would open investment in electricity generation to foreign investors, was not considered in the basic statutes of its party. However, it was a fact that in order to meet the electricity needs of the country in the upcoming years, an estimated capital injection of 55 billion dollars was required.

"Once again: the solution is as close, or as far as the legislators want it to be", stated energy expert, David Shields (2005). "It is important to realize that there is only one point to analyze and resolve: the *financial situation of the industry*. We need only to act with tolerance and goodwill in order to resolve this point".

"All stakeholders agree upon the fundamental diagnosis: Nowadays, the state-owned electricity companies work under poor structural conditions and in a legal, economical and political framework that hinder any optimal development. Not even fiscal reforms, measures of administrative and financial autonomy, or new construction or acquisition laws have been approved to allow them to work effectively. Meanwhile, various private investment schemes have been operating in the midst of legal uncertainty, due to inconsistencies between the Mexican Constitution and the law" (Shields, 2005).

Shields (2005) stated: "We all know that the Mexican electricity industry is daily drifting away from achieving a healthy and sustainable development. The only thing that has saved the country from a real energy crisis is the low growth rate of the national economy, which has maintained the growth of electricity demand below 3% annually in the XXI century, compared to a historical average rate of 6%. And we all know that it is more convenient for the country to recover its high rates of economic growth".

The debate on the growth of the electrical industry in Mexico is an eminently ***financial issue***. The fundamental question is: How will the development of this industry be funded? All legislative and lobbying efforts should be focused on solving this issue.

Which should be the right vision? The one that seeks the predominance of public companies and public sector investment, or the one that points towards a mixed investment formula (public and private)? Shields (2005) recalled the recommendation of the Mexican Supreme Court: "Legislators should review the effectiveness of the Electricity Act of 1992, and decide if private capital is required or not required in this industry, to legislate accordingly". Shields (2005) continued: "Analyzing the financial situation of the CFE—with all its subsidy, transfer and labor liability entanglements—in order to reach a consensus on how to remedy it, should be seen as a matter of '*national finances*', and not of ideologies or 'covert privatization' schemes".

Meanwhile, the Mexican Investment Program of the Electricity Sector (*Programa de Obras e Inversiones del Sector Electrico—POISE*) developed in 2010 by the SENER (2010) for the years 2010 to 2024, states that the total investment directed to the public service of electricity generation during that period will be 1,193,296 million Mexican pesos at year 2009 prices, with the following composition:

- 49.0% for generation
- 18.5% in transmission works
- 20.1 % for distribution
- 11.6% in plant maintenance, and
- 0.8% for other investments.

The POISE estimated that the budgeted resources of the CFE would cover 41.9% of the total investment and the remaining 58.1% investment would be done through the public works financing scheme (PEE) or under *the scheme of Independent Energy Producers (PIE)*. For practical purposes the PEE and PIE will be grouped in this document as PIE because they both are private investment projects.

The objective of the 1992 electricity reform should be mainly to establish the legal and regulatory framework that allows the public utility company, CFE, to have sufficient financial resources to meet its long-term obligations, both to its workers (for their pension and retirement), and also for the public service (including its expansion, modernization and payment of its debts).

At the beginning of the XXI century, the CFE (2010) was concerned because it estimated that the annual average growth rate (demand) for electricity in the next 10 years would grow 5.6%. To meet this demand and under the existing legal framework, the government should have to invest about 60 billion dollars. An indebtedness scheme could be an option, but it would be impractical, since the debt of the public sector already represented 43% of GDP. Therefore, modifying the legal framework to allow private investment to complement the public one was a serious option to consider.

According to Soberon (2009), the advisor of the Legislators from Democratic Revolution Party (PRD), in the Chamber of Deputies of the LVIII Legislature expressed his concern about the stagnation of public investment in electricity generation. The consequence of this was an increased pressure by the PIEs to allow them to dispatch energy from their plants and request the closure of the "expired" generation plants of the CFE because its useful life cycle had already ended.

As a result of the promotion of private investment in the electricity industry, today CFE has more than enough electricity generation capacity. So, should they proceed with closing the CFE old plants or should CFE modernize its current system of electricity generation? Would it be convenient to take advantage of this moment of high capacity reserve margin for electricity generation and instead of closing the public generation plants, provide the needed maintenance and renovate these public plants as needed?

## OPERATIONAL IDENTITY OF THE CFE

The electricity industry in Mexico has changed its structure in recent years. There has been a growth of the participation of the Independent Energy Producers (PIEs), whose effective installed generation capacity increased their contribution from 1.32% in 2001 to 22.9% in 2014.

It is interesting to clarify that the private investment is only in electricity generation and not in transmission, because this last one is very expensive and investors rarely allocate money to private systems of electricity transmission. As a matter of fact, it is extremely expensive to investors that the CFE charges the transmission service; this is also considered as the "portering" or carrying service so that private producers inject or allocate electricity to the national grid. The costs of expanding the transmission network are absorbed by the CFE, as well as the subsidies for domestic sale of energy and to the agricultural sector.

Another aspect to consider about the PIEs is referred to as *"dismantling the engineering and national industry"* because it states that independent energy producers use a minimum amount of national engineering (Saxe, 2009): it is stated that they use national engineering only to construct ditches (because they cannot import them), and the infrastructure, used to install the private generating plants, but not the maintenance contracts. That is, the development of the national industry is abandoned when generating electricity.

The supply of the national industry for the construction of energy-generating power plants virtually disappeared. For example, the National Chamber of the Electrical Manufacturing (Camara Nacional de las Manufacturas Electricas) in Mexico estimates that during the XXI Century, the electrical equipment manufacturing industry has disappeared in between 65% and 75%, because of the investment projects called *"a turn key operation"* and the increase in independent producers' projects. This means not generating any jobs or quality jobs. It also means the employment of inexperienced laborers to dig the holes and perform part of the civil works. What would be the sustainable operational scenario that allows efficient electricity generation at a low cost, and with economic benefits to promote the development of national (domestic) industry?

According to the operational indicators, the PIEs have had a remarkable growth from the year 2000. Table 1 presents a summary of the installed capacity and electricity generation for the period 2001-2014, with which the Annual Average Rate of Growth (AARG) was calculated. It can be seen that the Total Generation of Electricity grew during this period thanks to the PIEs electricity generation.

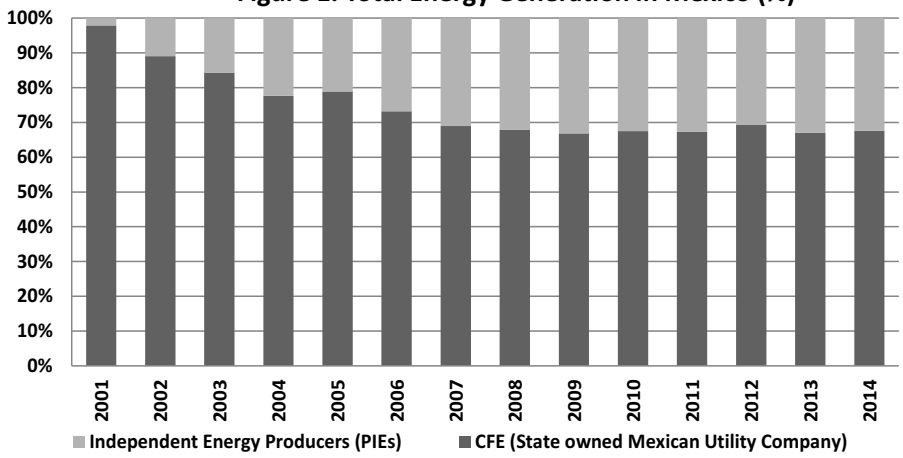
**Table 1.** Installed Capacity & Electricity generation in Mexico

| | **Installed Electricity Capacity (MegaWatts)** | | | **Energy Generation (TeraWatts hour)** | | |
|---|---|---|---|---|---|---|
| | **Total** | **CFE (State owned Mexican Utility Company)*** | **Independent Energy Producers (PIEs)** | **Total** | **CFE (State owned Mexican Utility Company)*** | **Independent Energy Producers (PIEs)** |
| 2001 | 36,720 | 36,236 | 484 | 194.92 | 190.88 | 4.04 |
| 2002 | 40,350 | 36,855 | 3,495 | 198.88 | 177.50 | 21.83 |
| 2003 | 43,727 | 36,971 | 6,756 | 200.94 | 169.32 | 31.62 |
| 2004 | 45,687 | 38,422 | 7,265 | 205.39 | 159.53 | 45.86 |
| 2005 | 45,576 | 37,325 | 8,251 | 215.63 | 170.07 | 45.56 |
| 2006 | 47,857 | 37,470 | 10,837 | 221.90 | 162.47 | 59.43 |
| 2007 | 49,854 | 38,397 | 11,457 | 228.49 | 157.51 | 70.98 |
| 2008 | 49,931 | 38,474 | 11,457 | 231.40 | 157.16 | 74.23 |
| 2009 | 50,384 | 38,927 | 11,457 | 230.64 | 154.14 | 76.50 |
| 2010 | 52,946 | 41,489 | 11,547 | 241.51 | 163.07 | 78.44 |
| 2011 | 52,512 | 40,605 | 11,907 | 257.88 | 173.62 | 84.26 |
| 2012 | 53,114 | 41,207 | 11,907 | 260.50 | 180.32 | 80.18 |
| 2013 | 54,035 | 41,617 | 12,418 | 257.86 | 172.77 | 85.09 |
| 2014 | 54,168 | 41,750 | 12,418 | 267.65 | 180.93 | 86.72 |
| %AARG** | 3.04 | 1.10 | 28.35 | 2.47 | -0.41 | 26.60 |

**Source:** CFE
* Includes co-generation & firms' autosourcing
** Annual Average Rate of Growth

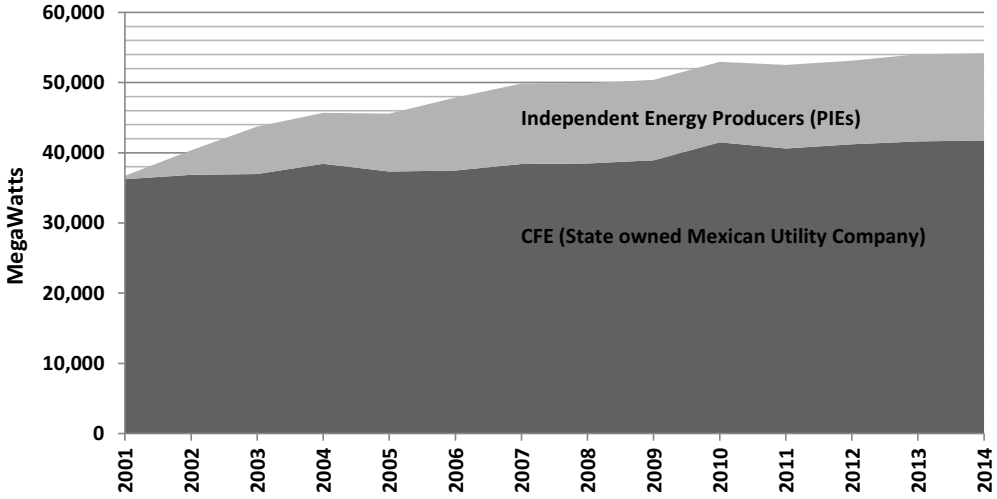
The gross electricity generation by PIEs in the year 2014 was 21.46 times that generated in year 2000, as shown in Figure 1. The same story applies for Installed Capacity.

**Figure 1. Total Energy Generation in Mexico (%)**




Regarding the development of the installed capacity, the operating indicators are as follows: While the CFE increased its installed capacity by 5,514 MW in 2014 compared to the one installed in 2001, the PIEs increased their installed capacity by 11,934 MW, as seen in Figure 2.

**Figure 2. Installed Electricity Capacity in Mexico**




These figures show the notorious stagnation of the installed capacity with public resources during recent years, in contrast to the accelerated growth of the installed capacity of PIEs. In the case of self-sufficiency of individuals, electricity generation increases in greater proportion to the installed capacity for the same purpose, revealing a greater capacity utilization and electricity generation that is no longer be taken care of by the public service. *The prophecy of Senator Mario Govea Sanson in 2009 came true…is this a bad or a good thing?*

Indeed, the increasing participation of PIEs in the Mexican electricity system has been perceived with an increased fear because of the constant advancement of private investment into the Mexican electricity industry. Undoubtedly, the accelerated increase of the private investors in the process of electricity generation, both for the public utility

company (CFE), as well as that generated for self-use, has helped the economic growth of the Mexican electricity industry.

## CHALLENGES FOR INTERNATIONAL EDUCATION

The President of the Mexican Chamber of Deputies addressed the deputies (Soberon, 2009), trying to answer the concerns of Mario Govea Sanson. His speech was as follows:

- "-- Designing a sustainable energy policy for any country is not easy, as it involves the knowledge of many aspects such as respect for the environment and the planet, public and private policies, financing, costs, and even international cooperation agreements to fight climate change".
- "-- The World Energy Council (WEC) in an attempt to develop energy scenarios in 2050 summarizes the critical aspects of energy development for any country in three: accessibility, availability, and acceptability. It is important to think about a third part of the world's population that has no access to commercial forms of energy. It is also crucial to ensure the reliability and security of energy supply, which guarantees the economic growth of any country because this is now a matter of national security. Finally, it cannot be forgotten that electricity generation can only be acceptable according to the philosophy of love to the only home we have which is our planet; it is of utmost importance to think about ethics and environmental sustainability by always looking for cleaner and diverse sources of energy".
- As Farias (2010), Vice President of Energy and Sustainability at CEMEX (Cementos Mexicanos), said during the United Nations Convention on Climate Change (COP 16) carried out in the city of Cancun, Mexico in November 2010: "You have to reach economic growth goals, get people out of poverty while de-carbonizing the economy at the same time."
- "-- The perceived dilemma, my dear fellow deputies, is as follows: Would it be good for the markets to begin operating the electrical systems of the countries, under the assumption of production efficiency, lowering costs, and developing providing industries? Has the modernization of the electricity generation system of the CFE fallen behind? Is it good that private investment is dominating the renewable energies market, or is it time to boost public investment in these type of energies?"
- "-- I cannot answer lightly or superficially to Mario Govea Sanson's inquiry. So I propose the creation of a Commission to investigate this case and enlighten us with accurate data about the approach presented today in order to help us decide: How should the government, the energy industry, academics, and society need to work together to guarantee for renewable energies to have a leading role in the country's energy policy? Will stimulating renewable energies, including the combined cycle power plants based on natural gas, through private investment, effectively contribute to economic growth, social equality, and environmental protection in Mexico and the world? How should the strategies and laws be designed in order to allow a country to shift from an unsustainable energy economy to a sustainable energy economy? What role should private capital play in the process of electricity modernization of any country? Where should the effort of any country, including Mexico, be channeled in the future to guarantee the sustainability of its electricity system? What are the experiences of other countries? The solution will then rest upon the hands of this new Commission. Thank you very much" (Soberon, 2009).

This paper proposes a classroom debate of the reformed Law of Public Electricity Service in Mexico, which opened new opportunities in 1992 for private investment in the Mexican utility industry. How should the strategies and regulations of the Mexican laws be designed in order to trigger a country to go from a non-sustainable energy economy towards a sustainable energy economy?

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**NOTES**