DEBATE ON REFORM OF THE ELECTRICITY SECTOR IN MEXICO

Report on its Background, Current Status and Outlook

Prepared for the

North American Commission for Environmental Cooperation

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ACRONYMS

Acronym	English	Spanish
SME		
PRI		
CFE	Federal Electricity Commission	*Comisión Federal de Electricidad*
SEN	National Electricity System	*Sistema Eléctrico Nacional*
LFC		Luz y Fuerza del Centro
Pemex		Petróleos Mexicanos
CONAE	National Energy Efficiency Commission	*Comisión Nacional para el Ahorro de Energía*
FIDE	Electrical Energy Savings Trust	*Fideicomiso para el Ahorro de Energía Eléctrica*
	Public Electricity Utility Law	*Ley del Servicio Público de Energía Eléctrica*
DOF	Official Gazette of the Federation	*Diario Oficial de la Federación*
BLT	Build, Lease and Transfer	
PIE	Independent Energy Producer	*Productor Independiente de Energía*
CRE	Energy Regulatory Commission	*Comisión Reguladora de Energía*
LGEEPA	General Law on Ecological Balance and Environmental Protection	Ley General del Equilibrio Ecológico y la Protección al Ambiente
NOM	Mexican official standards	
REN	National Electricity Grid	*Red Eléctrica Nacional*
COSEN	Centre of Operations for the National Electrical System	*Centro de Operación del Sistema Eléctrico Nacional*
SUTERM	Union of Mexican Electricity Workers	*Trabajadores Electricistas de la República Mexicana*

EXECUTIVE SUMMARY

Like many other countries, Mexico is embroiled in an intense process of discussion to carry out a reform of its electric sector. The purpose of the exercise is to allow increasing participation of the private sector in the generation, transmission and distribution of electrical power.

In February 1999, President Ernesto Zedillo, whose term ends in December 2000, sent to the Senate a proposal to reform the Mexican electric sector. Had it been approved by that body and the Chamber of Deputies, it would have opened up power generation and distribution activities to the private sector. Eventually, it would have curtailed public-sector participation in the electric market: publicly owned corporations (Federal Electricity Commission (CFE) and Luz y Fuerza del Centro (LFC)) now provide for more than 90 percent of the country's power generation needs as well as the entirety of transmission and distribution.

The proposal calls for transmission and dispatch operations as well as nuclear power plants to remain in the hands of the State. Meanwhile, additional required capacity and a portion of the existing power plants would be transferred to private investors, along with distribution operations, through a gradual and orderly process that would be closely supervised by various government bodies. These latter would see to the creation of a transparent, reliable regulatory framework within which to establish a competitive model (CM) that would replace the present model (PM) for the country's electric industry.

According to President Zedillo's original initiative, the reform proposal attempted to resolve a situation that is the result of two closely linked phenomena: 1) growing demand for electrical power and 2) chronic insufficiency of public resources to make the necessary investments to satisfy this demand.

The federal government warned that public resources were insufficient to meet the investment needs in other budget items, especially for social goods where government funds are indispensable. Consequently, the initiative refers to the impossibility of sustaining the pace of public investment necessary to expand and modernize generation capacity.

The CM proposed by the government would be based on private investment in generation and distribution. The proposal asserted that the para-governmental power company, CFE—despite its operating surplus—could not finance the expansion without resorting to greater levels of indebtedness, which are backed in the final analysis by the federal government.

In a reaction without precedent in the history of Mexico, the president's reform initiative met with widespread rejection; criticism of the CM it contained referred to historical, economical, social and political aspects. The volume of opinion and commentary on the initiative is very large, amounting to a debate on the viability of the market models for the Mexican electric industry which has still not been resolved—and which will certainly be reactivated in the near future.

The debate took place between the proponents of the CM (essentially the federal government) and the defenders of the PM (individuals and civil society groups, especially trade unions) and did not take the form of an organized dialogue within a predefined format. At times, the reactions of various spokespeople on either side were out of proportion to the content of the statement being reacted to.

However, by the end of the initial phase of the debate, concluding with the electoral period and the renewal of the legislative bodies, the discussion on the future of Mexico's electricity industry had been substantially enriched. It was possible to identify a tentative, although not an explicit, agenda for carrying on the debate in the near future. Thus, besides defining the sides or stakeholders in the debate, the government's initiative had the merit of shedding light on the main points of discrepancy between the aforementioned models.

A first key point concerns the *origin of the initiative*. The PM defenders disagreed with the government's CM proponents as to the actual levels of investment required; they disputed that the power utilities are not solvent enough to meet their own investment needs. According to the PM defenders, one solution would be to give these companies greater managerial autonomy and to complement public investment with private funds under the current framework for private-sector participation.

Another point concerned the *viability of the market models* for the electric industry. In the government's view, expressed by Ministry of Energy officials, the PM, based on a monopolistic market, shows clear signs of obsolescence around the world. Only by a thoughtful and extensive application of the CM, which excludes public companies from generation and distribution, can the potential of the new model be realized. This would translate into an increased and economically efficient supply of electricity without the use of public funds.

The CM detractors, for their part, argued that the declining role of the State in economic governance would foster lax regulation of the resulting competitive markets. The participation of large international energy consortiums and oligarchic domestic groups would lead to unfair competition schemes, and corruption would flourish under a large regulatory bureaucracy. As is typical with such bureaucracies, especially in Mexico, its independence would be limited. Its technical decisions would be skewed by short-term political convenience, and would be determined by government bodies such as the Ministry of Energy and the Office of the Presidency.

Another relevant point in the debate related to *sovereignty and privatization*. After all, the privatization of various industries and services initiated by various administrations since the early 1990s were justified as positive for the economy and for fighting poverty in the country, but they have not met their objectives. Thus, as the government attempted to rally consensus around the president's initiative, the negative image in the public mind as to the results of those privatizations militated against it.

Other issues addressed during the debate centered around prices and rates, labour issues, alternative models, and international experiences with electricity privatization. Differences of opinion on all these issues were marked, and practically no consensus was achieved.

Concerning the selection of generation technologies, and in general, the environmental impact of the electric industry, both the CM and the PM envisage the increasing adoption of natural gas-fired combined cycle plants. In the short term, an increase in air pollutant emissions will be observable as a direct consequence of stepped-up electricity production. However, in the medium-term (3–10 years), each kilowatt of power will be "cleaner" on average, since natural gas will to a large extent displace fuel oil in electricity production.

President Zedillo's initiative did not make headway at that time, and it is currently on the list of matters pending debate in the Senate. It is difficult to predict how the new senators will address the matter when they take office in September of this year. In Mexico, there is a widespread consensus that the reform of the electric sector is a priority issue. It is felt that the reform proposal put toward by the government and the ensuing debate constitute an excellent basis for defining the market model required by Mexico's electric industry.

As is public knowledge, for the first time in more than 70 years, the Institutional Party of the Revolution (PRI) lost the presidential election. It no longer holds an absolute majority in Congress. The new political geometry in Mexico is disconcerting in terms of the country's political tradition, due to the many unknowns clouding the immediate future. President-Elect Vicente Fox came to power on the strength of a coalition of various forces and his own party, the PAN. With its ally, the Green Party of Mexico (PVEM), the PAN has a majority in the Chamber of Deputies and is the largest opposition party in the Senate, where the PRI retains its majority.

The new conjuncture is relevant for the discussion on the embryonic electricity reform, since the political map is radically different from the one existing when Zedillo's initiative was put forward. The only relative certainty at present is that the proposal will be revived in Congress and reformulated by the President-Elect, and that the senators will discuss it as a pending matter. There is also the possibility that President Fox will develop a new initiative and send it to Congress eventually.

Speaking broadly, the discourse of the new president and his principal spokespeople around electricity has focused on the need for private capital but without completely privatizing operations or disposing of assets. There are some indications coming from the new government's electricity experts that a new model is being developed, in which private participation will be accompanied by segmentation of the CFE into several smaller companies. There would be free access to the transmission grid for all producers as well as private participation in distribution.

Regardless of the continuation or conclusion of the debate and the market model ultimately proposed during the next decade, any planning scenario for the Mexican electric sector cannot vary markedly from the forecasts and inertial trends prevailing in the current industry. The make-up of electricity supply and the expansion of capacity will be determined by variables such as the life cycle of the existing facilities and by the additional uncommitted generation capacity estimated at 15,804 MW for the period 1999–2008. Required investment will be between $21–24 billion, which represents the opportunity for private capital under the current conditions.

According to various electricity specialists, officials, and consultants in Mexico, it is idle at this point to speak of liberalization when various possibilities for private interests to participate already exist. In reality, Mexican society should gear its efforts towards developing more effective regulatory mechanisms and removing barriers and obstacles to carrying out power generation projects financed by private capital.

In the coming months, discussions around the reform of the electric sector will experience renewed impetus. Undoubtedly, the recent debate constitutes a fundamental background, providing information about the principal stakeholders involved and their particular visions; these stakeholders' level of information and knowledge of the topic; the forms which the confrontation of ideas should take; the specific role that can be played by the media; and, particularly relevant, the identification of some points that may be included in the upcoming agenda for debate.

TORONTO, ONTARIO, CANADA, SEPTEMBER 22, 2000

I GENERAL BACKGROUND

Globalization and the Transformation of Electric Markets

Today's world economy is evolving in a context where *globalization* is the foundation of economic relations. This phenomenon may be defined as a process which, in the final analysis, involves the dynamic interconnection and interrelation of productive activities all over the globe.

Globalization promises that a new environment will emerge, driven by changes in technology, transportation and communication, in which theoretically any product or service can be produced with optimum economic efficiency and marketed anywhere on the planet without tariffs or other barriers.

The consummation of globalization will lead to a global market (of all products and services) based on the free circulation of capital through all national economies.

There are clear indications that the process is underway. Despite worries about its real viability and effects on today's societies, globalization is extending throughout the world in greater or lesser degrees, and no isolated national effort can fully resist it.

Traditional notions of sovereignty and self-determination developed by nation-states have lost impetus, and the relative importance of many national institutions (e.g., central banks, mail and communications systems, educational institutions and large quasi-governmental corporations, especially power utilities) is on the wane.

All over the planet, exclusive markets are under attack from globalization on various fronts. Public and private monopolies are finding it ever harder to preserve their territories and market share. This is the case for the electricity utilities.

Practically all national power utilities that have benefited from monopolistic markets as they developed throughout the twentieth century are under pressure to change that structure. Thus *deregulation, privatization, segmentation* (into generation, transmission and distribution), *restructuring* and *reform* are used in varying contexts as instruments with which to transform the traditional monopolistic structure of the world's electricity markets.

Due to its profound implications and scale, electricity sector restructuring or modification has been the subject of overwhelming amounts of knowledgeable but complex commentary and debate in recent years. To keep this report to a manageable size, we shall limit ourselves to considering the continued viability of a public monopoly over electricity.

Detractors of the current monopolistic approach propose a gradual or accelerated conversion to a free market. Two polar positions (along with multiple and varied intermediate positions) have quickly staked

out their terrain in the ensuing debate: those supporting public monopoly on the one hand, and those preferring the free market—more recently termed the "consumer choice-based market"—on the other.

Reasons for the Monopoly

Electricity, unlike other goods and services, cannot be stored; at least, not profitably and in significant quantities. Yet demand for electricity fluctuates in time, reaching peaks and troughs with some randomness. This fact constrains and shapes the productive apparatus of electrical power, giving it some distinctive technical and economic characteristics vis-à-vis other manufacturing systems. To wit, equipment must be capable of modulation to satisfy peaks of demand, necessitating a constellation of power plants of different individual capacities, whose total capacity corresponds to peak demand.[1] These plants may represent a wide variety of primary energy sources and technologies, with correspondingly diverse capital and operating cost structures.

In theory, a market is functioning properly when the sale price of a good, in this case electricity, is determined by its marginal cost. But the monopolist does not naturally obey this basic principle. It appropriates the surplus made available by its privileged position. In the case of the electricity monopoly, it is governmental intervention in a variety of forms which *compels* the producer to adhere to this principle.

In such a regulated market, the power utility's pricing is normally based on "hidden" or overhead costs, i.e., the average cost of production and supply of electricity plus a component representing recovery of and return on investment, which is also regulated. For almost the entire twentieth century, the US regulated market has been governed by this type of management.[2]

At the origins of the electric industry, when access to the market was supposedly free—although, of course, the consumer had almost no choice whatsoever—companies practiced a usage-based pricing system. This system, functioning in Mexico at the inception of the electric industry and for several decades thereafter, guaranteed great prosperity to the power companies. It also gave them the latitude to discriminate among customers: they sold the product selectively, applying criteria such as proximity of the plant to the customer and the presence of bulk demand.

With the natural growth of electricity demand and the creeping perception of the disruptive effects of this pricing system, as well as the advent and dictates of new power generation technologies, the concentration of electricity production seemed increasingly necessary. In the early phases of the electric industry, "it made a great deal of sense to have the grids interconnected, and to have the power produced by the most efficient hydro or thermal units."[3]

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[1] Jacques Percebois, *Dossier Méthodologique,* IEJE copy, Université de Grenoble, France, November 1984, pp. 143–144.

[2] IEA, DOE., *Pricing Electricity in a Competitive Environment. Background. Modeling Competitive Electricity Pricing,* US IEA/DOE, http://www.eia.doe.gov/emeu/pgem/electric/ch2.html.

[3] W. Varoquax, "Tarification de l'électricité." In: *Revue de l'Energie,* no. 370, January 1985, p.12.

The typical power company of the 20th century was vertically integrated. Economies of scale* could be obtained by building and operating larger plants, and by placing the four activities inherent in the production and supply of electricity to the end consumer—generation, transmission, distribution and marketing—under the control of a single entity. The ultimate goal was to provide a quality service that saw to fundamental issues such as continuity, voltage regulation and frequency control.

Along with the growth of the electric industry in monopolistic markets came various regulatory agencies. Their purposes were to place limits on monopolistic profit-taking, facilitate economies of scale, ensure equitable service provision and promote the rapid electrification of areas still off the grid. In the case of Mexico, though, the governmental regulatory agency enlarged its regulatory mission early on to assume actual responsibility for carrying out the four basic electricity production activities.

Due to the economies of scale afforded by large production units and the possibility of offering acceptable service over a specific zone or territory, the public or private power utility came to constitute a "natural" monopoly in the market where it operated. Each monopoly developed in accordance with the characteristics specific to its context and culture. Its features and practices are, in sum, the result of a long process conditioned by the economic and technical conditions of the time as well as a set of specific political and social factors.

Reasons for the Competitive Market

In the mid-1980s, what with various transformations in the organization and legal framework of the electric industry (which would ultimately transform the monopolistic structure of the market), changes in the technical and commercial practices of the past appeared to be getting underway.

Now, in the year 2000, practically all around the world, various actions taken under the aegis of "deregulation," "reform," "restructuring," "liberalization," etc., have indeed begun to transform the electricity market. The monopolistic model of the twentieth century seems to be giving way to a new commercial paradigm that, as discussed above, favours the formation of a consumer choice-based market.

From a global perspective, this new market is evidently in its infancy, and its consolidation seems remote in many areas of the world. However, in most countries of the Organization for Economic Cooperation and Development (OECD) and many developing countries, the reforms are making headway. Despite some backtracking and resistance, all appearances are that the new model will eventually take hold around the world. "In the electric industry, there is a growing consensus that competition is inevitable and that the unresolved issues relate to the specific form it will take."[4]

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* Economies of scale are achieved when the long-term average cost of production decreases as a result of larger production volumes.

[4] Virginia State Corporation Commission, *Staff Investigation on the Restructuring of the Electric Industry*, www.state.va.us/scc/news/restrc2.htm.

Broadly speaking, it is accepted that the positive experiences of deregulation and introduction of competition in other industries such as aerospace, telecommunications and natural gas may be emulated for electricity.

It is also argued by some that, where possible, a competitive market is more efficient than a regulated one. In addition to the stimulus it provides for innovation, competition is asserted to create incentives for producers to minimize their costs. Price signals invariably improve in a competitive market, with a concomitant improvement in resource allocation. This in turn leads to cost efficiency, favouring prices that are truly pegged to the marginal cost of production and supply of electricity service.

With this improvement in price signals, the range of service and pricing options offered to the consumer broadens. The choice available, in terms of levels and types of service, amply exceeds that available in a regulated market, and reliability improves. Moreover, the competitive market is more receptive to technological innovations that answer consumers' needs, and frequently such innovations lead to an overall improvement in services and to long-term cost reductions.[5]

Power generation in a competitive market lets independent producers bid competitively for contracts to supply electricity directly to large industrial consumers, as well as to distributors via a common power transmission grid.[6]

Unlike the monopoly situation, competition can create a spot electricity market arising from the producers' capacity and flexibility to plan their supply to match demand. A large monopolistic producer has to wait for the consumer to turn on a switch and demand electricity. In order to deal with the fluctuating demand created by these myriad individual actions, it has to maintain a costly rolling reserve capacity.[7] Efficient production planning with smaller, more efficient plants tends to reduce production costs. It optimizes the size and composition of the productive apparatus, gearing it more closely to electricity demand.

One of the most serious arguments in favor of the competitive market concerns technology selection. Various studies suggest, and experienced businesspeople agree, that from 1930 to the mid-1980s, the average cost of plant construction and the optimal plant size have changed drastically. In 1930, a 50-megawatt (MW) plant was considered to be the most economical, based on the average cost per installed Kilowatt ($/kW). At that time, a smaller plant would have been more costly due to the research and development costs. With technological progress, the capacity of the least expensive plant rose to 200 MW in the 1950s and to 500 MW in the 1970s. Into the 1980s, cost-optimal plants had a capacity of 1,000 MW or more.

However, towards the middle of that decade, this trend was reversed by the advent of gas-turbine plants, which radically lowered costs for smaller facilities. Now, the optimal plant has a capacity in the

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[5] *Idem.*

[6] Rozels, R.P. "Competitive Bidding in Electric Markets." *Energy Journal* 10, 1989, pp. 117-138.

[7] John C. Moorhouse, "Competitive Markets for Electricity Generation." *CATO Journal*, vol. 14 no. 3, http://www.cato.org/

50–150 MW range.[8] This new technological and economic reality may erode the conventional wisdom about larger plants and their associated economies of scale. Thus, argue the proponents of a competitive market, the monopolistic utility can no longer justify its explosive growth and invoke its heavy capital costs to justify its market exclusivity.

According to its proponents, in order to consolidate an efficient market, the competitive model has four prerequisites: i) private ownership of electricity facilities; ii) free access to the transmission grid for all power generators; iii) presence of at least three independent generators competing to deliver electricity within a given area, and iv) separation of generation operations from transmission and distribution.[9]

In addition to these prerequisites, studies supporting the creation of a competitive market refer to a series of benefits that normally include the following:

- Increased competition
- Reduced production costs and prices
- Reduced operating costs for companies
- Diminished regional pricing disparities
- Less downtime for productive facilities
- More reliable electricity service
- Improved environmental protection

The debate over the reform or restructuring of the electric industry market has not reached a conclusion. Although the failings of the monopoly market have been pointed out and the arguments in favor of the competitive or "consumer choice" market have been enunciated in plain language, it is still not certain what form the market will take in the near future. Still, it may be asserted that globally, the monopolistic structure of electricity markets will undergo varying degrees of substantive change.

There are, furthermore, varying appraisals of certain cases in which restructuring went ahead with considerable vigor. In the case of Great Britain, most analysts concur that the vigorous reform, held out as a model to be imitated, resulted in a series of undeniable benefits. Yet some observers question this conclusion, insisting that the reforms must be situated in a broader context.

Begun in 1990, the reform of the British electricity sector induced private investors to increase power generation capacity by 25%, with significantly improved environmental performance and service quality as well as lower prices per kWh. Yet some observers maintain that the English case owes its success

[8] Charles Bayless, "Less is More: Why Gas Turbines Will Transform Electric Utilities." *Public Utilities Forthnightly,* December 1, 1994. Cited in Thomas R. Casten, *Turning Off the Heat.* New York: Prometheus Books, 1998, p.43.

[9] John C. Moorhouse, *op. cit.*

primarily to the replacement of coal by natural gas as a primary energy source, and to the increasing adoption of combined-cycle technology.[10]

The social costs of the dissolution of the coal industry in England have yet to be calculated. Reform of the electricity sector in countries like Chile, Argentina and New Zealand has had positive effects, but serious power delivery problems due to insufficient reserves have been experienced. In addition, the larger number and variety of power sources has not in fact responded to the demand as dynamically as had been supposed.[11]

Thus, there are varying conceptual visions about the effectiveness of the electricity market. For the monopolist, competitive markets are a theoretical fiction which do not function in practice as their proponents suggest. The competitive model may have been tried and proven with good results in its early phases, but it tended to show distortions eventually—a tendency that could be repeated elsewhere.

In the competitive model, short-term logic governs economic decisions and the action of the market alone is relied on for all aspects of regulation. Long-term planning, taking account of social factors and sustained by a macroeconomic vision of the country, simply does not exist. Discernible in the debate therefore is the classic divide between short-term *laissez-faire* thinking and its antithesis, long-term planning.

The competition proponents, for their part, do recognize the validity of the monopolistic model as seen in historical perspective, given the prevailing technologies of the time, the issues of national sovereignty and other market-specific factors. What they assert is that this model has outlived its usefulness and is now hindering the development of the electric industry.

Brief Historical Overview of the Mexican Electricity Market

The origins of Mexico's electric industry date back to the last quarter of the nineteenth century. Like the European and North American countries at that time, Mexicans were beginning to use electric-powered engines in industry, especially mining. In the initial stage of development of the Mexican electric industry, power suppliers were "essentially manufacturers, miners, brewers, and flour and textile mills"[12] who sold their surplus power to the surrounding areas for commercial and residential use.

Thus, "Mexican capital played a significant role at the dawn of the electric industry."[13] From 1890 to 1905, almost all companies set up to market electrical power to towns and state capitals were Mexican-owned. These companies had evolved from the mere sale of surplus to the direct sale of electrical current, especially in the centre of the country.

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[10] George Baker and Rafael Friedman, "Reflections on Electric Power Restructuring in Mexico." *World Trade Executive,* February 28, 1999, p.10.

[11] *Ibid.*

[12] E. Galarza, *La Industria Eléctrica en México.* Fondo de Cultura Económica, Mexico, 1941, p.18.

[13] *Ibid.*, p.73

Between 1887 and 1910, more than 100 Mexican light and power companies came into being, almost all of them located in central Mexico—thus configuring the subsequent pattern of industrial concentration in Mexico. Despite the civil war that lasted into the 1920s, the years from 1910 on saw a gradual and sustained influx of foreign capital (mainly Canadian, US and German) which would almost completely displace Mexican capital by the 1930s.

In 1934–1935, it is estimated that Canadian capital represented more than 50% of total investment (approximately $175 million) in the Mexican electric industry; the United States followed with $90 million, Mexican investment amounted to only $10 million, while German investment focused on various electrical equipment.[14]

In the first three decades of the 20th century, Mexican generation capacity grew rapidly, spurred on by high profitability and the country's general economic growth. The governments of the day granted concessions to exploit watercourses relatively cheaply and without bureaucratic complications. From 1911 to 1937, Mexico's installed capacity rose from 135 MW to 629 MW.

In the mid-1930s, a considerable proportion of the Mexican electricity market was in the hands of two large conglomerates: the Canadian-owned Mexican Light and Power Company (incorporated in Toronto in 1902 with initial share capital of $12 million) and *Impulsora de Empresas Eléctricas*, a subsidiary of the US group Bond and Share Co., which would be consolidated into the huge American and Foreign Power Company conglomerate years later.

In 1936, Impulsora was struck by the workers of one of the country's oldest unions, the Mexican Electrical Workers' Union (*Sindicato Mexicano de Electricistas*—SME), founded in 1914. In those years, the government of president Lázaro Cárdenas implemented various forms of government-labor collaboration; under a policy that would come to be known as "Mexican corporatism," trade unions and professional associations became closely tied with the state and its official political party, the Institutional Party of the Revolution (*Partido Revolucionario Institucional*—PRI).

From 1940 on, the conjunction of energy sector (electricity and petroleum) labor associations' interests with the government's thrust to have more control over rate-setting and electrification of rural areas crystallized into a tacit alliance between these associations and the subsequent regional and national governments. It has persisted to the present day. As well, the expansion of the electric industry demanded technicians and professionals from the various fields of engineering, and so the energy sector became a growing source of employment for newly graduated engineers. The professional associations were correspondingly strengthened, and in turn rallied around the government's efforts to consolidate the "national" electricity sector.

[14] J. Bastarrachea S. and J. Alberto Aguilar L. "Las inversiones del sector eléctrico." In: *El Sector Eléctrico de México*, CFE and Fondo de Cultura Económica, 1994, Mexico, pp. 251-253.

In achieving their rate-setting and electrification aims, the Mexican governments of the time were confronting private companies which set rates at will. In addition, their use-based pricing system discriminated in practice against certain customers. For valid technical and economic reasons, power generators simply found it more profitable to sell large volumes at high voltages, and so they preferred the large consumers. In the first half of the 1930s, the influx of foreign investment into the electricity sector slowed as rumors grew that the government planned to nationalize the electric industry.

This was the context for the creation, in 1937, of the Federal Electricity Commission (*Comisión Federal de Electricidad*—CFE). Operating with a budget of only $14,000, 17 employees and rented office space,[15] its principal mission was as a regulatory agency for foreign power companies and as a liaison between these and the government. But private investment into capacity expansion came to a halt between 1939 and 1943. A climate of uncertainty reigned in the private sector, what with the progress of the CFE and the vitality of the trade unions, not to mention the war that consumed the energies of England, Canada and the United States from. Only strictly necessary maintenance and upkeep expenses continued to be made.[16]

A budget allocation of $295,000 in 1938 marked the renewal of Mexican investment in the power industry, this time with government funds. Net cumulative investment from all sources rose from $188.1 million in 1939 to $418.4 million in 1950, but only 18% of this $230 million increase came from private sources: public moneys directly paid for 52% while loans taken by government agencies accounted for 30%.[17]

In 1942, the CFE was contributing 10% of the electricity generated in the country. This it sold to the large companies, which also owned the distribution grid. From then until 1950, growth in the electric industry was fundamentally driven by the CFE's inroads into the rural and other new markets, and by the activities of the Mexican Light and Power Company and *Impulsora de Empresas Eléctricas* consortiums.

The CFE's contribution was largely responsible for driving total generation capacity up from 680 MW to 1234 MW between 1939 and 1950; and this increase in turn relied on expanded thermal capacity, which rose from 291 to 628 MW during the period.[18]

The inception of this federal agency ran concurrent with the nationalization of the Mexican power industry. The 1940s witnessed the gradual acquisition of the assets and installations of various companies; the continuous flow of public investment quickened, averaging annual growth of nearly 20% during the second half of the 1950s and reaching $362 million in 1959. The CFE was on its way to being the sole owner of all the industry's assets.

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[15] Armando Sepúlveda, "Causó Júbilo a Extranjeros la Nacionalización Eléctrica." *Excélsior*, April 14, 1999, p. 1.
[16] J. Bastarrachea, *op.cit.*, p. 254.
[17] *Ibid.*
[18] *Ibid.*, p. 257.

In 1960 the Mexican government purchased 95% of the common shares and 74% of the preferred shares in Mexican Light and Power Company and bought American and Foreign Power outright, gaining control over the two large private consortiums still operating in the Mexican market. The transaction consisted of a downpayment of $59 million plus $138 million payable within 15 years.

The electric industry nationalization decree of 1960 was based on the following premises: a) the government's intent to secure harmonious national progress, guaranteeing its benefits to all citizens of the Republic; b) the ineluctable task of responding to the growing demand for electricity, and c) the state's responsibility for the provision of electricity to the general public—for the benefit of society, not for private interest.[19]

From 1960 to 1972, besides building many new facilities and gaining administrative experience in the administration of its new assets, the CFE continued to incorporate the subsidiaries of the large consortiums into its structure. Invariably, it became in effect the substitute employer. It assumed the companies' obligations under various collective agreements, built up the reserve capital necessary to handle depreciation and pensions, opened new positions for engineering professionals and developed the internal market for a great variety of works and services. All of this activity strengthened the government's alliance with the trade union and professional organizations and consolidated the phenomenon of "corporatism" discussed above.

During this period, and culminating in 1972, the country's electric industry grew within a context of increasing nationalization and technical integration. New investment, far from being neglected, grew at an annual average pace of 16%. The nation's installed capacity went up by 139% from 2,308 to 5,517 MW.[20].

Mexico's electricity grid has expanded to cover almost the entire country in the past 30 years. The installed capacity of the National Electricity System (*Sistema Eléctrico Nacional*—SEN) is currently 35,256 MW (December 1998 data). The SEN is the entity comprising all the assets, facilities and equipment of Mexico's two public electricity utilities: the CFE and Luz y Fuerza del Centro (LFC). This latter company was created in 1994 "to fill the gap in public power service left by the companies undergoing liquidation that formerly operated in the central part of the country."[21]

Despite experiencing multiple technical and financial difficulties, the electricity sector increased its supply to respond to the demands of the country's productive apparatus. At least during the initial phase of modern Mexican industrialization, which many specialists situate between 1940 and 1970, the CFE adhered to two basic principles for the country's energy policy: 1) prioritize satisfaction of demand and 2) keep power prices low to promote competitiveness. In the last twenty years however, rates have progressively been adjusted to reflect the cost of production.

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[19] Guillermo Rodríguez y Rodríguez, "Evolución de la Industria Eléctrica en México." In: *El Sector Eléctrico de México,* p. 28.
[20] Bastarrachea, *op.cit.,* p. 259.
[21] Ministry of Energy, *Prospectiva del Sector Eléctrico 1999–2008.* Mexico, 1999, p. 28.

For years, public utility planners and administrators, and in particular those of the CFE, were faced with the dilemma of applying sound microeconomic administrative criteria while working within the macroeconomic and social policies dictated by the country's highest authorities.

Now, as the debate on the involvement of private capital in the electric industry gathers impetus, it is interesting to note that a large number of intellectuals, technicians, electric industry workers and politicians (senators and representatives) have opposed this participation by invoking the nationalization decree of forty years ago.

From an economic perspective, the historical development of the electricity market in Mexico may be condensed into four overarching phases. In the first, from its beginnings at the end of the nineteenth century to 1910, the market operated on the impulse of Mexican capital primarily, with foreign investment serving as an adjunct. In this first phase, industrial facilities were heterogeneous as to both capital origin and generation technology.

The second phase, from around 1910 to 1940, featured the withdrawal of Mexican capital from the electric industry and the penetration of foreign capital supplied mostly by the two foreign consortiums mentioned above.

The salient features of the third phase, from 1940 to 1972, were the contraction or withdrawal of foreign investment and its replacement by Mexican government capital, on the one hand; and the expansion in terms of territorial coverage and the vertical integration of the Mexican electricity utility, on the other.

The fourth phase, from 1972 to the present, is characterized by increasing consolidation of the CFE through a series of legislated modifications; an expansive spending and investment policy to meet electricity demand that has outstripped the pace of economic growth as a whole; the electrification of large remote areas of the country; employment growth (although with a decline in recent years) and professionalization of the workforce.

In addition to these factors, nationalism has always been invoked by both the government and the unions as a motivation for the consolidation of the electricity sector. Indeed, Mexican society as a whole has a positive impression of the CFE and its work, even though some relevant criticisms of its operational and management methods have been voiced. This overall appreciation is evident from the strong resistance elicited among various currents of opinion by the bald suggestion of "privatizing" the electricity sector. In support of their position, these commentators refer to the failings of the competitive market existing in Mexico between 1910 and 1940.

In all four phases, the electricity market operated under a monopolistic structure; when various companies operated simultaneously, their geographic zones of coverage did not overlap. Mexican consumers have never had the opportunity of choosing their own electricity provider.

Table 1.1
Mexico: Power Generation Capacity*
(1900–1998)

Year	Capacity (MW)
1900	20
1910	110
1920	120
1930	510
1940	680
1950	1 234
1960	3 021
1970	7 414
1980	16 862
1990	18 266
1998	35 256

*The data for 1960 refer only to the installed capacity of the SEN, composed of the CFE and the LFC.
Source: CFE.

The Mexican electric industry is now embarked on a process of reflection in which practically the whole society is participating. The debate revolves around consideration of various paradigms inspired by the present model (PM) and the competitive model (CM) which we present and discuss in subsequent chapters.

It is clear that this process, and the actions that ensue from it, will ultimately lead to reforms that will alter the structure of Mexico's electricity market. To grasp the issues of the ongoing debate, it is necessary to understand the structure of the market, the regulatory framework and the sources and amounts of funds available to promote growth. These are the subjects of the next two chapters.

II STRUCTURE OF THE MEXICAN ELECTRIC INDUSTRY

Supply

According to 1998 data, the total effective electricity generation capacity in Mexico is 38,502 MW. Of this, some 90% originates from the CFE and 2.2% from the LFC: the SEN companies. The state-owned corporation *Petróleos Mexicanos* (Pemex) accounts for 4.4% of the total, and the private sector for 3–4%.[22] In terms of supply, Mexico's electricity market is thus thoroughly dominated by the SEN (combined capacity of 35,256 MW).

At present, the CFE and LFC meet slightly over 93% of the country's total electricity demand of 147.1 terawatt-hours (TWh). For 1998, direct electricity sales were 110.7 TWh (75% of the total) by the CFE and 26.7 TWh (18%) by LFC, which serves the Federal District (Mexico City) and some municipalities of Mexico, Puebla, Morelos and Hidalgo states. This latter company, it should be noted, generates less than 8% of the power it sells, getting the rest from the CFE.[23]

The two member companies of the SEN thus serve as the public electricity utilities, as that term is defined in Chapter III. The current level of territorial coverage is around 95%. LFC covers the one-fourth of the country's population of close to 100 million living in the center of the country, while the remainder is served by the CFE.

The installed capacity of the private sector, authorized by the applicable legislation, is 6,756.5 MW. In 1998, private sources only generated 5.93 TWh or 3.5% of the total gross power output in the country. Pemex generated 5.42 TWh (3.2%).[24]

The SEN plants break down by generation technology as follows: 79 hydroelectric units; 36 gas turbine; 29 steam; 8 internal combustion; 7 combined cycle; 5 geothermal; 2 coal-fired; 1 nuclear; 1 dual (fuel oil and coal) and one wind-powered. In other words, Mexico's power production is largely driven by fossil fuels (66.4% based on hydrocarbons, 10.5 on coal, for a subtotal of 77%). Of the remainder, 14.4% derives from hydroelectric, 5.4% from nuclear and 3.3% from geothermal and wind sources.[25]

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[22] Ministry of Energy, *Balance Nacional de Energía 1998*, 1999, p. 45 (Table 13) and p. 95 (Table 37), CFE, *1999 Annual Report* (draft), p. 12.

[23] Ibid., and CFE, *Desarrollo del Mercado Eléctrico, 1994–2008*, Mexico, internal document (no date), p. 4.

[24] *Balance Nacional*, p. 45.

[25] *Prospectiva*, p. 62 and CFE, Estadísticas por Entidad Federativa 1998, p. 12.

According to CFE data, the remaining useful life of the installed plant ensures that electricity can be generated under the current conditions and operating levels for the next 19 years.[26] In recent years, the electric industry's productivity and efficiency indicators have improved markedly.

Table 2.1
Productivity and Efficiency in the Electric industry

	CFE		LFC	
YEAR	**Interruption time (min/user)**	**Power sold per operations employee (GWh/employee)**	**Interruption time (min/user)**	**Power sold per operations employee (GWh/employee)**
1988	802	1.1241	487	0.64
1989	567	1.299	447	0.669
1990	536	1.295	373	0.821
1991	495	1.319	414	0.828
1992	375	1.355	437	0.862
1993	447	1.447	408	0.906
1994	251	1.585	373	1.152
1995	242	1.654	401	1.140
1996	203	1.771	377	1.165
1997	236	1.853	352	1.382
1998	224.8	1.933	374	1.630

Source: Ministry of Energy web site.

Despite significant efforts to raise the productivity and efficiency of the two companies, some specialists believe that these two companies are overstaffed. In 1999, the 108,543 Mexican electricity sector workers (73,302 for CFE and 35,241 for LFC) produced average annual sales of 1.33 gigawatt-hours (GWh) per worker—a very low figure compared with other countries, especially those of North America.

Although the CFE's economic efficiency may indeed be debatable, its own financial and management indicators show this to be a healthy company with a "sound financial structure."[27] This is not the case for LFC, which, according to some observers, received an indirect subsidy equivalent to $2.4 billion in 1999.[28]

[26] CFE, *1999 Annual Report*, p. 34.

[27] *Ibid.*, p. 32.

[28] Arturo Dessomes, *Electric Power Equipment in Mexico,* US Department of Commerce, January 8, 1999. Web site of Industry Canada, Environmental Affairs, Strategis, http://strategis.ic.gc.ca/engdoc/main/html. Mexico - Electric Power Equipment—Market Assessment—ISA990801 *(8.9 K*)

In terms of future supply, an estimated 22,248 MW of additional installed capacity will be required by 2008—the equivalent of 80% of Norway's current installed capacity, for example. This represents 2,225 MW of new capacity per year until then. The CFE has already taken steps within its investment program to commission 6,444 MW of capacity in the coming years. The capacity gap of 15,804 MW, a little less than half the country's current capacity, thus constitutes the area of opportunity for the private sector in the Mexican electric industry.

Table 2.2
Capacity and Demand, 1998–2008
(MW)

1998		2008			1999–2008	
Effective Capacity	**Maximum Demand**	**Effective Capacity**	**Maximum Demand**	**Total Additional Capacity**	**Capacity developed by CFE**	**Capacity open to private sector**
35 256	28 571	57 504	48 014	22 248	6 444	15 804

Source: Based on **Prospectiva del Sector Eléctrico 1999–2008.**

Transmission

The SEN currently (1999) possesses an electricity transmission grid surpassing 600,000 kilometers in length. This includes 34,079 of high voltage lines, 38,844 of secondary transmission lines, and 528,107 kilometers of distribution lines.[29]

The time horizon for the current program of investment in the grid is 2003, since beyond that year it is difficult to forecast the physical location of new plants. Between 1999 and 2003, 20,237 kilometers of new transmission lines are expected to be added, and between 2004 and 2008, an additional 12,273 kilometers.[30]

At present, the independent producers are permitted to build transmission lines for their own use; alternatively, they may access the SEN's transmission grid through payment of charges established and published in the Official Gazette of the Federation (*Diario Oficial de la Federación*—DOF) on November 24, 1994 and amended on May 15, 1998.[31]

Demand

The supply forecasts and plans discussed above come in response to consumer demand that has grown consistently since 1965 if not earlier. In that period, domestic electricity sales grew at an average annual rate of 8%, much faster than Mexico's economy as a whole.

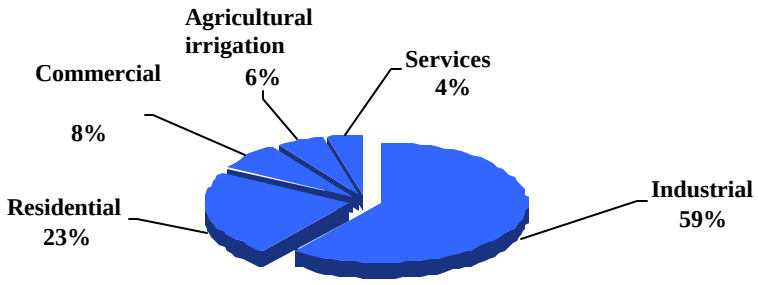
[29] CFE, *1999 Annual Report,* p. 16.
[30] *Prospectiva,* p. 118.
[31] *Ibid*, p. 120.

In the last 10 years, sales have grown by 5% per annum; the figure is more than 6% for residential and medium-size business consumers. According to some Ministry of Energy estimates, demand growth in the year 2000 has returned to the historical average near 8%.

In 1998, gross generation by the SEN amounted to approximately 171 TWh, 80% (137.3 TWh) of which was sold domestically. The market value of electricity sales was $6.9 billion[32] and as indicated above, electrification has reached nearly every one of the country's residents.

The largest electricity consumer, absorbing 60% of the total, is the industrial sector. It is followed by the residential sector with 23.1%; the commercial sector with 7.7%; agricultural irrigation with 5.6% and services with 3.8%.[33] The total number of users (accounts with the CFE or LFC) is greater than 22 million, more than 19 million of them residential.

Figure 2.1
Electricity Consumption by Sector (1998)



Total users: 22 millon **Residential sector: 19**

In the last few years, the largest increase in electricity demand occurred in the residential sector. From 1989 to 1998, sales to this sector grew by an average 6.5% per annum. However, the industrial sector, especially medium-size businesses, promises the fastest growth for the foreseeable future.

Table 2.3
Average Annual Growth of Electricity Sales (CFE and LFC)
(%)

Sector	1989–1998	1999–2008	80% confidence intervals
Residential	6.5	5.0	4.5–5.5

[32] The data on sales revenues are taken from CFE, *Estadísticas por Entidad Federativa 1998*, p. 12. The exchange rate used (9.150160 = 1 dollar) is taken from CFE, *Precios Internos y Externos de Referencia de los Principales Energéticos*, 10th edition 1999, Figure A.1.

[33] *Prospectiva*, p. 40.

Commercial (1)	3.7	4.8	4.0–5.5
Services	1.5	4.7	3.5–5.8
Industrial (2)	5.8	6.3	6.0–6.6
Agricultural	1.9	0.9	-0.1–1.8
Total (excluding exports)	**5.3**	**5.6**	**5.4–5.8**

(1) Users charged general low-voltage rates, primarily commercial, service and micro-industrial establishments.

(2) Users charged general high-voltage rates (large industrial units) and medium-voltage rates (primarily medium-size and small industrial establishments as well as retail businesses and large service establishments).

Source: **Prospectiva del Sector Eléctrico 1999–2008**, p. 88.

Mexican demand will continue to grow by an estimated total of 72% in the next 10 years. To meet this new demand, the country's energy planners call for an expansion of the installed capacity by 63%. Under a scenario of normal economic growth,[34] sales are expected to rise from the current 140 TWh annually to 236 TWh in 2008.

The SEN has organized the task by dividing the country into nine geographical areas: Northwest, North, Northeast, West, Central, East, Peninsular, Baja California and Baja California Sur. In the last decade, top sales growth occurred in Baja California and Baja California Sur, with annual averages of 8.2 and 7.2%, respectively. The largest overall consumers remained the Western region, taking up 23%, and the Central and Northeastern regions with approximately 19% each.

Map 1 shows past growth and projected average annual growth of electricity sales in Mexico under three hypothetical economic growth scenarios devised by the CFE for the period 1999–2008. The **high** scenario assumes average annual GDP growth of 5.5%; the **planning** scenario assumes 5.2% and the **moderate** scenario assumes 3.8%. Practically all market forecasts issued to date by Mexican government planners have adopted the **planning** GDP assumptions. Thus, with anticipated GDP growth of 5.2% per annum, electricity demand will grow by 5.6% per annum from 1999 to 2008 (see Map 1).

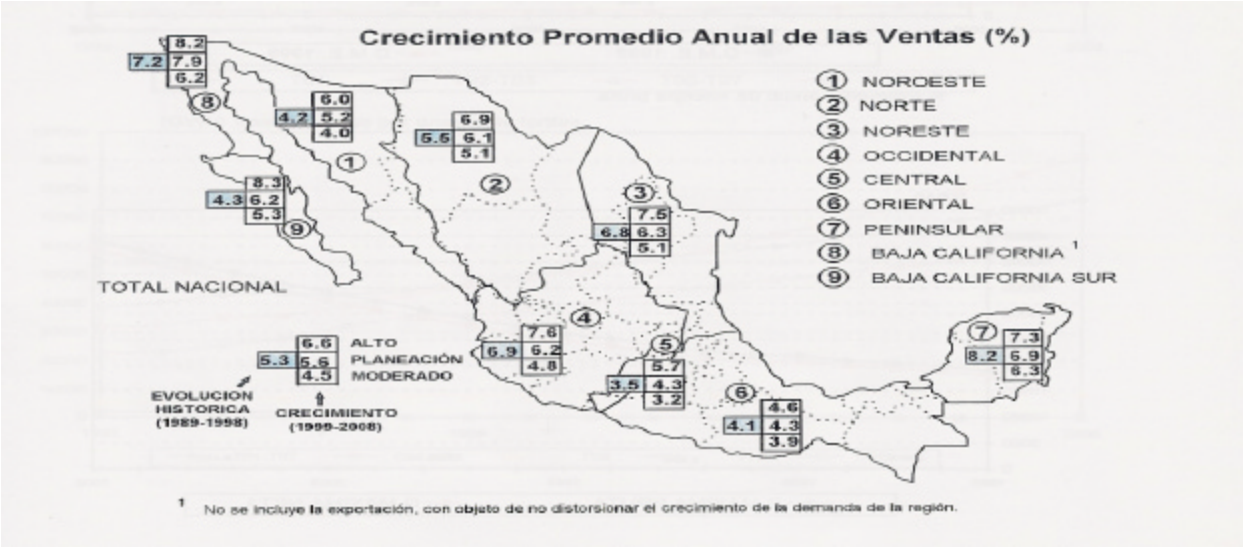
[34] The CFE planners made their power demand projections by considering three possible scenarios: the "Moderate," with average GDP growth of 3.8% from 1999 to 2008; "Planning" with 5.2% and "High" with 5.5%. *Desarrollo del Mercado Eléctrico 1994–2008,* p. 11.

Table 2.4
SEN Planning Regions: Sales, Capacity and Demand

Area	1989 sales (GWh)	1998 sales (GWh)	2008 sales (GWh)	Growth 1989–1998 (%)	Growth 1998–2008 (%)
1 Northwest	6 796	10 020	16 681	47	67
2 North	7 280	11 113	20 098	53	80
3 Northeast	13 479	23 746	43 943	76	85
4 West	16 966	29 724	54 028	75	82
5 Central	22 062	29 026	44 310	32	53
6 East	15 584	22 337	34 138	43	53
7 Peninsular	2 073	3 961	7 738	91	95
8 Baja California	3 640º	6 347	13 595	74	114
9 Baja California Sur	610	863	1 569	42	82
Small systems	47	71	119	51	68
T o t a l	**88 537**	**137 208**	**236 219**	**55**	**72**

Source: Extrapolated from data in **Prospectiva del Sector Eléctrico 1999–2008.**

Map 1
Historical and Projected Electrical Power Demand (1989–2008)



Source: **Desarrollo del Mercado Eléctrico 1994–2008**, CFE, pp. 11, 23.

Balance of Trade

Electricity supply and demand data include imports and exports. In the last 10 years, the balance of trade has varied somewhat erratically, but there was a general trend of declining exports and increasing imports. 562 GWh were imported and 1931 GWh were exported in 1989, rendering a favorable balance of 1369 GWh; but by 1998, the trade balance had turned negative by 1,434 GWh because imports had increased to 1,510 GWh while exports dwindled to 77 GWh. The projections include minimal exports for the next few years.

Energy Savings and Efficiency

Energy savings and efficiency plans implemented mainly by government agencies such as the National Energy Efficiency Commission (*Comisión Nacional para el Ahorro de Energía*—CONAE) and the Electrical Energy Savings Trust (*Fideicomiso para el Ahorro de Energía Eléctrica*—FIDE) may significantly augment energy savings so that some new capacity creation can be postponed. CONAE's programs in particular may diminish new power plant requirements by 7,531 MW or 13% of the total capacity required for 2008, as well as reducing the amount of electricity sales by 25,754 GWh or 11% of sales for that year. Yet although profusely discussed in **Prospectiva del Sector Eléctrico 1999–2008** [Outlook for the Electric Industry, 1999–2008], this energy efficiency potential is not factored into the planning calculations, perhaps because the actual results of any given efficiency program are hard to predict.

Rates

In 1962, shortly after the nationalization of the electric industry, the government set the pricing policy that would remain in effect to this day. In a coarsely drawn, highly schematic classification, the CFE and smaller affiliated companies divided their customers into 13 different rate categories by business and individual consumer type. After 1988, the number of categories was increased to 31 (see Appendix 2, "Electricity Rates in Mexico"). The price of electricity to the consumer is now set "as a function of power volume demanded, voltage, temperature [of the user's zone of residence], type of user and guarantee of service."[35]

The current rate structure consists of the following sectors:[36]

Residential
Users paying rates 1, 1A, 1B, 1C, 1D and 1E for domestic service.

Commercial
Users paying rates 2 and 3 for general low-voltage service; these are primarily commercial, service and microindustrial establishments.

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[35] *Prospectiva,* p. 44.
[36] *Desarrollo del Mercado,* p. 14.

Service
Users paying rates 5, 6 and 7 for public lighting, wastewater and drinking water pumping and temporary service.

Industrial
(Includes medium-size and large business users)

> *Medium-size business*: Users paying rates O-M and H-M for general medium-voltage service; these are primarily medium-size and small industrial establishments, as well as commercial and large service establishments.
>
> *Large industry*: Users paying rates H-S, HSL and HTL for general high-voltage service; these are essentially large industrial establishments and major water supply systems.

Agricultural
Users paying rates 9 and 9M for agricultural irrigation pumping.

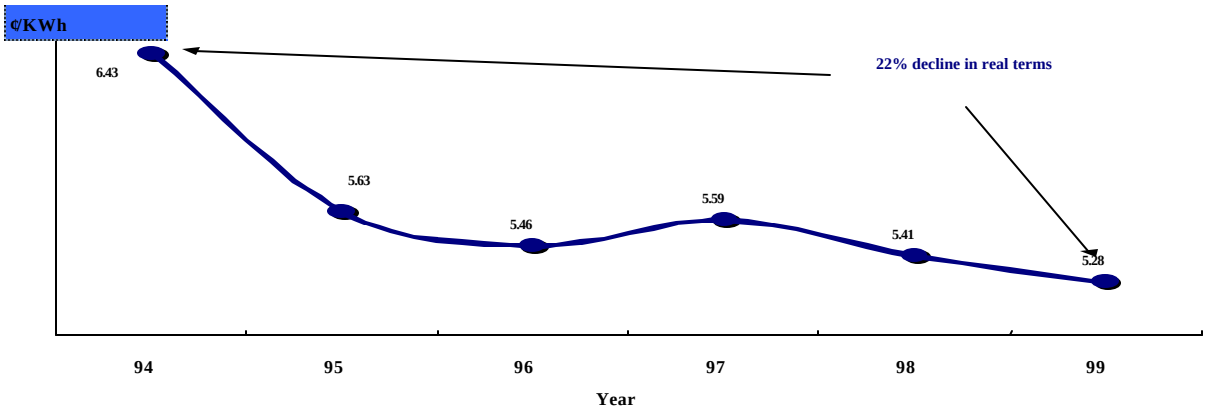
Exports
Sales to US and Belizean companies.

The rate structure is gradually being adapted to reflect the complexity of the productive apparatus and the various consumer types, including residential, service and industrial consumers. The last group can opt for hourly rates: this makes for more efficient administration of demand and streamlining of peak demand management for the provider.

Historically in Mexico, electricity prices, especially to domestic ratepayers, have tended to lag behind the cost of production. Sharp real rate increases in the early 1990s constituted an effort to bring rates in line with costs, but rates fell almost 22% in constant currency from 1994 to 1999, with the aggregate average price[37] declining steadily from 6.43¢ to 5.28¢ per kWh. [38]

[37] The aggregate average price includes maintenance charges, but does not take account of the LFC sale prices or the value-added tax (VAT).
[38] CFE, *Annual Report*, p. 20. The exchange rate applied is 9.56 pesos to the dollar according to Bank of Mexico data.

Figure 2.2
Aggregate Average Price per kWh (1994–1999)



Fluctuation in the price/cost ratio has been an ongoing preoccupation in defining the country's rate policies. The authorities have tried to apply policies in such a way that average price tracks cost more closely, and periods of disparity are shortened.

From 1997 on, almost all rates were automatically indexed on a monthly basis for inflation in the cost of basic inputs into production, transmission and distribution. The affected rates are those applicable to the commercial sector (rates 2 and 3 for general low-voltage service), the Service sector (rate 7 only, temporary service), and the industrial sector, as well as the so-called "Interruptible service" rates (I-15 and I-30).

The indexing formula for all voltages is a function of the average Producer Price Index (PPI) for "Machinery and Equipment" (IPPME), "Raw Metals" (IPPMB) and "Other Manufacturing Industries" (IPPOM).[39] In addition, the high- and medium-voltage rates are indexed to international fuel prices (fuel oil, diesel, coal and natural gas) using an index called ICC.[40] In calculation of the index factor for medium-voltage rates, the change in the average of the three PPI is assigned a weight of 71% and the ICC is weighted 29%; the corresponding weighting for the high-voltage rates is 59%–41%.

Indexing has rendered pricing more transparent, and it is now possible to extrapolate price scenarios for the future from inflationary trends in various inputs, including fuel. These scenarios are fundamental to the design of private investment projects in the electric sector.

In order to make comparisons with alternative investment projects, the private sector needs to know the production costs incurred by the CFE per kWh. As various Mexican electricity analysts point out, the true figures are a well-kept secret. The publicized average costs exhibit distortions due to the inclusion of

[39] *Prospectiva*, p. 46. For more details, see: http://www.cfe.go.mx/gercom/tarif100/ti.chtml.
[40] *Ibid.*

financial expenses and the aggregation of generation, transmission and distribution costs. In short, they do not provide accurate information about the net costs of power generation.

Evidently, spot estimates of generation costs are laborious and complex, given the dimensions and complexity of the CFE's installed facilities. Considerable efforts to establish the marginal short- and long-term costs of generation have been made over several years, but the results have not been made public.

In 1999 CFE sales revenues stood at approximately $8.223 billion[41] for total costs slightly over $7 billion. The aggregate average cost per kWh delivered was reported as $0.047, and the aggregate average cost of generation was $0.033/kWh.[42] These figures do not strictly reflect the true cost of production, though, since they include all manner of government transfers and subsidies. After all, the price-cost ratios given in the income statements in the Commission's 1998 and 1999 annual reports were 0.75 and 0.73, respectively, meaning that the average revenues fetched by the CFE for its products are currently 25% short of its costs. Thus, the operating surpluses habitually reported by the company are due to a wide range of government subsidies and to various *sui generis* accounting practices.

Moreover, the aggregate costs are estimated by a cumbersome and complex calculation of financial and operating costs. The complexity is due to the wide range of power plants at different points in their useful lives, using a variety of technologies and having disparate levels of amortization or depreciation, among other factors.

Rate-Setting Policy

According to recent information, except for rates applied to the residential and agricultural sectors, all rates were sufficient to cover the average cost of production. For rates applied to the industrial sector, the largest power consumer, the price/cost ratio is approximately equal to 1.

Normally, all rates are composed of fixed charges corresponding to the type and quality of service requested, plus variable charges for power consumption volume.

For the residential sector, which consumes 23% of power, the price of power is subsidized on the order of 58% since the current price/cost ratio for this sector is 42%. The fiscal cost to the federal government due to this subsidy is estimated at approximately $2.4 billion in 1999. For the agricultural sector (irrigation pumping), the rate subsidy amounts to almost 70%, but it should be added that this sector only represents 6% of the national market.[43]

Rate-setting policy is not established by the CFE but rather by the Ministry of Finance (*Secretaría de Hacienda*) authorities. The decision to eliminate subsidies is, in the final analysis, a political one, and the

[41] Figures taken from CFE, *1999 Annual Report* and converted to dollars (1 dollar = 9.56 pesos).

[42] Assuming that the cost of generation is equivalent to 70% of the aggregate average cost.

[43] Estimates produced from database of Luis E. Gutiérrez Santos, "Electricidad, precios y bienestar social." *Examen,* no. 114, April 1999, p. 47.

improvement of the price/cost ratio in both sectors depends on economic policy decisions in the immediate future.

As of January 1 of this year, a Ministry of Finance order authorizing new rate adjustments and modifications goes into force. For 2000, rates for residential use, agricultural irrigation (rates 9 and 9M), public lighting (rates 5 and 5A) and wastewater and water supply pumping (rate 6) will rise by 0.08% per month. The aim of these adjustments is to raise the price/cost ratio for these rates, as stated in the document in question: "the rate-setting proposal […] aims to narrow the gap between these rates and the real cost."[44]

In the last ten years, electricity prices in Mexico have remained almost invariant in real terms. Despite some fluctuations, the median price for these years (the weighted average of all rates) remains stable, and the rates applicable to the industrial sector in particular show average annual growth of -2.1% while the other rates increased.

Table 2.5
Electricity Rate Trends 1989–1998
(1998 Constant Cents/kWh)

Year	Commercial	Industrial	Lighting	Residential	Agricultural	Average Price
1989	10.46	4.82	8.47	4.80	1.15	5.39
90	11.05	4.86	11.77	5.57	1.35	5.85
91	13.01	5.55	13.53	6.89	2.62	6.92
92	14.94	5.59	14.92	7.68	3.60	7.71
93	15.56	5.4	15.62	7.79	4.42	7.81
94	14.85	4.52	14.54	7.41	4.04	7.04
95	9.80	2.82	9.40	4.68	2.19	4.35
96	10.29	3.37	10.25	4.97	2.27	4.70
97	11.57	4.21	11.32	5.50	2.50	5.45
1998	**11.28**	**3.98**	**11.96**	**5.49**	**2.47**	**5.25**
Average annual growth in %	**0.8**	**-2.1**	**3.9**	**1.5**	**8.9**	**-0.29**

Source: CFE, **Precios Internos y Externos de Referencia de los Principales Energéticos, 1970–1998,** 10th edition 1999**,** domestic electricity price table (no page number).

Short-term projections (5–10 years) of Mexican electricity prices are only valid if done by consumer sector, since the sectors obey different parameters. Residential rates are set basically as a function of

[44] On CFE web site, section "Gerencia Comercial," http://www.cfe.gob.Mexico.

economic policy criteria. The key question is to determine the speed at which the authorities intend to rectify the price/cost ratio.

For industrial rates, the methodology is defined and the foreseeable price trends may be plotted by taking account of trends in the producer price indexes and in forecasts of the price of fuels used for power generation.

The next chapter presents a review of the current regulatory framework, giving special consideration to the modes of private-sector participation in today's electric industry. Issues also discussed are investment requirements, technology selection, and briefly, environmental impact, particularly on the atmosphere, of the electric industry's activities in Mexico.

III REGULATORY FRAMEWORK AND INVESTMENT IN THE ELECTRIC INDUSTRY

Fundamental Issues and Background

As suggested in Chapter I, the restructuring of the electric industry, in Mexico and around the world is an irreversible process. Cracks in the structure of the monopoly market seem imminent. In reality, the fundamental questions of restructuring may be phrased as follows: i) What proportion of the market will be served by the private sector? ii) In addition to the generation of electricity, will the private sector be allowed to participate in transmission and distribution? iii) Given the current conditions of capacity expansion and regulatory framework, how fast will the private sector be incorporated into electricity production? And as a corollary, iv) What types of technologies will be selected and what are the implications for environmental impact?

In answering these questions, it is worth recalling the legal framework governing private-sector participation in the electric industry. Since 1975, the Mexican government has allowed the private sector to generate power for its own use ("self-sufficiency" or *autoabastecimiento*). It was not until the enactment of new legislation in 1992 and 1993 that a real opportunity opened up for private-sector participation in the market. This is still restricted to certain forms and subject to direct control by the Ministry of Energy.

To be specific, the applicable legal framework, and especially the Public Electricity Utility Law (*Ley del Servicio Público de Energía Eléctrica*), excludes private companies from providing energy for public utility, i.e., electricity sold to an end consumer on the open market. The law makes this the exclusive domain of the SEN companies (CFE and LFC). Article 1 states that:

> *It is the exclusive competence of the Nation to generate, conduct, transform, distribute and supply electrical power for purposes of public utility, pursuant to Article 27 of the Constitution. No concessions will be awarded to private interests, and the Nation, through the Federal Electricity Commission,*[45] *will use the natural goods and resources required for such purposes.*[46]

At present, only the SEN may act as a public electric utility. In the usual sense of the term in Mexico, "public utility" may be defined as "an activity to satisfy a collective need of an economic or cultural

[45] When this law was enacted, the LFC was not yet incorporated into the SEN.
[46] *Public Electricity Utility Law,* Official Gazette of the Federation, December 23, 1992.

nature by means of services which, by virtue of special regulation issued by the government authorities, must be regular, continuous and uniform."[47]

The elements of this definition indeed characterize the Mexican *electric utility,* which by law has the following aspects:

1) *It aims to satisfy societal needs or interests.*

2) *It is regulated by the provisions of public law.*

3) *The authority intervenes to ensure that, within the framework of government regulation, the service is provided adequately, which means that it must be provided:*

a) without interruption;
b) with regularity and under reasonably good operating conditions;
c) to everyone under equal circumstances;
d) mandatorily, i.e., it may not be denied to a user who has met the conditions prescribed by law.[48]

The reforms of 1992–93, which constitute the current regulatory framework and hence determine the configuration of (public and private) electricity supply, are based on this concept of *public utility.* Without changing the essence of this law, especially in regard to *exclusive* access to the open market, but in the spirit of expanding opportunities for the private sector, the government opted to exclude some activities from the definition of *public utility.* Article 3 of the new law reads:

The following are not considered to be elements of **public utility***:*

I. Power generation for self-sufficiency, cogeneration or small-scale production;

II. Power generation by producers for sale to the Federal Electricity Commission;

III. Power generation deriving from cogeneration, independent production and small-scale production for purposes of export;

IV. Importation of electrical power by natural or legal persons exclusively for their own use; and

V. Electrical power generation for use in emergencies arising from interruptions in public electricity service.

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[47] Gabino Fraga, *Derecho Administrativo,* 5th ed., Mexico, Porrúa, p. 19. Cited in Guillermo Kelly Novoa, "Marco legal y regulación del servicio público de energía eléctrica en México." In: *El Sector Eléctrico en México,* p. 43.

[48] Guillermo Kelly, o*p. cit.,* p. 43.

Quite apart from the specific scope of this reform, the measure may be considered groundbreaking in that it expanded opportunities, admittedly limited ones, for private-sector participation in power generation. Under current conditions, the private sector can only participate in the market as a generator, and the resulting power can only be used for its own consumption, for export, or for sale to a single buyer: the CFE. The remaining activities (transmission and distribution) are still in the hands of the SEN, which continues to serve as the *public utility*. The law states that these latter activities include:

> *I. Planning of the national electrical system;*
>
> *II. Generation, conduction, transformation, distribution, and sale of electrical power; and*
>
> *III. Performance or construction of all works, facilities, and activities required for planning, implementation, operation and maintenance of the national electrical system.*[49]

Publication of the regulation corresponding to this law followed one year after its promulgation in 1992. It sets out the terms and conditions of the law's operation, as well as its specific applications. The regulation defines the activities not considered to be part of the *public utility*, which the private sector may now undertake. Thus, it defines the specific options for private-sector power generation. [Table 3.1]

As **Table 3.1** shows, explicit limits to the market's openness have persisted to the present day. Government agencies retain a large measure of control, although, strictly speaking, private capital can and does flow into generation activities.

It may also be deduced that under the current regulatory framework, private investors have essentially two options: 1) power generation for self-sufficiency or 2) generation as independent producers for sale to the CFE. In the former case, obviously no call for tender is required: the project is clearly private in nature and the plant owners may not market their power. For such permit holders, the regulation provides that the CFE may purchase up to 20 MW of capacity[50] as well as all surplus, provided that its price does not exceed the marginal cost to the CFE at the point of delivery.

[49] *Public Electricity Utility Law*, Article 4 (DOF), December 23, 1992.
[50] *Regulation of Public Electricity Utility Law*, Article 135, Paragraph II. DOF, May, 31, 1993.

Table 3.1

Modes of Participation in Power Generation Activities

Self-Sufficiency
…Self-sufficiency is defined as the use of electrical power for one's own consumption where: I. The power is generated by plants devoted to meeting the needs of the co-owners or shareholders therein, and II. The permit holder expressly undertakes to use the electrical power exclusively within the perimeters authorized by the Ministry [of Energy]. (Article 101)
Cogeneration
To obtain and operate under a cogeneration permit, it is essential that: I. The electricity generated be devoted to meeting the needs of establishments associated with the cogeneration, where these are understood to be those of the natural or legal persons who give rise to the basic cogeneration processes or are the co-owners of the facilities or shareholders in the corporation in question, provided that they use this electricity or it is at their disposal, or that they contribute to the process that originates or makes possible its use, and II. The permit holder undertakes to make its surplus power available to the Commission [CFE] (Art. 103)
Independent Production
Independent production is considered to be electricity generation by a plant with a capacity greater than 30 MW, exclusively for sale to the Commission or for export (Art. 108). Where the power is provided exclusively to the Commission (not for export), the project must be included in advance in the planning and program for that entity, or be equivalent thereto (Art. 110).
Small-Scale Production
Small-scale production is defined as electrical power generation for: I. Sale to the CFE of the totality of the electricity generated, in which case such projects may not have a capacity greater than 30 MW in an area determined by the Ministry; II. Supply to small rural communities or isolated areas lacking electricity service, in which case such projects may not exceed 1 MW, and III. Export of up to 30 MW (Art. 111).
Export
…The Ministry may issue electrical power generation permits for purposes of export, where the power is produced by cogeneration, independent production or small-scale projects,… (Art. 116). Applicants for electrical power generation permits for purposes of export must attach the document certifying the agreement to purchase the power they intend to produce or the letter of intent in that regard. (Art. 117) … The permit holders mentioned in the preceding paragraph may not dispose of the electrical power generated on national territory, except where they obtain a permit from the Ministry to change the recipient thereof. (Art. 118) …In reviewing applications … the Ministry will consider the electricity supply requirements within national territory, in the corresponding zone, as well as the type of fuel to be used. (Art. 119)
Import
…The Ministry may issue permits to purchase electrical power from generating plants established abroad by legal contracts concluded directly between the electricity supplier and its consumer. (Art. 120) …Electrical power import permits, with the opinion of the Commission, must set out the conditions and time periods in which the permit holder will request a supply of power in the event that importation ceases. (Art 121) …Imported electrical power … is subject to payment of the import tariffs set out in the applicable legislation. (Art 122) …applicants, except where they connect to the national electricity grid, must operate their facilities within the country with their own resources and personnel… (Art. 123)

Source: *Regulation of the Public Electricity Utility Law*, DOF, May 31, 1993.

Independent producers must participate in a bidding process whose main parameters are the cost per kWh to the CFE under two schemes: Build, Lease and Transfer (BLT) and Independent Energy Producer (*Productor Independiente de Energía*—PIE), whose parameters depend on the capacity required by the CFE. In both cases, the CFE backs the project and purchases the production throughout the plants' useful life.

Under the current regulatory framework, the private sector is not permitted to participate under any circumstances in transmission activities (except those necessary for cogeneration or self-sufficiency) or in distribution activities.

Another important player in the Mexican electric market, besides the Ministry of Energy, which serves as the governing body for the current *regulated* electric market, the Energy Regulatory Commission (*Comisión Reguladora de Energía*—CRE) is the official contact or liaison office. Created in 1995 to "promote the efficient development of the gas and electric sectors on behalf of the users", the CRE assumed the tasks of administering and issuing power generation permits under terms and conditions discussed above. This entity is the "port of entry" into the Mexican electric market (see Appendix 3: *Accessing the Energy Regulatory Commission*).

Table 3.2
Main Characteristics of BLT and PIE

Scheme	Characteristics
Build-Lease and Transfer (BLT)	Consists in the design, financing, construction and commissioning of a power plant financed by private investors to CFE technical specifications. Once in operation, the plant is leased to the CFE for a period of 20–25 years at the end of which ownership passes to the CFE. During the leasing period, the CFE is responsible for operation and maintenance of the plant.
Independent Energy Producer (PIE)	The project developer designs, finances, builds and operates the plant and delivers the energy generated to the CFE. The associated capacity and energy are purchased by the CFE for a period of 20–25 years through a bidding process. The plant remains the property of the private investors.

Source: *Examen,* April 2000, p. 114.

Private-Sector Participation in the Electric Market

Despite the restrictions imposed by the current regulatory and legal framework, private-sector participation has grown since 1992 under the terms described above. According to CRE data, there are currently a total of:

149 valid generation permits classified as follows: self-sufficiency (107), cogeneration (29), independent production (7) and importation (6). These permits represent more than $5.5 billion in investments for construction and operation of 8,794 MW of capacity, 32% of which is in operation (2,838 MW), 23 % is set to begin construction (2,301 MW) and 5% is inactive (461 MW). [51]

Despite the CRE's extremely active stance, some critics point out that private-sector participation in the country's total power generation amounts to only 4.2% (1,646 MW) of its effective capacity. This includes generation permits issued before the 1992–1993 reforms. Pemex accounts for 4.2% (1,728 MW) generated under the self-sufficiency and cogeneration schemes. Meanwhile the PIE projects planned for this year and 2001 will contribute 3,251 MW of installed capacity.[52]

Table 3.3
Generation and Import Permits Issued, 1994–1999

Scheme		Permits	Capacity (MW)	Capacity (%)	Estimated Investment (million dollars)
Self-sufficiency and cogeneration		136	5 533	**Almost 63 %**	3 911.0
	-Private	*100*	*3 805*	*43 %*	2 759.0
	-Pemex	*36*	*1 728*	*21 %*	1 152.0
Independent production		7	3 251	**37 %**	1 613.6
Import		6	10	not significant	2.6
T o t a l		**149**	**8 794**	**100 %**	**5 527.2**

Source: CRE, *1999 Annual Report*, p. 22.

Private-sector participation in the market appears insufficient in light of the challenge of expanding installed capacity taken up by the authorities. Five years after the inception of the CRE and almost seven years after the enactment of the reforms, the results of private electricity production efforts are not encouraging and the outlook is not promising.

From the viewpoint of private investors, the current regulatory framework is not only overly restrictive but increasingly complex in practice, due to the costly and cumbersome bureaucracy it entails. PIE projects finally accepted after a complex bidding process are celebrated enthusiastically by both their promoters and the CRE authorities.

In the opinion of various Mexican electricity specialists and consultants, it is pointless to argue about the desirability of opening up the electric market when this has in fact already occurred to some extent. What

[51] Energy Regulatory Commission, *1999 Annual Report*, p. 20.
[52] *Ibid.*

is needed, say these experts, is regulatory activity aimed at removing various bureaucratic obstacles and barriers confronting private-sector generation projects submitted to the Mexican authorities.[53]

In the near future, up to 2008, no planning scenario can overlook the forecasts and inertial tendencies noted in the document *Prospectiva del Sector Eléctrico 1999–2008,* produced jointly by the group of Mexican authorities with a direct influence on the configuration of the electric industry. For at least the next five to ten years, capacity expansion will continue to be determined by the variables indicated in that document, which are as follows:[54]

a) Energy required and capacity demand
b) Existing capacity
c) Committed capacity
d) Capacity added through reconditioning and modernization
e) Withdrawn capacity
f) Additional uncommitted capacity

Variables *a* and *b* are known, although there is some controversy about the quantity of "energy required," since this has to do with demand projection assumptions and consequently with capacity requirements. Variable *c* has a very restricted range of possible values due to the lengthy maturation period for projects and the difficulty of creating and seeing them through the bureaucracy. At the present time, this variable may be considered to be a constant determined by the parameters of the projects in progress. Variables *d* and *e* are determined by the CFE based on technical considerations.

Finally, failing the application of a radical electric sector reform, including the disinvestment or accelerated sale of CFE assets to remove them from operation—especially certain power plants—variable *f* is currently the big unknown and the chief area of opportunity for private investors, at least until 2008 under the current regulatory framework.

Those wishing to seize this opportunity should bear in mind that from a financial planning standpoint, the *Prospectiva* document is a formalization of the CFE's medium-term investment program. Any alternative scenarios, relating to the configuration of power plants, which differ greatly from the scenario put forward by that document could be of dubious reliability.

The "additional uncommitted capacity" mentioned in the *Prospectiva* document provides an opportunity for the private sector under the current terms of participation. Indeed, the document proposes the locations and characteristics of the required plants, although it states that the location plan is tentative, and that private investors have some latitude in regard to the selection of technologies and fuels.

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[53] On July 4, 2000, a wide-ranging interview was conducted by the Commission for Environmental Cooperation with Alberto Escofet Artigas, a renowned engineer and one of the most noted specialists in the Mexican electric industry. Mr. Escofet expressed his opinion as to the need to raise the quality of current regulation so as to remove obstacles to independent producers' access to the Mexican power market.

[54] *Prospectiva…*, p. 105.

For 1999–2008, total electricity sector investment requirements are estimated at approximately $51 billion (1999). The generation and transmission activities particularly require approximately $28 billion, of which $24 billion[55] could be financed by the private sector under BLT and PIE schemes for the generation work, although only with BLT schemes for transmission.

It is hoped that over the next ten years only 8 of every 100 dollars invested in generation will come from public funds. The figure for transmission is 59 for every 100 dollars invested. Overall, the expansion of the electrical system will require about 41–47% private capital. If these investment goals are met, by 2008 slightly over 27% (15,804 MW) of the country's installed capacity could be in the hands of private investors [Table 3.4].

Table 3.4
Electric Sector Investment Requirements, 1999–2008
(billion 1999 dollars)

Item	Financed investment (private sector)	%	Public sector	%	Total	%
Generation →	16.80	**92**	1.42	**8**	18.22	**100**
Transmission →	3.99	**40**	5.90	**60**	9.89	**100**
Distribution ↓			7.49		7.49	
Maintenance			8.46		8.46	
Other investments			1.56		1.56	
Leasing capital			5.37		5.37	
Total	**20.79**[56]	41	**30.2**	59	**50.99**	100

Source: Based on *Prospectiva del Sector Eléctrico 1999–2008,* pp. 124–125.

It is worth stressing that the lengthy maturation of power generation projects, which are normally preceded by complex financial engineering and negotiation involving different groups of investors, make it necessary to take urgent measures to attract investment.

[55] The figure is derived from a reference in *Prospectiva:* "Of the total required, 230 billion pesos [$24 billion] in 1999 currency will come from financed investment projects. The amount represents the spectrum of opportunities for private-sector participation in the electric market…" p. 125.

[56] The data presented by the *Prospectiva* in producing this estimate do not coincide with estimated requirement of $24 billion. There is a discrepancy of $3 billion. (See previous note.)

To attract capital and independent producers to this important market niche—even within current the current framework—the responsible authorities have to make significant promotional efforts in capital markets and among electricity producers.

Furthermore, and irrespective of the fate of proposals to reform the electric sector, the current regulatory framework must expedite the permit issuing procedures, and the range of possibilities now offered to investors and private entrepreneurs must be substantially broadened.

Under the investment program we have been analyzing, the partial investment amounts are greater during the first half of the period analyzed. Thus, of up to $51 billion of required investment, only $4.12 billion will be applied in 1999. An additional $31 billion will be necessary during the years 2000–2005 and, to close the period, from 2006–2008, the remainder of $16 billion will be required. [Table 3.5]

Table 3.5
Application of Investments in the Electric Sector (1999–2008)

	1999	**2000–2005**	**2006–2008**	**Total**
Amount invested (billion dollars)	4.12	31.0	16.0	**51.12**
Investment amount Cumulative	4.12	35.12	51.12	
Percentage (%)	8.04	60.5	31.25	**100 %**
Cumulative percentage (%)	8.04	68.9	100 %	

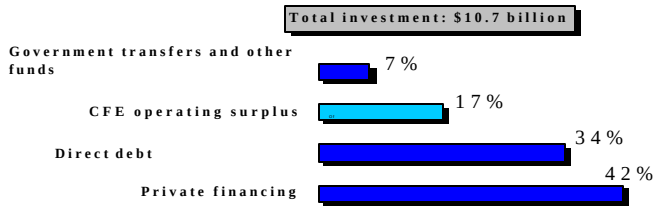
Source: *Prospectiva del Sector Eléctrico 1999–2008*, pp. 120, 124–125.

The relevance of alternative forms of investment in public works becomes clearer when we analyze the financing sources of the electricity sector in the recent past. Given the government's vision, it is surprising that the SEN does not have the capacity to provide the resources necessary to invest in expanding electricity supply.

From 1994 to 1999, the total amount invested in the sector was $10.7 billion, partially funded by the CFE's operating surplus of 17% for the period. The remainder had to be financed with direct debt (34%) as well as private financing (42%) and federal government transfers and other resources (7%) [Figure 3.1].[57]

[57] Luis Téllez Kuenzler, "Electricidad, Desarrollo y Democracia." *Examen*, no. 114, April 1999, p. 11.

Figure 3.1
Sources of Investment in Electricity Sector (1994-1999)



Generation Technology

From the standpoint of private investors, the prime consideration in the selection of generation technology is **cost**, a concept encompassing not just power generation equipment and its commissioning but also all future operating costs. These latter include operation and maintenance personnel costs as well as fuel, which in turn implicitly or explicitly includes charges for quality (i.e., grade) and transportation. A further cost to be considered is that of the ultimate dismantlement of the plants.

As Chapter I implied, in recent years the technology of combined cycle (CC) gas turbine power plants has come to be considered state-of-the-art, in both technical and economic terms. In contrast to conventional thermal plants, which operate at efficiencies of 35–40%, CC plants reach 50–80% efficiencies. Furthermore, they can be built more quickly at capital and operating costs much lower than for conventional plants.

By the 1990s, gas-driven CC plants had become the best option worldwide for almost all new generation projects, wherever natural gas is available. In addition to their cost advantages, these plants are less environmentally damaging, since they produce no sulfur dioxide (SO_2) and only half as much carbon dioxide (CO_2) as conventional coal-fired thermal plants for the same energy output.

Clearly, across-the-board implementation of CC depends, in the first instance, on its availability in the market,[*] as well as on the security and stability of the natural gas supply during the plants' operational life. In contrast to conventional thermal plants, which can generally run on a range of fuels, CCs are strictly gas-powered. Accordingly, the installation of this type of plant depends on a synchronized supply of gas and requires careful price forecasts for this fuel.

Based on technical considerations and the economic factors discussed above, the SEN planners have determined that in the period 1999–2008, CC plants will account for the bulk of new power generation capacity in Mexico: as much as 84% or 18,691.9 of the estimated 22,247.8 MW of new capacity.[*]

[*] A study of the market in relation to this type of plant should be carried out. It is important to determine whether medium-term supply will be able to keep up with nearly exponential changes in demand.

[*] This estimate is contained in a *pro forma* plan produced by the SEN planners; the actual percentage cannot, of course, be known until the private investors have made their technology choices.

Specifically, outside of the "committed capacity" (projects under development) and the hydroelectric projects, CC plants could supply nearly all of the 15,804 MW of additional capacity that constitutes the new private-sector investment niche.

Table 3.6
Planned Capacity (*pro forma*) (1999–2008)

Technology	Committed (MW)	Additional (MW)	Total (MW)	Total %
Combined cycle	5 813.9	12 878.0	18 619.9	84
Reconditioning		226.0	226.0	1
Hydroelectric		2 511.0	2 511.0	11
Fuel oil				
Coal				
Geothermal	118.7	105	223.7	1
Nuclear				
Gas turbine	459.9		459.9	2
Internal combustion	51.3	84.0	153.3	~1
Wind				
Total	**6443.8**	**15 804.0**	**22 247.8**	**100**
Percentage of total (not including hydroelectric) supplied by combined cycle		99.7	94.3	

Source: Based on *Prospectiva del Sector Eléctrico, 1999–2008,* Table 40, p. 130.

Cogeneration and Renewable Energy

In the near future, the electricity supply will continue to be based on conventional generation technologies and improvements therein, CC being a good example. The further adoption of renewable energy sources (except hydro) is largely contingent upon future technological innovations, since their long construction, distribution, and maturation times often make them unprofitable under current conditions—the exception being wind and other energy sources that could be competitive in remote areas off the present-day transmission grids.

The *Prospectiva* indicates that cogeneration, a method for the optimal production and use of two forms of energy from one or more sources, has significant potential for the period under analysis. It states that considering the cogeneration permits issued by the CRE and the natural gas consumption projections for

the country, by late 2008 the country should possess an installed capacity of 2,115 MW generating approximately 10,520 GWh yearly.[58] For the same year, the total installed generation capacity driven by renewable energy sources (mini-hydro, solar, wind and biomass) could reach 559 MW, for 1,836 GWh per year.[59]

The combined contribution of these energy sources by 2008 will nevertheless be modest, amounting to only 5.2% of sales and 4.6% of effective installed capacity.

Environmental Impact

Consideration of the environmental impact of the activities underlying the world's electric industry is increasingly unavoidable. The relevance of internalizing the environmental costs of power projects in the cost of producing, transmitting and even distributing electrical power is becoming obvious. At present, these costs are implicitly factored in terms of the quality of the fuel used.

The so-called externalities (or external costs) of electricity generation are still not explicitly figured, but there is growing interest in accounting for them. It is to be predicted, and is of course desirable, that the sale price for kWh will include such costs in the future.

As mentioned previously, Mexican electricity production is based on fossil fuels, particularly petroleum derivatives, natural gas and coal. Compared with other energy sources, these are, in general, more damaging to the environment. The main environmental effects of fossil fuels are as follows:

- Soil and water contamination and ecosystem disruption by spills or accidents during exploration, extraction, processing and transport phases
- Air pollution
- Acid rain and deposition
- Global climatic effects due to CO_2 emissions
- Landscape and life pattern disruption in communities where extraction and processing of these fuels occur.

Given the critical environmental contamination problems, and especially air pollution, it is surprising that the projected pattern of fuel consumption for electricity generation for the period 1999–2008 remains so inflexible.

Since, as indicated in the "Generation Technologies" section of this report, practically all future new capacity will probably come from natural gas, the current dependency on petroleum, gas and coal for power generation (77% of the total) seems likely to endure.

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[58] *Prospectiva*, pp. 135–138 [Based on studies by the CONAE].
[59] *Ibid.*

By 2008, gas will have replaced fuel oil as the most commonly used fuel, a trend that will be accentuated by the gradual replacement of fuel oil in plants located in critical, typically urban, zones, so as to meet environmental standards. Under the proposed fuel substitution policy, the proportion of total fossil fuels represented by fuel oil will decrease from 67.2% in 1998 to 26.4% in 2008. If this goal is achieved, the volume of fuel oil sold to the national electric sector will decrease in absolute terms.

Reduced fuel oil consumption, apart from the environmental benefits, will place some economic pressure on the refineries of the national refinery system administered by the quasi-governmental corporation Pemex-Refinación, since fuel oil is a practically unavoidable residual product of the current production technology. From the broad perspective of the country's overall energy policy, reduced domestic demand for this fuel should be offset by reconfiguration of the refineries to produce lighter petroleum derivatives, or by finding alternative foreign markets for this fuel.

Currently, 67% of total installed capacity depends on fossil fuels (hydrocarbon-powered plants, dual type and coal-fired), the rest depending on primary energy sources (geothermal, wind, hydro and one nuclear plant); the relative proportions are expected to be 75% and 25%, respectively, by 2008.

Table 3.7
Fossil Fuel Consumption for Power Generation

	1998 (%)	**2008** (%)	**Change**
Total Terajoules per day	**3 686** (100 %)	**5 865** (100 %)	**+2 179** (+59 %)
Fuel oil m^3 per day (%)	**59 388** (67.2 %)	**37 079** (26.4 %)	**-22 309** (-37 %)
Diesel m^3 per day (%)	**1 370** (1.4 %)	**668** (0.4 %)	**-702** (-51 %)
Coal Million tons/day (%)	**9.35** (13.1 %)	**18.2** (15.2 %)	**+8.85** (+95 %)
Natural gas Million m^3 per day (%)	**19** (18.3 %)	**90.6** (58.0 %)	**+71.6** (+377 %)

Source: Based on data from *Prospectiva del Sector Eléctrico 1999–2008,* p. 114.

The proportion of electricity generated by fossil fuel-based plants will rise from slightly more than three-fourths in 1998 to over 85% in 2008, although with a higher proportion of gas and other cleaner fuels.

Although clearly, absolute emission volumes will increase by 2008, the increase will not be *ipso facto* proportionate to the 59% increase in fuel consumption. The new fuel mixture with 377% more gas than in 1998, the significant decline in fuel oil use and a larger, more efficient set of gas-based CC plants may well improve emission factors.

Table 3.8 gives rough estimates of these factors for Mexico based on generally applicable coefficients.

Table 3.8
Air Pollutant Emissions for Power Generation
(1998)

Pollutant	Total emissions (thousand tons)	Emission factor (Kg/kWh)	
		Gross	Net
Carbon dioxide CO_2	100 875	0.58997	0.7351839
Carbon monoxide CO	26	0.00015	0.0001907
Nitrogen oxides NOx	365	0.00214	0.0026617
Sulfur oxides SOx	701	0.00410	0.00511106
Particles	93	0.00055	0.0006799
Hydrocarbons	6	0.00004	0.0000470

Source: Based on preliminary CONAE data.

Of course, all electric industry activities must obey the applicable legal provisions on environmental protection, chief among them the General Law on Ecological Balance and Environmental Protection (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*—LGEEPA) and the Mexican official standards (NOM) on environmental protection.

This report contains a lengthy list of the environmental standards applicable to the electric sector in Mexico, preceded by a list of the laws, regulations, decrees, orders and agreements applying to the development of power generation and transmission projects (Appendix 4: Environmental Law Applicable to the Electric Sector).

IV VIEWS ON REFORM OF THE ELECTRIC SECTOR

Elements of the Presidential Initiative

As was remarked in the previous chapter, the current regulatory framework emerging from the reforms of 1992 and 1993 provided new and significant opportunities for private sector participation in the electric industry. The amendments to the Public Electricity Utility Law and its Regulation reflected "an acknowledgement of the need to bring in private resources to help expand electricity supply."[60]

Since the amendments were based on a redefinition of activities considered to be of "public utility" that did not significantly alter the monopolistic structure of the market, they aroused no significant controversy between the defenders of the present model (PM) and the proponents of the competition model (CM) of the electric market.

The initiative of the Mexican President in early 1999 called for much more profound changes in the structure of the electric industry, necessitating amendments to Articles 27 and 28 of the Constitution. Article 27 established the State's *exclusive* control over *strategic* activities, which included electricity generation, transmission, and distribution by public utilities. Article 28 expressly prohibited monopolies and monopolistic practices, but exempted certain strategic functions of the State, such as electricity.

Abolishing the State's exclusivity meant adopting a legal strategy to amend these two articles. Simultaneously, the generation, distribution and marketing of power (except of nuclear origin) would have to be excluded from the definition of "strategic activities." The national transmission grid, however, would continue to be exempted from the monopoly prohibition of Article 28.

Under the changes, activities formerly considered strategic (thermal or hydro power generation as well as distribution) would now be legally considered "priority" areas, meaning areas no longer controlled by a monopoly and open for private investment. If the proposal had been approved, Mexico's electric industry would have undergone one of the most sweeping transformations in its history, from the current *sui generis* monopoly market to one of competition.

The principal elements of the market structures proposed by the presidential initiative were the following:[61]

1. Transformation of the existing public electricity agencies into various specialized generation and distribution companies, plus one company called the National Electricity Grid (*Red Eléctrica Nacional*—REN) in charge of the national transmission grid.

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[60] Office of the President of the Republic, *Propuesta de Cambio Estructural de la Industria Eléctrica en México,* (Summary), Mexico, 1999.

[61] *Ibid.* Section on "Principal Elements of the New Proposed Structure."

2. Creation of a decentralized public agency, the Centre of Operations for the National Electrical System (*Centro de Operación del Sistema Eléctrico Nacional*—COSEN), responsible for the operations of the national transmission grid and the wholesale electric market (electricity dispatch); creation of another agency in charge of nuclear power generation.
3. Opening of electric industry activities to domestic and foreign private investment.
4. The establishment of a spot market for wholesale electricity, in which generators would sell power under competitive conditions at a freely determined price.
5. Free access to the national transmission grid, and the possibility for qualified users to participate, whether directly or through marketers, in the wholesale electric market.
6. Development of long-term bilateral contracts under terms freely stipulated between the buyers and sellers of electrical power.
7. Legal exemptions to let electric delivery systems off the national grid operate under special conditions.
8. Application of a transparent, effective subsidy policy with explicit objectives of societal benefit.
9. Ministry of Energy planning of investments in the national grid and provision of incentives for the efficient and competitive operation of the electric industry.
10. The development of a clear, transparent, predictable legal framework giving private investors legal assurance and allowing the CRE, as an independent authority, to regulate the price, investment, and service quality aspects of the natural transmission and distribution monopolies as well as other activities of the electric industry.

The ten elements of the presidential initiative and the diagram illustrating them (Figure 4.2) each point to quite general issues about the structure of electric market in Mexico. Regardless of the fate of the initiative in its current form, these points will serve well as guideposts to present and future discussion on the matter.

Following the presentation of the initiative, a publicity campaign headed up by various energy sector officials was carried out. The Minister of Energy, Dr. Luis Téllez Kuenzler, participated in a large number of formal and informal forums, as did other officials associated with his department. The scope and potential benefits of the initiative were publicized by means of publications, press conferences and extensive use of the electronic media.

According to Dr. Téllez:

> *The initiative to reform articles 27 and 28 of the Constitution on electricity presented by the Federal Executive Branch calls for the reorganization of the electric industry to ensure that this sector can act as a bolster of our country's economic and social development…*

> *Passing this reform initiative is the next challenge facing the Congress of the Union, which will act accordingly and in benefit of the nation, as it has always done…*[62]

The current president of the CRE, Dr. Héctor Olea, stated that:

> *Heeding the call of President Ernesto Zedillo to reform the national electric industry represents a historic responsibility.*
>
> *Today, we have a chance to act promptly and responsibly, guided by a long-term vision, not only to address the growing needs of our industry, but also to promote its development on behalf of the users, under the firm and sovereign supervision of the nation's institutions.*[63]

Meanwhile, the Director of Investment for the Ministry of Energy observed that:

> *The approval of the proposal…, will permit greater private-sector participation in the generation, distribution, and marketing of electrical power. This will make possible a greater degree of competition among the industry's participants. The result will be the consolidation of an electric market governed by energy and economic efficiency, in which generators and consumers alike can seek the greatest benefit from their respective activities.*[64]

The initiative aimed to address two closely correlated issues: the accelerating growth in electricity demand and the chronic shortage of public resources with which to make the necessary investments and satisfy this demand. The Federal government warned that public funds could not be stretched to accommodate all of society's investment needs. Public funds being irreplaceable in the provision of certain public goods, it was maintained that the rhythm of public investment necessary to expand and modernize generation capacity could not be sustained simultaneously.

The government's competition model would be based on private investment in generation and distribution. It stated that the CFE, despite its operating surpluses, could not finance the expansion without incurring further debt that is ultimately backed by the federal government in any case.

As the competition model became consolidated, it would see the CFE divesting itself of all power plants except the single nuclear plant, and it would no longer participate in distribution. A decentralized, independently funded public agency would be created (independent of the government apparatus) to operate a free wholesale market in which distributors, qualified users and sellers would participate. The agency in question, COSEN, would be in charge of electricity dispatch. Following strict technical and

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[62] Luis Téllez Kuenzler, *op. cit. Examen,* pp. 4–5.
[63] Héctor Olea, "Apertura y rectoría estatal." *Examen,* p. 35.
[64] Dionisio Pérez-Jácome, "Inversión privada en el sector eléctrico." *Examen,* p. 30.

economic criteria, it would determine the sequence of power plant commissioning necessary to satisfy demand.*

The CFE would become the sole operator of the national transmission grid and the nuclear power plant. The CRE, still responsible to the Ministry of Energy, would transmute into a powerful regulatory agency governing all aspects of the industry.

Once the competition model were fully established, there would be a new scheme of competition among government, private and civil society agents, which is summarized below (Table 4.1):

Table 4.1
Competition in the Electric industry under President Zedillo's Initiative

Exclusive government activities with operation of non-transferable, non-assignable assets.	⇒ *Operational control over electric system* ⇒ *Nuclear power generation*
Assets that remain in the public domain and may only be operated by quasi-governmental entities	⇒ *Transmission grid* ⇒ *Hydroelectric generation for agricultural irrigation*
Assets remaining in the public domain which may be operated under concessions awarded to public and private companies	⇒ *Distribution grids* ⇒ *Hydroelectric power plants in hydraulic facilities specifically intended for that purpose*
Public-sector assets subject to disposal or injections of private or civic sector capital in the medium term.	⇒ *Thermal and geothermal power plants*
Assets that are private property from their creation	⇒ *New power plants built by private interests (except nuclear)*
Assets of complementary institutions retained by the State	⇒ *Institute for Electricity Research (IIE)* ⇒ *CONAE*

Source: From Ministry of Energy, *Reforma del Sector Eléctrico: Documento Rector*, p. 12.

* If COSEN were indeed created, it could become a powerful force for environmental protection, if environmental criteria were added to the technical and economic ones.

Reactions to the President's Initiative

In theory, Mexico's political system is founded on the separation and independence of executive, legislative and judicial power. In practice, the political system has traditionally been "presidentialist" in the sense that the executive branch has wielded power over the legislative and judicial branches.

For seventy years, nearly all initiatives presented to the two houses of congress have been adopted. The effects of "presidentialism" were helped along by the fact that the president's party—the PRI—has always held majorities of seats in those bodies: for the last ten federal administrations, in fact.

However, during the second half of President Zedillo's administration (1997–2000), his party held a minority of seats in the Chamber of Deputies. Through an alliance with the conservative National Action Party (PAN), it managed to pass many controversial initiatives (such as the value added tax hikes and the Fobaproa initiative[65]); moreover, it kept its absolute majority in the Senate. Nevertheless, the traditional quasi-automatic mechanism for approval of presidential initiatives was showing signs of wear.

This was the context in which, in February 1999, the President sent the initiative in question to the Senate. Following normal procedures, the initiative was referred to the First Joint Commissions on Constitutional Matters; Non-Renewable Energy and Resources and Legislative Studies. The Commissions initiated a process of public consultation by means of five analytical forums held in eight different cities. The Director of the CFE was invited to appear before the Joint Commissions, while the Minister of Energy appeared before the Senate.

Normally, the initiative would have gone on to the plenum of the Senate, and from there to the Chamber of Deputies. However, the initiative was so systematically and virulently rejected in the forums and by important sectors of public opinion that it never came back to the Senate plenary sessions, let alone to the Chamber of Deputies.

The initiative's formal legislative status is now "pending" and when the current legislative session concludes in late August 2000 it will become part of the "legislative backlog." Some participants in the process believe that the initiative had procedural flaws that might in any case have given rise to a successful Supreme Court challenge by the trade unions on the basis of vested rights.

No Mexican debate in recent memory has been so heated. The generalized rejection of the presidential initiative and the competition model was multi-dimensional in nature, with criticisms being voiced on

[65] Fobaproa, The Fund for Savings Protection, was created by the federal government to back depositors' savings. A series of defaults on payments on a large number of loans granted and bankruptcies of phantom projects sanctioned by the banking system and supported by this fund caused the largest financial upheaval in the country's history. Its cost is estimated at around $100 billion for the year 2000 and was—via internal public debt—transferred to the nation as a whole. (See A. M. López Obrador, *Fobaproa: expediente abierto*, Grijalbo, México, 1999, pp. 89-99).

historical, economic, social and political grounds. Yet the initiative could be back on the legislative agenda in September 2000.

And one must acknowledge that the initiative had the merit of crystallizing debate on a set of issues that have yet to be fully elucidated—issues that will inevitably have to be addressed by the new federal administration when it takes office on December 1, 2000. The most relevant of these are: i) origins of the initiative; ii) State, sovereignty and privatization; iii) viability of the models; iv) financing and investment; v) costs and rates; vi) labour issues; vii) alternative models and disposal of assets, and especially, international experiences.

The sum total of opinions and statements made on these and other related matters is huge. In what follows, we present a summary of the arguments made in various forums by the proponents of the CM (essentially the federal government) and the defenders of the PM (individuals and civil society groups). The statements were selected for inclusion on the basis of being representative of the range of points of view expressed. It should be emphasized that the debate did not by and large take the form of an organized dialogue within a predefined format. On all sides, the reactions of various spokespeople were often out of proportion to the content of the statement being reacted to.

This first phase of the debate, still without conclusion, has substantially enriched understanding of the possible options for the future of Mexico's electric industry. A tentative agenda for future debate appears to have been defined.

i) Origins of the Initiative

In the government's formulation, the CM initiative arises from the need to ready the electric industry to face accelerating demand in the coming years. The SEN (CFE and LFC) is not in a position to make the necessary investments, and only through market liberalization can the resources necessary to expand supply be attracted.

The present administration, in recognition of this fact, decided that it was the right time to promote the opening (privatization) of the electric sector. For the government spokespeople, the initiative was consistent with various plans to restructure and modernize the public administration that were implemented from the late 1980s onward, translating into the privatization of productive sectors such as steel, mining, ports, highways, telephony, railways and banks.

However, some defenders of the PM pointed out that the initiative responded to a will to advance the process of privatization, coextensive with the neoliberal paradigm and the push to globalize. Specifically for Mexico, it was asserted that the initiative was designed to address the Zedillo administration's "cash-flow" problems.

Such a transcendent and important measure, reasoned the defenders of the PM, should have been (but was not) mentioned in the government's plans and programs for the energy sector when it took office.

Quite the contrary, the growth scenarios presented in these planning documents largely assumed that the PM would continue to operate as it had long done, within the adjusted regulatory framework arising from the reforms of 1992–1993.

As one journalist specializing in energy issues in Mexico remarked, "the executive's initiative to privatize electricity seems to be the result of strong pressures which urged its collaborators to take action in a hurry." After firing some salvos concerning the government's need for funds to pay down its external debt (equivalent to five times the amount of investment in electricity during the Zedillo administration), the same journalist mused as follows: "The former director of the Federal Electricity Commission (CFE), Rogelio Gasca Neri, [had stated] in 1998 that the committed capacity was estimated at 7,600 MW and that with the nine calls for tender issued by the CFE in that year, a timely and efficient supply of electricity would be guaranteed to all Mexicans until 2006. What is going on now?"[66]

In truth, many Mexicans were wondering about the real reasons that pressed the President to send his initiative to Congress. Some observed that, with the presidential race being imminent, electoral interests might be behind the initiative. A US consulting firm specializing in the Mexican energy industry observed that the timing of the President's proposal had more to do with the electoral strategy for 2000 than with energy or electricity demands.[67]

With the publicity surrounding the initiative during the first quarter of 1999, some observers hypothesized that external pressures had been brought to bear on the presidency. Policy analyst Luis Hernández Navarro asserted that the executive's proposal had been based on guidelines provided by the World Bank. The Bank had given the government a $30 million loan, one-third of which targeted the electricity and secondary petrochemical industries "to promote the short-term restructuring of the sector to create the conditions for the introduction of competition, design a rate-setting policy, and initiate actions towards these objectives." According to Hernández Navarro, these guidelines coincided "almost word for word with the structural reform initiative for the [electricity] sector produced by the executive."[68]

Thus, apparently, the initiative had come forward due to a conjunction of various interests, including international financial institutions such as the World Bank; certain short- and medium-term "cash flow" problems of the Zedillo administration; commitments under international agreements (the North American Free Trade Agreement (NAFTA) was mentioned) and the spread of globalization in Mexico.

ii) State, Sovereignty and Privatization

Government proponents of the CM argued that liberalization would not imply a weakening of the State and its capacity to defend the sovereign interests of the nation. But from the viewpoint of some PM defenders, the initiative was indeed part of a process of erosion of national sovereignty.

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[66] Emilio Lomas, "Alguien está mintiéndole," PARABOLA. ***La Jornada***, March 14, 1999.
[67] George Baker and Rafael Friedman, *op. cit.* p. 9.
[68] Luis Hernández Navarro, "Un matrimonio perverso." ***La Jornada***, March 1999.

By submitting the initiative to scrutiny and ultimate approval by the legislative branch, reasoned government officials, the state was in fact engaging in a sovereign act—and all the more so in that such an act answers the dictates of Mexico's economic development needs and demographic makeup.

The reform proposal, they added, reaffirms the State's role as the regulator of the economy within a context of greater openness and competition. By guaranteeing the future supply of electrical power under the best possible conditions, which only the CM could provide, the government was attempting to render the country's productive facilities more competitive, strengthen the government's financial structure and enable it to devote more resources to social programs.

For detractors of the reform proposal, the initiative itself constitutes an erosion of sovereignty. It was motivated by and developed in answer to extranational interests, and worked out according to the guidelines of international agencies such as the International Monetary Fund and the World Bank. In particular, it was felt that the necessary private capital would be supplied not by local but by foreign sources.

Historically in Mexico, the notion of nationalism has been bound up with that of sovereignty, and nowhere more so than in the energy industry—more specifically, the electric industry. Various administrations up to 1980 cultivated a nationalist mystique around this industry defined as strategic, so as to justify direct government interference in the administration of the power utility. By the same token, the utility was deprived of the managerial autonomy that now appears especially necessary, and which has long been a demand of the industry's trade unions and professional organizations.

Moreover, the question of foreign participation in the electric market must be set in its historical context. Mexico, it may be said, is pervaded by a deeply-rooted defensiveness, almost hostility, toward foreign involvement. Born out of both real experience and nationalist discourse, this consciousness is transmitted to Mexican society from the government, through the educational system, and in commemorative speeches referring to the "heroic acts" of the Mexican people in their struggle to recover the nation's property and to the "combativeness" of the energy industry trade unions against foreign employers. The discourse was bolstered by positive public perceptions of the national electrical utility, mainly due to the long-standing policy of satisfying demand and keeping electricity rates low.

Along with the entrenched notion that electrical power belongs to "all Mexicans" came public distrust of the privatization processes undertaken by various governments since the early 1990s. In the public mind at least, real experience with privatization has been negative, and its promises have not been borne out.

To quote one critic of the government's proposal: "When privatization fever took hold, its necessity was asserted with the argument that the State must marshal all its resources to fight poverty. Yet most of the publicly owned companies have been sold off, the proceeds have been spent, and poverty has made unprecedented gains."[69] On the same subject, Gabriel Szekely, after attending a March 5, 1999, work session with the Minister of Energy and one of the deputy ministers, convened by the newspaper *El*

[69] Eduardo Montes, "Meta oficial: México S.A." ***La Jornada***, April 16, 1999.

Universal to discuss privatization, remarked on a plethora of explanations invoked during that session as to why the proposal had met with such opposition. "Electricity has inevitable associations in the public mind with the image of other privatizations…"[70]

In short, the mixture of nationalism with the negative public perception of the results of earlier privatizations inexorably led to the rejection of the presidential initiative.

iii) Viability of Models (PM or CM?)

The central tenet of the government's proposal was that the PM is not viable, since it will not permit an expeditious and economically efficient response to accelerating demand. According to Minister Téllez, the objective of the electric industry reform is to anticipate potentially critical medium-term mismatches between supply and demand, and keep the installed plant from becoming uncompetitive in terms of cost, supply or quality.

All sides in the debate seem to agree that the monopolistic structure of the Mexican electric market found its historical justification at mid-century when, as Téllez acknowledges, "its integration obeyed the dictates of economies of scale."[71] However, he argues that the "monopolies are now increasingly obsolete" and that "the dynamic of competition and new technologies make them costly and inefficient."[72]

But defenders of the PM do not accept the alleged obsolescence of monopoly. In fact, it is suggested that these markets are not only historically justified but theoretically inevitable. Competitive markets, it is asserted, do not exist, or exist at best in the form of oligopolies, which ineluctably become monopolies in any case. Jacinto Viqueira noted that "privatization by itself will take us from us a state monopoly to a private one, winding the clock back sixty years."[73]

Another argument raised against the CM was that the declining role of the State in economic governance would foster to lax regulation of the resulting competitive markets. The participation of large international energy consortiums and oligarchic domestic groups would lead to unfair competition schemes, and corruption would flourish under a large regulatory bureaucracy. As is typical with such bureaucracies, especially in Mexico, its independence would be limited. Its technical decisions would be skewed by short-term political convenience, and would be determined by government bodies such as the Ministry of Energy and the Office of the Presidency.

Regarding the adoption of new technologies, the PM defenders pointed out that, like the CM, the present model provides for all new generation capacity to be based on modern gas-fired plants using CC technology. Thus, neither model has a comparative advantage on this point. In addition, with the PM, it is

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[70] Gabriel Szekely, "¿Cómo privatizar con éxito?" ***El Universal***, March 1999.
[71] Luis Téllez K. *Examen,* p. 5.
[72] *Ibid.*
[73] J. Viqueira, lecture, "El gran disparate: privatizar la energía eléctrica," March 24, 1999, Universidad Obrera de México, Mexico.

possible to promote the use of renewable energies, whereas with the CM, such a decision depends on short-term mercantile considerations and is in the hands of private interests.

In environmental terms, suppliers under the CM would limit themselves to meeting environmental standards. They would centre their environmental protection efforts around the use of "cleaner" fuels. Their commercial policy, based on profit maximization, would be geared toward augmenting supply to increase sales. The result would be irrational energy consumption and its ensuing environmental impact.

According to the defenders of the PM, this latter model does not seek to maximize profit, but rather—in theory at least—to minimize costs while satisfying demand. In strictly environmental terms, it may well be an environmentally-friendlier model that would better accommodate nationwide energy efficiency programs, as well as promoting the use of renewable energies without necessarily contemplating immediate profitability. At a working meeting with Dr. Téllez on March 10, 1999, members of the College of Mechanical Engineers and Electricians (CIME) questioned and criticized the proposal on these and many other grounds.

Other CM detractors pointed to the difficulty of ensuring that the regulatory agencies and other government bodies would afford all suppliers and purchasers neutral and equal treatment. Since these conditions are a *sine qua non* of the model, its consistency and viability are thrown into doubt.

In that regard, the opposition political parties—the PAN and the left-of-centre Democratic Party of the Revolution (PRD)—questioned the viability of one key component of the CM: COSEN. In President Zedillo's proposal, this agency replaces the current National Energy Control Center (*Centro Nacional de Control de la Energía*—CENACE) as the electricity dispatcher. COSEN, argued these critics, could foster the creation of regional monopolies; and anyway, the efficiency of CENACE as it stands is not in doubt.

Moreover, a detailed analysis of the governance of COSEN heightened uncertainty as to whether this agency, so pivotal to the smooth operation of the CM, would possess the necessary neutrality and civic control. These features were not in evidence in the government's proposal. On the contrary, COSEN's board of directors would be made up of nine members designated by the Minister of Energy, who would retain a veto over the designation of the General Manager. In addition, five of the nine board members would be active public servants.[74]

Gabriel Szekely notes that, faced with these challenges and the growing uncertainty, Minister Téllez apparently recognized the urgency of business and consumer representation in the new public agencies such as COSEN and the revamped CRE and CFE. This, says Szekely, would constitute a first in Mexico; such representation has been absent in areas as strategic and controversial as telecommunications and banking.[75]

[74] "Electricidad ¿Peligrosa Privatización?" *Tendencias Económicas y Financieras*, March 6, 2000, pp. 6-7.
[75] G. Szekely, op. cit.

The question of civil society participation in the decision-making process on the operation of the market, which was insufficiently addressed or aroused skepticism, came to be seen as necessary to the solidity of the government's proposal, and ultimately, to the validity of the CM. This issue is particularly crucial in the current context, and will doubtless have equal relevance to all subsequent phases of the electric industry reform.

Moreover, certain critics of the CM's viability—while recognizing the numerous defects of Mexico's two power utilities in terms of administrative operations and financial capacity, and admitting that some restructuring is necessary—point out that the failures are the product of poor administration which, ultimately, has always been the responsibility of the governmental authorities. After all, since the inception of the CFE or, more recently, the LFC, it is they who have set its commercial policy without considering medium- and long-term technical criteria.

Opinions on the viability of the model have been numerous and varied. Generally speaking, PM defenders recognize the need to reform the system and agree to private investment in power generation—but only for new capacity. They argue that the existing human and technical resources as well as the store of knowledge and experience built up by the SEN utilities are sufficient to meet the challenges, provided that these companies are given complete managerial autonomy and allowed to seek financial independence.

The Ministry of Energy spokespeople, on the other hand, considered that only a swift and extensive application of the CM could advance the goals of the new electric industry. In the coming months, the debate on electricity reform in Mexico will return to the issue of the viability of the two market models, since alternative models proposed will assuredly take the form of various hybrids between them.

iv) Financing and Investment

The matter of investment requirements and financial resources was of critical importance in the debate that followed the presidential proposal. One major factual discrepancy in the points of view expressed concerned how much investment would be needed for the expansion of capacity.

According to PRD congressman Cuauhtémoc Velasco, who opposed the CM, at that time (1999) and for a planning horizon of only five years, the Ministry of Energy was "inflating the figures" on investment requirements, since its estimates were half again as great as those of the CFE. This same representative, on behalf of his party and along with several PAN colleagues, demanded an in-depth audit of the CFE and its investment projects. He went so far as to declare that "40 or 50 percent of the cost increases in these projects are due to corruption." Even if true, such allegations would not negate the need to attract a considerable volume of investment—in fact, at levels not very different from those indicated in Chapter III of this report—to the electric industry; all parties to the debate concur on this point.

The arguments of CM opponents centered around three major lines of discussion: a) the required investment amounts are not as large as has been suggested; b) the CFE, a soundly managed company,

can assume the necessary financial commitments by itself, and c) all of the investment in capacity expansion can be accommodated under the current rules governing private investment.

At least initially, point a) concerning investment amounts, discrepancies in projected demand figures and the supposed limitations of the CFE, caused a great deal of controversy. It gave rise to a proposal to create a special tripartisan commission of the Chamber of Deputies to analyze the operations of the CFE and the LFC.

The inquiry, which became politicized in the extreme, included the following points:

1. *Assess the capacity of the quasi-governmental organizations to provide for the growth of domestic demand*
2. *Analyze and study generation costs per megawatt*
3. *Produce a report on the underutilization, operation and overutilization of the plants*
4. *Review and appraise the national transmission and distribution grids*
5. *Study subsidies of the CFE and their application.*

Evidently, the scope of the inquiry has far surpassed the original timelines established for the movement of the presidential initiative through the houses of congress. So far, the results of the inquiry have not been published.

The timeline for answering the question about investment amounts, the answer to which is even now a complex exercise, was also exceeded, although it continues to be an essential issue. This report relies on the most dependable figures currently available, based largely on CFE data and studies and published in the Ministry of Energy document *Prospectiva del Sector Eléctrico 1999–2008*.

In regard to point b) about the financial soundness of the CFE and its capacity to assume the investment risk, the CIME asked the Ministry of Energy at the working meeting mentioned previously:

> *If the CFE were to be granted managerial autonomy, wouldn't it, as a government-owned corporation, make a fabulous credit risk, especially in an environment of significant electric market growth in Mexico that is not characteristic of developed countries?* [76]

This simple question has profound implications. The implications are, firstly, historical, since demands for greater CFE managerial autonomy date back many years. Secondly, they are ideological: the government's taking such a step would imply a deviation from the dominant trends of globalization,

[76] CIME, working meeting with Dr. Luis Téllez Kuenzler, March 10, 1999, Mexico.

counterposed as they are to the strengthening of state-owned companies. And thirdly, there are implications relating to the political conjuncture: to wit, how could President Zedillo's administration, one year away from the end of its term, grant managerial autonomy to the CFE or the LFC?

The concept of managerial autonomy for the electricity utilities was mentioned repeatedly in various forums, and undoubtedly will be again when new models are proposed in the near future. Some of these models may have the SEN competing alongside private generators as another player in a "mixed" competitive market.

Finally, regarding point c) concerning the possibility of meeting the new investment requirements under the current rules of private-sector involvement, the government was unequivocal in stating that the PM does not allow for this possibility. It does not promise a real solution to the problem of financing, nor a significant "release valve" for the pressure on public finances. Under the current conditions, practically all projects undertaken by the private sector generate medium-term financial obligations and commitments for the government.

In the 1990s, almost one-third of investment in the electrical infrastructure came from private sources. The mechanisms used to attract and retain these resources were twofold: financial leasing, based on the build, lease and transfer (BLT) arrangement, from 1990 onward; and financed investment schemes, based on PIE, starting in 1995.

Under these mechanisms, investment projects are not recorded as public expenditures until the builders complete and deliver them to the CFE for operation. Thus, the government incurs medium- and long-term payment obligations for the investments made. In the case of BLT schemes, the government pays rent during the useful life of the facilities, and in the case of PIE, it will have to assume charges for capacity.

In support of these ideas, the Director of Investment of the Ministry of Energy observed that the PIE projects are very attractive to private companies in terms of profitability, but constitute contingent debt for the government.[77] In any case, say the government spokespeople, these payment obligations represent debt that has to be covered with fiscal resources during the period stipulated in the contract. "Therefore, this is really an arrangement that enables the government to defer payment and accounting of its expenditures."[78]

The apparent "health" of the CFE, suggested Minister Téllez, would eventually be threatened by payment obligations to private investors for projects built in the future, which "will in fact constitute a burden on the annual operating budgets."[79] In essence, the government argued that the electric industry cannot continue to contract obligations that exceed its future ability to pay, as it has done in the past.

[77] Dionisio Pérez Jácome, *Examen, op. cit.* p. 29.
[78] Luis Téllez Kuenzler, *Examen, op. cit.* p. 8.
[79] *Ibid.*

Countering these arguments, defenders of the PM stated that the government was inferring that the CFE, and of course the LFC, were bankrupt. They questioned the government's accounting practices, calling for an exhaustive analysis of these companies and expressing their doubts about the official view. PRD representative Benito Osorio, President of the Energy Commission of the Chamber of Deputies until August, 2000, warned in one of his constant statements to the press that Minister Téllez had misinformed the executive branch so as to speed up the process of privatization, and that he had suppressed information about viable alternatives to the sale of assets.

According to Osorio, the Ministry of Energy had overestimated the investment shortfall, since "40 percent of future investment is already guaranteed." Naturally, the government replied to these arguments, stating that this investment would ultimately be converted into public debt.

As the government spokespeople explained, the increase in this type of "contingent" debt reduces the government leeway in placing other debt instruments on international markets. From the standpoint of international public or private financial agents, all Mexican government liabilities are placed in the public debt account, regardless of guarantees implicit in any particular loans. Therefore, in considering the impact of the CFE's "cloud of debt" on public finances, one must look beyond conventional notions of the profitability of its projects. Meanwhile in the CM, debt to expand capacity would be incurred by private interests.

This complex situation was explained by the government spokespeople in various forums, and was noted and accepted by some CM detractors. However, Rep. Osorio indicated that PIE-based financing schemes could be used to obtain investment for short-term capacity expansion *during a certain period of time*. Private investors, he said, had already been warned by the World Bank that it would soon be turning off the credit tap to countries that failed to undertake structural reforms of their electric sectors.

Another consideration mentioned during the debate was that Mexico has, in view of its acceptance into the Organization for Economic Cooperation and Development (OECD), essentially lost its status as a developing country. As a result, it will have increasingly restricted access to loans from international agencies for electrical infrastructure, at interest rates that are no longer preferential.

The government representatives were reproached on various occasions for their policy of prioritizing "unjustifiable" debt payments, such as the internal debt service for the Fobaproa (see footnote 65) or the bailouts of multimillion dollar loans defrauded through highway projects and others. Public spending on electricity infrastructure was seen as minor compared to these expenditures.

The discussion around investment and its financing will continue to be fraught with controversy. It will require a careful evaluation of the SEN's potential to respond to demand, and it will depend on the speed at which private capital can be incorporated or new forms of financing can be devised.[80] This will undoubtedly remain the number one topic on the agenda for reform of the electric sector.

[80] Some electricity trade union leaders have suggested the use of AFORES (pension funds) to finance expansion of the electric sector with domestic resources.

v) Costs and Rates

The reduction of costs and rates is proclaimed to be one of the long-term consequences of the application of the CM. In Chapter II we discussed the Mexico-specific complexities of specifying the true costs of production per kWh. The figures presented by executive branch spokespeople on this point were questioned by some specialists.

PM defenders pointed out that the residential rates (approximately 5.5¢/kWh) are the lowest in the world. The government team replied that directly subsidized rates do not permit valid comparisons, which would have to calculate the total cost to the country of supplying residential electricity; that is, the real average cost of unsubsidized production.

With those adjustments factored in, the government insisted, the average cost per kWh for residential users would rise to 8.1¢, close to the international average. Various independent specialists refuted this figure, again placing it closer to 5.5¢. Clarification of these figures will have to await the inquiry proposed by Congress, which, as mentioned earlier, due to its inherent complexity and its politicization, has not yet produced trustworthy results.

As for industrial rates, the government acknowledged that they are, at least nominally, on a par with those of the United States. However, in terms of real cost (price to the user plus subsidy), research has shown that LFC charges the highest rates in North America; only California and Arizona have higher rates than the CFE.[81]

Despite these estimates, some PM advocates argued that the decapitalization of the domestic power utilities was due, *inter alia*, to the government's decades-long subsidization of industry through electricity rates. Representatives of the SME (the LFC trade union) illustrated the inequity fostered by the government in terms of the targets of its subsidies by noting that "70 percent of electricity is consumed by 1 percent of customers (businesses and government departments)."[82]

The government team maintained that implementing the CM would lead to the "elimination of subsidies represented by low rates, which have systematically undermined industry's efficiency and financial viability,"[83] and that these would be replaced by direct subsidies to users qualified to receive them.

On the matter of costs and rates, the debate became somewhat disjointed. The critics of the CM being unable to ascertain the exact real-cost figures the government had in its possession, they were unable to rebut the accounting rationales which the government representatives continually presented and discussed. Instead, they concentrated on a radical defense of the prevailing rates.

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[81] Luis E. Gutiérrez Santos, "Electricidad, precios y bienestar social," *Examen*, p. 50.
[82] Coordinación de Investigación de la Universidad Obrera de México, ***Hoja Obrera***, no. 24, March 1999.
[83] Luis E. Gutiérrez Santos, *op. cit.*, pp. 45–46.

Other PM defenders mistrusted the argument that costs, and consequently rates, would decline under the CM. Jacinto Viqueira and other well-known specialists such as Claudia Sheimbaum and Víctor Rodríguez used technical arguments and comparisons with other countries to show that the CM would engender rate hikes.

In the case of Great Britain, said these specialists, the rate decreases were artificial, since the authorities had increased them before beginning to privatize. The image of the English model held aloft by the Mexican government did not tell the whole story of privatization in that country.[84]

For the industrial sector, the government emphasized that reducing generation costs by making the generators more efficient would lead to rate decreases. However, it was asserted that the effects might only be felt once the new plants actually came on line. In the short term, the subsidy might be withdrawn or modified, leading to increases.

As for residential and domestic rates (for which, as noted in Chapter II, the price-cost ratio was less than 1), the government's spokespeople explicitly stated that by progressively eliminating subsidies, a balance would eventually be struck between prices and costs.

To this government position, it was responded that the proposed CM would lead to significant rate increases. Rep. Osorio stated to the press, in reference to the acknowledged price-cost ratio, that "with privatization of the industry, costs of domestic and agricultural service will rise by 220 to 300 percent." It should be noted that the government representatives had not hitherto expressed an intention to raise these rates in the short term.

Nevertheless, there was a prevailing perception that the government's proposal would inexorably lead to rate increases, at least in the short term. Based on further analogies with previous privatizations (roads and telephony), it was feared with good grounds that rates would rise. This fear, based on those experiences, emerged as another powerful argument inducing the public to reject the proposal.

vi) Labour Issues

The employment status of electric sector workers under the reform initiative was another a highly controversial issue. As expected, the main stakeholders were, on one side, the government authorities along with the leaders of the Union of Mexican Electricity Workers (*Trabajadores Electricistas de la República Mexicana*—SUTERM), the trade union representing CFE workers; and on the other, the CFE and LFC workers themselves, along with the union of this latter company, the SME.

The text of the initiative alluded in very general terms to the opportunities offered by the CM to electric industry workers and, more specifically, to retirees. But the issue of job security, never fully addressed,

[84] Víctor Rodríguez, Claudia Sheimbaum, Jacinto Viqueira, "Contra la privatización de la industria eléctrica." ***La Jornada***, February 29, 1999.

was bound to provoke hostile reactions from a great many workers. The "Labour Aspects" section of the presidential proposal stated:

> *The proposed reform seeks to protect the labour rights of electricity workers and improve their working conditions and those of their trade unions. Greater participation of the private sector in the electric industry will signify increased investment, translating into better employment and training opportunities for Mexican electrical workers.*
>
> *The new electric industry will offer a range of opportunities for workers. On the one hand, the opening of new companies and the installation of new power plants and transmission and distribution lines will require trained, specialized personal throughout the country. With the appearance of new sources of employment, there will be more job opportunities throughout the Republic. On the other, working conditions will be improved, since salaries will rise as a function of the newfound productivity.*
>
> *Retired electric industry workers will retain one hundred percent of their vested rights. The government will establish a mechanism to back the totality of those rights.*
>
> *Moreover, the unions will benefit. They will be strengthened by increased sources of employment as well as more favorable working conditions for their members.*[85]

The text transcribed above was all the government's proposal had to say about "labour aspects" in various presentations. Since it did not go into depth on the labour situation, it aroused much suspicion, which turned into protests almost immediately. The sharpest protests leveled against the government's initiative were led by the SME, since it was intimated that the SUTERM leadership had been won over to the government's proposal in advance.

One political observer remarked that SUTERM, in addition to supporting the president's initiative, had indeed been "the first to propose it," and added that not only does "the SME oppose it, but it has taken all manner of actions (including accusations of treason) to denounce it."[86] This union was certainly one of the strongest opponents of the government's campaign. It succeeded in rallying a large number of intellectuals, academics and opinion leaders, as well as a sizeable segment of the PRD, around the rejection of the proposal. The same observer lamented that "the government's proposal has not made much headway, and the agenda has been dominated by the SME along with various PRD spokespeople."[87]

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[85] Office of the President of the Republic, *Propuesta de Cambio Estructural de la Industria Eléctrica en México,* Mexico 1999, (complete version) "Labour Aspects" section, p. 62.

[86] Luis Rubio, "La electricidad y la transparencia política." *Reforma,* March 21, 1999.

[87] *Ibid.*

The evocations of labour instability allegedly augured by the implementation of the CM took various forms. Some observers foresaw layoffs at the local level; others referred to international experiences in which significant downsizing in the electric sector took place as a result of privatization.

Enrique Caldera, a specialist in electricity issues and a former CFE employee, warned of two likely immediate consequences of the privatization of distribution. The first was "the laying off of at least 50 percent of the employees on the grounds of redundancy and outsourcing."[88] The second, already evident in Mexico's energy utilities since the mid-1980s, was the replacement of engineers and technicians by an "army" of lawyers, accountants, economists, and administrators.

Another action organized by the SME in resistance to the president's proposal was an international seminar on the worldwide impacts of electricity privatization. Various academics and electric industry workers from different countries spoke on labour issues amendment documented cases of downsizing. One Argentine researcher noted that privatization of her country's electric industry had led to substantial layoffs, which were achieved by coercive tactics: 30 percent of distribution personnel, more than 45 percent of power plant employees, and more than 25 percent of transportation workers.[89]

It seemed as though the fears of the SME and its affiliated groups and individuals had a sound basis, but the government representatives responded promptly to the concerns raised. They stressed that no layoffs of electricity workers were envisioned and asserted that labour conditions in the new public or private companies would be basically the same as those prevailing in the CFE and the LFC, since in light of the legal provisions, the legal provisions governing employer substitution should apply (i.e., when control of entity passes from one employer to another, labour rights are not affected).

In recent months (July 2000), the government and SUTERM signed an employment security agreement based on these basic principles, and along the same lines as an employment stability agreement "in anticipation of the liberalization of the electric sector"[90] signed between this union and the CFE in June 1999. The next step may be to develop an agreement acceptable to the SME.

vii) Alternative Models and Disposal of Assets

CM proponents in Mexico contend that this model was designed with reference to various international experiences, adapting them to the local conditions of Mexico. The version of the CM contained in the reform initiative contemplates a gradual yet sustained and irreversible dismantlement of the PM, in which a single purchaser buys power from competing private generators. Once all successive stages of the CM were implemented, there would be competition for both generation and distribution, with open access to the transmission grid.

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[88] Enrique Caldera, "De dogmáticos e ignorantes." *La Jornada,* April 30, 1999.

[89] Viviana Cifarelli, Taller de Estudios Laborales de Argentina. Seminar, "Impacts of Electricity Privatization around the World," cited in ***El Universal***, September 24, 1999, p. 22.

[90] CFE, 1999 Annual Report, p. 6.

The government's proposal was to be implemented in three phases: 1) reorganization of CFE and LFC; 2) deregulation of the electric industry to allow private investors to participate in new projects, and 3) permission to private investors to purchase share capital in publicly owned companies.

The government recognized that the proposal needed to be implemented carefully and "without any haste that could negatively affect its potential benefits or the transparency of the process."[91] However, the government's spokespeople rejected all proposed modifications to the sustained and irreversible nature of the proposed CM.

Some CM detractors conceded the necessity of the first two phases, even as conceived by the government's proposal. After all, who could oppose a reorganization of the CFE and the LFC, or the participation of private investors in new projects? Although the approaches to these two phases were divergent and at times antagonistic, they offered fertile ground for the establishment of an agenda that could lead to consensus.

But no agreement was anywhere in sight as to the third phase. The combination of private and public capital, which the government saw ultimately as a moderate *disposal of assets,* was perceived by detractors as an *auctioning off national assets.*

The government argued that demonstrating the appropriateness of the CM depended on the consummation of this last phase. Otherwise, if the doors to private investment in state-owned companies remained closed, private companies would likely be subject to the same macroeconomic pressures as the CFE and LFC at present, and their operations would have to be subsidized.

The CIME had asked the following question of Minister Téllez: Why not simply open up new power plant development to private investment without selling off CFE and LFC assets? And there was a further question: "If the CFE is acknowledged to be a competitive, efficient company possessing excellent human resources, why not give it full managerial autonomy and allow it to compete on an equal footing with the new producers that would enter the market?"[92]

According to the government's thinking, two alternative models could arise from the lines of thought underlying these questions: 1) involvement of private capital in capacity expansion only, or 2) disposal of assets under a public/private co-ownership scheme.

Regarding the first alternative, government representatives noted that private sector participation would be inhibited by the market power held by public power generators, which would determine or distort the price of electricity. Against the second alternative, the government contended that it would not relieve the public purse of the burden of these investments nor the risks they entailed. In addition, they asserted that funding sources were more reticent to associate with government projects, preferring to work with private enterprise.

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[91] Summary of the initiative to reform articles 27 and 28 of the Political Constitution of the United Mexican States sent by the Chief Executive to the Congress of the Union. National Palace. *Examen,* February 2, 1999, p. 88.

[92] CIME, working meeting with Dr. Luis Téllez Kuenzler, March 10, 1999. Mexico.

PM defenders argued that private investment was in fact already flowing to new generation projects. The "emergency" situation (which, incidentally, the government did not characterize as such) was due to the failure of the Zedillo administration to maintain consistent levels of investment in the sector, in a deliberate attempt to depress the electric industry and make the reform inevitable. Predictably, the debate around the disposal of assets came to an impasse.

International Experiences

Government spokespeople made profuse reference to the success of international experiences with electric sector reform. These, it must be said, took place under circumstances specific to each country. The market models of these countries prior to undertaking the reforms were characterized by great diversity. Public and private companies coexisted under various regulatory schemes and within various institutional frameworks (unions, parties or civic groups with strictly local characteristics). Power plant technologies varied as well.

In commenting on the various environments in which the reforms were carried out, an advisor to the Minister of Energy observed that, in contrast to Mexico, the debate in Europe on liberalization and its effects on national sovereignty, had been resolved some time ago. In many European countries, this advisor argued, the debate now centered more around practical matters; i.e., the speed with which users would be given the option of choosing their own supplier.

At least in theory, Mexico's reform process could take place more smoothly. This official remarked that "Mexico has a comparative advantage over the European countries and the United States in that the government owns the industry's assets."[93]

Opponents of the government's proposal pointed out (not necessarily in direct reference to that observation) that a basic function of the government is to safeguard and preserve such assets—and not to sell them under conditions disadvantageous to the country. The model applied in Mexico would have to be based on this foundation. Its design would have to take account of specific local issues. Opponents claimed that the "Littlechild" model of reform successfully applied in England—which the government intended to repeat in Mexico—was maladapted to local conditions and would not prosper.

Some opponents countered the proposal of an adapted "English" by brandishing a "French" model along the lines of *Électricité de France* (EDF), which Mexican energy specialists have known about for many years. This model, also successful in its context, could be more suitable for the country since it has characteristics in common with the PM, especially those relating to the public monopoly.

CIME asked the Minister of Energy:

[93] Luis E. Gutiérrez Santos, "México y los cambios en el sector eléctrico europeo." *Examen,* p. 82

> *Why did you fail to consider the successful experience of France, in which the autonomously run, government-owned corporation* Électricité de France *covers 96% of the country's electricity needs, as well as exporting electricity competitively to countries like Germany, Italy, Spain, Portugal and even England, providing 6% of that country's power needs via the English Channel? Moreover, its management is so competitive that it has installed capacity of 11 000 MW all over the world, including in our own country, where it is building thermal plants at Río Bravo, Tamaulipas, and Saltillo, Coahuila?*[94]

The French management model is indeed well known in Mexico. For 20 years now, Mexican electricity technicians, professionals and officials have had opportunities to explore various aspects of EDF by means of visits, joint seminars, short-term internships and other forms of cooperation. In Mexican engineering circles, the efficiency and sound management of this company are widely accepted.

CM proponents argued that assessments of the English reform generally suggested that it had been positive. The English model had improved the operational efficiency and expansion of the sector along with a sharp decrease in real prices.[95]

Some CM detractors, while accepting these claims, questioned the model's applicability to the Mexican case, adducing the development gap between England and Mexico as measured principally by two parameters: per capita energy consumption and density of consumption. According to Enrique Caldera, 1996 data put these per capita annual consumption figures at more than 5,000 kWh and less than 2,000 kWh, respectively. In addition, consumption density was 124 MWh/km^2 in that country, versus only 6.6 MWh/km2 here. With these data, Caldera was trying to illustrate the idea that "the English system is dense, strong, well-developed and mature, while ours is weak, extensive, diffuse, and young."[96]

Caldera stated further that "the President's initiative was modeled on the English dismemberment of a state-owned company, CEBG. This neglects the fact that the British electric industry was at an advanced stage of maturity, perhaps even senile, while ours is barely an adolescent." For Caldera, the model might apply to Mexico at a later stage of development of its electric sector, but that this would necessitate at least a fourfold increase in the size of the current system.

According to Mr. Caldera, Great Britain essentially has no expansion left to plan. New infrastructure work is limited to the substitution of gas-powered CC plants for old coal-fired plants as well as nuclear plants in the near future; whereas in Mexico, expansion planning would have to be a central element of any reform.

References to other international reform experiences besides the English case, made by both parties to the debate, were discounted on the other side for their tendentious accentuations of strengths or

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[94] CIME, working meeting with Dr. Luis Téllez Kuenzler, March 10, 1999. Mexico.
[95] Ministry of Energy, "Panorama Internacional del Sector Eléctrico." *Prospectiva,* p. 166.
[96] Enrique Caldera, *op. cit.*

weaknesses. For example, apart from the labour issues discussed above in relation to Argentina, a truly minor power outage in Buenos Aires was invoked to demonstrate that privatization does not guarantee infallible supply. Various cases mentioned with reference to other Latin American countries served to further erode the image of international experiences.

The government's argument centered around an enumeration of the positive aspects of the international experiences, although it did note certain disturbing elements. The dialogue on these experiences did not lead to points of convergence.

In this chapter, we have attempted to show how the presidential initiative had effects at many levels. It led various sectors of Mexican society into a debate which, while somewhat dormant now, is clearly marked for a return to the political agenda. So far, this debate has had the merit of focusing public attention on the kinds of issues that must be included on the agenda in order to build a suitable market model for the Mexican electric industry.

As mentioned, the president's initiative is currently (August, 2000) on the list of matters pending debate in the Senate. The outcome is hard to predict, especially in light of the new senators who will take office in September. Nevertheless, the next chapter attempts to address this issue with as much currency as possible. Regardless of the ultimate fate of the initiative, the matter of electric sector reform will be a priority on the legislative agenda of both houses of Congress, as well as for the new executive, the political parties and the main stakeholders in the debate.

V SUMMARY AND OUTLOOK

Current Status

The deadline for the approval of the president's initiative by the Chamber of Deputies fell in April 2000. With the presidential election campaign being waged at that time, it was determined that the proposal would have to be reconsidered by the new federal administration taking office in December—and presumably earlier, when the composition of the new legislative bodies taking office in September would be known.

Although the initiative did not in fact prosper at that time, its effects were felt within the SEN organizations. Their officials assumed that, despite objections to the president's initiative, it would eventually be implemented in one form or another. They, and various high ranking officials of the Ministry of Energy, reasoned that political continuity was assured, since the PRI was certain to the presidential elections once again.

Thus in 1999, i.e., prematurely, they began to implement the first of the three phases in the government's proposal by modifying certain administrative practices as well as embarking on an internal reorganization of the CFE and LFC in accordance with guidelines set out in the president's initiative (see page 70, Chapter IV, for more information about this reorganization).

In March of that year (one month after the initiative was sent to Congress), some critics stated that "deregulation had occurred in the LFC and CFE without respect for the applicable laws. Four new administrative areas had been created, including the *Dirección Delegada de la Junta de Gobierno* in anticipation of the 'modernization and structural change' announced February 2."[97]

In the CFE's 1999 Annual Report, the director states that in June of that year, a formal process of corporate transformation was initiated. This involved "the establishment of business divisions and the simulation of an internal energy market that, without requiring amendments to the applicable constitutional framework, allows the [CFE] to increase its operational and financial effectiveness."[98]

The document further states that by August 2000, with its "Corporate Transformation Program," the CFE hopes to achieve the objectives of "a more flexible structure, decentralized functions and strengthened services" and to "plan for possible opening to investors to increase its power generation capacity…"[99]

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[97] John Saxe Fernández, "Carta Magna, Electricidad y Petróleo," *Excélsior,* March 5, 1999.

[98] CFE, *Informe de Labores 1999,* p. 5.

[99] *Idem.*

Thus, in essence, the CFE officials were (are?) initiating the restructuring called for in the government's proposal, even if they state that the transformations are taking place within the applicable legal framework.

The tangible effects of the president's initiative for the electric utilities took the form of programs such as those mentioned above for the CFE. However, some of these programs anticipated the proposal itself, confirming some of the opponents' claims that the government's willingness to debate the initiative was nothing more than a bureaucratic procedure to rubber-stamp a process already underway.

The Political Parties

The three main political parties maintained relatively consistent positions during the debate. The PRD and PAN will probably maintain their positions; however, the PRI in opposition (having lost the presidency and its absolute majorities in congress) may alter its position on the reform.

Generally speaking, the PRD and the PAN opposed President Zedillo's initiative, although for different reasons. The PRD considered the participation of private capital in power generation acceptable within the current framework. Its position will probably be consistent with a strengthening of the PM, taking the French model to be the most attractive paradigm.

The PAN rejected the initiative, arguing that it was hasty and contained inconsistencies. Paradoxically, although the proposed CM seems consistent with this party's ideological platform (upon which inclination President Zedillo was counting), the PAN opposed debate on the initiative. It considered the matter to be the purview of the new government.

As for the PRI, with its traditional loyalty to the President, all but a few isolated members expressed support for the initiative, although with some alterations to align it more closely with the French model. In particular, the PRI diverged from the initiative on the matter of the sale of CFE plants as well as the concession of hydro or geothermal power generation under the government's terms.

The party contended that the current CENACE should remain under government control (unlike the proposed COSEN) and that transmission should continue under the governance of the state. As to distribution, it could be contracts could be awarded to private interests under certain conditions. In short, the PRI's position amounted to a rejection of significant parts of the CM and did not help the government's cause.

And then of course, for the first time in more than 70 years, the PRI lost the election. It no longer holds an absolute majority in Congress. The new political geometry in Mexico is disconcerting in terms of the country's political tradition, due to the many unknowns clouding the immediate future.

President-elect Vicente Fox came to power on the strength of a coalition of various forces and his own party, the PAN. With its ally, the Green Party of Mexico (PVEM), the PAN has a relative majority in the Chamber of Deputies and is the largest opposition party in the Senate. Of the 500 members of the

Chamber, 223 (208 PAN and 15 PVEM) belong to the PAN-PVEM alliance. 209 are with the PRI, 53 are with the PRD and the rest are with other parties. In the Senate, which consists of 128 legislators, the PRI has 60; the PAN and PVEM, 51; the PRD, 15.

In the last election, voters were no longer required to choose a slate of candidates from one of the parties, and now a genuine division of power can be glimpsed. Predictably, the traditional presidentialism in Mexico will start to lose impetus. Also, the balance of power in both houses of congress may create roadblocks for presidential initiatives, which were pushed through in the past on the strength of tacit alliances between the executive branch and "its forces" in the legislature.

The new conjuncture is relevant for the discussion on the embryonic electricity reform, since the political map is radically different from the one existing when Zedillo's initiative was put forward. The only relative certainty at present is that the proposal will be revived in Congress and reformulated by the President-elect, and that the senators will discuss it as a pending matter.

There is also the possibility that President Fox will develop a new initiative and send it to Congress eventually. However, this option seems a bit remote in time, since there is widespread consensus that the matter is priority and urgent and must be addressed in September 2000.

Predictably, following the election results, the parties' political positions shifted. It may reasonably be assumed that the PAN and PRD will maintain their basic ideological positions on electric sector reform; oversimplifying, the PAN will seek greater participation of the private sector, and perhaps a disposal of assets, while the PRD will accept increased private-sector involvement within the PM.

The PRI has not yet put forward a clear position, but at least four factors suggest that it will criticize, and possibly even reject, across-the-board electricity privatization:

1) Its position on the Zedillo initiative, leaning more towards an adaptation of the PM than toward the CM.

2) Its ideological platform, based on values such as nationalism and sovereignty—which has of course been neglected in the party's praxis in the last 20 years.

3) Its remaining links with trades unions, especially SUTERM and other groupings, which could be revived now that this party will have to redefine its stance.

4) Its strength as an opposition party in Congress.

In addition to the reticence foreseeable on the part of the PRI, the electricity reform proposal, whose premises include strong support for privatization, will encounter endless obstacles in attaining formal acceptance or approval. Due to the current balance of power in Mexico's legislative apparatus, only a

solid coalition of parties, or ideally, a broad consensus, can push forward a reform seen as necessary by many Mexicans.

President-elect Fox, His Team, and Electricity Reform

More than necessary, the reform appears to be perceived as urgent. Following the triumph of the PAN and its allies, statements from Fox's transition team have proliferated to the effect that his government will present a reform package for debate and approval by the new legislature when they commence activities in September and earlier. It is hoped "that the entire package will already be negotiated with the other political forces and be ready for approval."[100]

The package contains proposals for tax reform and for reform of the petrochemical and electric sectors. If the PAN legislators should vote in favour of the package *en bloc*, only a small number of additional votes will be needed for it to pass. One can only speculate about the alliances now in formation between political factions, and on the market model contained in the new reform initiative.

During his campaign, Vicente Fox committed to refrain from privatizing the energy sector companies Pemex and CFE. Insofar as can be determined from the statements he has made as President-elect, his position remains unchanged. On his South American tour in August, he reiterated that Pemex and CFE had to be opened up to investment so as to render them genuinely competitive.

One specific reference during an interview granted by the President-elect to the Chilean daily *El Clarín* in early August is noteworthy. In regard to privatization of electricity, Fox stated "as to power, we are liberalizing generation and distribution of electricity, but keeping the transmission lines and governance by the state."[101]

Speaking broadly, the discourse of the new president and his principal spokespeople around electricity has focused on the need for private capital without completely privatizing operations or disposal of assets. Senator Adolfo Aguilar Zínser, one of Vicente Fox's closest associates, is reported to have stated in June, before the elections, that he did not see why the CFE and the power plants should be transferred to private hands, instead of seeking a well-administered, well-managed finance alternative.

More recently, Luis Ernesto Derbéz and Eduardo Sojo, chief economic policy advisors on the President-elect's transition team, stated at a press conference that electricity reform was a high priority and that they would seek to introduce it during the next legislative sessions. Specifically, Derbéz stated that private sector contributions to the electric sector within the current legal structure were fundamental.[102]

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[100] Juan Manuel Venegas, "Prepara equipo foxista primer *paquete* de reformas," *La Jornada*, August 10, 2000.

[101] Matilde Sánchez, Special Envoy to Mexico, "Un puente con el Mercosur" in http://www.clarin.com.ar/suplementos/zona/2000-08-06/i-00301e.htm

[102] Héctor Rendón/Grupo Reforma, "Señalan prioritaria reforma eléctrica" in *Reforma*, July 19, 1999.

At the same conference, Derbéz and Sojo mentioned the increased electricity demand and the need for sustained power generation at an affordable price. They stated that it was important to "resolve the situation of the electric sector with private-sector contributions, within the current legal structure."[103]

Reiterating these statements on a televised broadcast,[104] they maintained that the government of Vicente Fox envisioned opening the nation's electricity industry to private investment, but "with no privatization." They claimed that the new proposal did not conflict with Fox's campaign promises. Mr. Sojo specifically answered the host's question about possible objections to privatization in Congress by stating that there would be no privatization. We are not planning, he said, to sell off the CFEs assets, but rather to attract new private investment in generation.

The body of comment to date as well as the background to the debate and the need for a degree of pragmatism as Vicente Fox's government takes office, all augur a proposal that, at least in principle, will satisfy the majority of the stakeholders. It is entirely possible that next September, a new initiative containing an alternative market model based on the PM will be put forward, leaving behind the original Zedillo initiative—perhaps for good.

So far, the new government spokespeople have only alluded to the broad outlines of the model. The Fox model (FM) calls for more openness to private capital in the areas of generation and distribution exclusively, and rules out the disposal of assets. Nothing has been said about transmission, nor the crucial topic of electricity dispatch (CENACE or COSEN?). Are these omissions due to the complexity of these topics, being unamenable to passing references in the media? Are they being "left alone"? Or, are they being subjected to profound intrinsic changes, in a model that is yet to be made public? The answers are unknown.

All of the unknowns in the sketchily defined scheme put forward so far can perhaps be elucidated by means of answers to two questions: 1) Will the CFE continue to be the sole purchaser of electricity? 2) With the liberalization of distribution activities, will state-owned entities continue to deliver electricity to the public?

There are strong indications coming from the new government's electricity experts that a new model is being developed, in which private participation will be accompanied by segmentation of the CFE into four (obviously smaller) companies. There would be free access to the transmission grid for all producers as well as private participation in distribution, which will, of course, involve the disposal of assets.

The segmentation of the CFE will essentially affect the generation part. It will be determined based on certain criteria of equity so that the new companies, made up of the same asset value and the same generation capacity (8,000 MW, approximately) as well as having the same number of users to serve, but not with regionalization criteria. In this way, the four new companies would operate in a market in

[103] Guadalupe Hernández and Jorge Herrera, "Hará Fox reforma legal en energía" in *Reforma,* July 19, 1999.
[104] "Zona Abierta" television program hosted by Héctor Aguilar Camín, *Televisa,* channel 3, Mexico July 22, 2000.

which they would eventually compete among themselves and with private generators, and where all would have free access to the transmission grid.

Electricity dispatch would be the responsibility of an organization like COSEN, as in the Zedillo initiative, but its board of directors would be appointed by civil society and the Congress of the Union. COSEN, in reality, a restructured CENACE, would set prices for bulk purchases of electrical power supplied by the CFEs and the private generators based on technical and economic criteria as well as, possibly, environmental criteria.

Finally, the distribution would be segmented into the 22 zones currently controlled by the CFE, which could be awarded as concessions to private operators. Price subsidies would progressively disappear and, in any case, they would be provided directly to the consumer.

Regarding subsidies, the President-elect has declared that they will continue until the CFE "achieves efficiency, and we will attempt to keep prices economically realistic." According to the information available at this time, Fox has stated that existence of two alternatives for the nature and amount of subsidies. So far, he has not decided in favour of the either alternative, and will not do so until reliable figures are available as to the "real scope of the subsidy" a few weeks from now.[105]

At this point, one can only speculate as to the market model the new government will propose, and, of course, as to the debate it will provoke and its outcome. Nevertheless, three things seem to indicate that the PM will suffer from major setbacks in the coming year.

General Conclusions

The PM defenders, or CM detractors, consider that the initial phase of the debate was advantageous to them. In the short term, the reform initiative, in its original form, has been rejected. In a new political climate, which for the time being, seems more open and tolerant towards visions unaligned with the executive branch, as well as a more objective debate occurring, based on serious technical argumentation, in which, presumably, ideological influences will hold less sway, and there will be a greater inclination to promote a electricity industry reform that meets society's expectations.

The apparent division of powers and the balance of political forces in both houses of Congress also augur a renewed debate on new grounds and without entrenched institutional commitments to international financial entities as the previous government insisted.

Among the unknowns that will soon be clarified, there is the composition of the technical teams that will constitute the new electric sector planning "establishment" in Mexico. How many officials and civil servants in the institutional apparatus of the *ancien régime's* energy sector will keep their jobs? Alternatively, how many of those remaining will be convinced CM proponents impelled by the high-ranking government bureaucracy?

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[105] Matilde Sánchez, *op.cit*.

Further questions arise about the continuity of advisory and consulting work conducted by various international firms specializing in power sector privatization. Their recommendations tended towards an across the board privatization which, judging by the government statements mentioned earlier, the new government does not openly endorse.

According to some PM defenders, the backlog in power generation capacity installation and the contraction of private investment to compliment public funds were caused by a deliberate policy of the Zedillo government to justify its own proposal. At the present time, the approach to the solution only consists in sorting out some mechanisms present in the PM so as to attract the investors and thus to expand generation capacity.

The ability to attract private capital will depend on the transparency of the market which, in large measure, depends on the substantive reduction of bureaucratic procedures for project bidding. Additionally, the governmental authorities will have to establish clear parameters making investments profitable, without affecting public finances.

Among the parameters necessary to attract investment are two relating to the market regulated by the CRE, but actually determined by the CFE. These are currently viewed unfavorably by the few independent producers wishing to enter the Mexican electricity market. These parameters are: 1) transmission costs; i.e., how much does it cost to connect to the grid? 2) prices paid for surplus electricity generated in cogeneration or self-supply arrangements; i.e., how much will the CFE pay for kWh generated by private operators?

Evidently, these parameters are delineated in the current regulatory framework, but various experiences with market participation suggests that the markets are bogging down and often being cancelled due to a lack of clarity. A strategy on the part of the government involving independent technical bodies and establishing a clear, transparent, comprehensible methodology for determining these and other related parameters would be a powerful asset for attracting private capital.

Thus, according to some PM defenders, a new subsidy policy is required to align prices and costs for residential and agricultural rates, as well as to remove the current subsidies to large consumers. Furthermore, they argue that it is urgent for all rates to be published for the long term and that the methodology used to develop these projections be made public.

Various Mexican electricity specialists feel that the PM should be maintained, if in improved form, and that all the measures described do not require any amendment to the applicable framework. They feel it unnecessary to hold a new debate around electric sector reform as the new government is announcing. To achieve the objective of expanded electricity generation capacity without diverting additional fiscal resources in the future, all that is required are "executive decisions and a clear definition of objectives and means by which to reach them."[106]

[106] Antonio Gershenson, "Electricidad: presiones o soluciones" in ***La Jornada***, July 30, 2000.

However, this reasoning should not be used to justify the avoidance of a debate leading to an urgent plan of action on the necessary reforms to define a new market model for the electricity industry or to ratify the PM with the relevant adjustments.

As stated earlier, it will be extremely difficult in the short-term to get beyond the investment program described in the official document, *Prospectiva del Sector Eléctrico 1999–2008*, which describes a set of works under development ("committed capacity") and a scenario for increasing participation for private capital ("additional capacity") that could provide more than one-fourth of the installed capacity by 2008 with gas-fired CC plants.

For some observers, the investments required are somewhat exaggerated since they are based on projections of steadily increasing electricity demands which could be questioned and/or modified. These projections suggest figures between 21–24 billion for generation capacity expansion projects 15 804 MW and some transmission projects.

Indeed, it may be reasonably assumed that the industrial sector may reduce its energy requirements if it adopts more efficient processes, and that this adoption is predictable with the new industrial plant. Furthermore, a degree of saturation in the consumption of household appliances is being observed in some segments of the residential sector. Moreover, the gradual adjustment of residential prices to bring them to more realistic levels will also put a damper on the pace of demand growth.

The demand projections and the definition of terms and conditions of private participation are fundamental components of a new electricity market model that is apparently in gestation in Mexico. It is worth stressing that, in order to adequately structure a market model, realistic electricity demand projections as well as a clear definition of these terms and conditions are required.

Prices

Regarding short-term prices, nearly all electric sector analysts agree that Mexican electricity prices and rate structure will be maintained as is, with the exception of the moderate adjustments mentioned for the next 3–5 years.

The current methodology for industrial rate setting, based on inflation indices for certain industries and the behavior of price indices for the basket of fuels used to generate electricity will continue to be valid in the short-term. It is improbable that the new government's proposal will be rapidly formulated and approved. Even if that were the case, the concrete implementation of a new rate policy for a new market model seems far off, judging by some recent experience such as in Ontario, Canada, where the market model that proceeded the current "consumer selection model" had many similarities with the Mexican PM.

However, in the medium to long term, once the subsidies are withdrawn; the price/cost ratios for residential rates are adjusted, and ideally, the environmental costs have begun to be internalized in the

cost of electricity production, prices will foreseeably rise. As a result, we may see the emergence of a dynamic products and services market relating to energy efficiency and environmental protection.

Environmental Impact

For the application of the model that is eventually accepted or imposed, practical, one of the biggest challenges will be to establish the forms or mechanisms to harmonize the economic policy with the energy policy, especially in terms of fuels, and between those two and environmental policies.

Unfortunately, the emphasis on increasing historical demand and consequent sales projections, which in turn translates into capacity and investment requirements, illustrates a mode of thinking that tends to relegate environmental issues to the backburner.

In Chapter II, we discussed the possibility of excess supply of fuel oil that could not be marketed domestically, in the event that most power plants are converted to gas, displacing fuel oil as the dominant fuel for power generation in Mexico. However, there is no certainty about the supply of natural gas in the medium term, especially to regions that lack distribution networks. Furthermore, private businesses do not appear to be adopting this fuel as an alternative, by and large.

Since Mexico does not possess abundant local sources of natural gas, electric sector interests would be confronted with international price volatility. They might be negatively effected by supply or price fluctuations as Mexico has experienced in the past, particularly in the 1980s.

In addition to recent experiences, certain worrisome signs have returned. In July 2000, international price increases for natural gas, which has effects in Mexico as with everywhere else, has supposedly led to the cancellation of a large number of private investment projects for power generation. One company involved in projects to install 250–300 MW in the country's large industrial cities had to cancel 80 percent of them. It stated that they were unprofitable since 95 percent of them used natural gas.[107]

Presumably, situations like the one described would probably be exceptional and the supply of natural gas would tend to stabilize. Nevertheless, the issue of fuel for electricity production is highly relevant due to its environmental implications in the near future.

So far, the only common element of all the market models considered, practically speaking, is the adoption of combined cycle technologies using natural gas. Both the PM and the CM concur on this point, taking fuel substitution as a *fait accompli*.

If so, as explained in the last part of Chapter III, it may be concluded that in relative terms, the concomitant environmental impact of each kWh, in terms of air pollutant emissions may be reduced. This plausible reduction should occur even if the PM is maintained as is.

[107] Dolores Ortega/ Grupo Reforma, "Golpea alza en gas inversión en energía" in *Reforma*, July 19, 2000.

If the electric sector is increasingly opened up to private capital under the conditions of the PM or if a new model is implemented, such as the one being discussed in the President-elect's transition teams, the environmental impact should be practically the same over the next 3–10 years. Over the longer term, the gradual displacement of conventional thermal plants by more efficient, less polluting ones, or the possible emergence of commercially viable technologies could reduce absolute pollutant levels.

However, in the short term, as already inferred, emissions should rise as a consequence of increased electricity production, even though the mixture of emissions will be less polluting than at present.

Should an entity be in charge of electricity dispatch, such as COSEN, it would be unfortunate if the possibility were not seriously considered of explicitly including environmental criteria as well as technical and economic ones in setting the prices per kWh. With the refinement of the design and mission of this organization to incorporate these criteria into the methodology for the selection of energy providers, so-called green electricity could be considered as a growing part of the total marketable power. In short, it is a question of ensuring that the dispatch organization could become a promoter of clean electricity production without distorting a competitive market.

Another omission of the CM, which should not be repeated in any alternative model contemplating the creation of a body like COSEN, concerns the participation of certain renewable energies such as solar and wind. In addition to giving them preferential access to the grid, they could also be promoted as power generated directly not through the grid.

Consideration of these energy sources, the National Solar Energy Association (ANES) also propounded various critiques of the government's proposal[108]:

> *…The proposal calls for the creation of an electricity market in which the power generators compete to sell their power in accordance with the roles of electricity dispatch and marginal competitive costs. These considerations, under the current rules of the game, inhibit the participation of renewable energies.*
>
> *…The proposal does not make mention of the possibility of distributed generation, and of course, it does not mention the possible use of renewable energy sources, nor the legal, institutional, regulatory and normative adjustments that implies…*
>
> *…The proposal does not situate the problem of the necessary transition from an electricity system supported by 65% fossil fuels to a sustainable, long-term arrangement based on other environmental, social and technological paradigms, so as to deal with the problem of climate change and thereby fulfil international commitments.*

The foregoing paragraphs synthesis the objections of the environmentalist groups to the presidential initiative. They view the CM conceived by the governmental authorities as requiring a major modification.

Concluding Remarks

[108] ANES, "Observaciones y Comentarios de la ANES a la Propuesta de Reestructuración Eléctrica," June, 1999, Mexico. p. 3 (points 6 y 7).

In order for the changed proposal contained in the reform to be generally and rationally accepted, society must be convinced that its situation will have been improved after the reform. Otherwise, the result is rejection; and moreover, if it is not accepted willingly, it may have to be imposed by force or by manipulating the collective will.

After the debate that took place in the country for almost two years, it may be observed that what the authorities are seeking in Mexico is to have the electricity reform accepted willingly by the majority of the population. It is to be hoped that an agreement can be reached to transform the market so as to favour the collective good.

The significant contribution of the recent debate may be summarized as the accumulation of knowledge about the manner in which the discussions should be held; the principle stakeholders involved and their particular visions; these stakeholders' level of information and knowledge of the topic; the specific role played by the media; and, particularly relevant, the identification of some points that may be included in the upcoming agenda for debate.

It is hoped that this report will be added to the sum of knowledge to enrich the debate on reform of the electric sector in Mexico, and that it will serve as a useful reference.

Finally, it is worth noting that during the research for this report, various collateral issues were detected that required the attention of everyone interested in the topic of electricity reform in Mexico, and which appear fundamental to. Specifically, it would be desirable to conduct ad hoc research into the following topics:

- Electricity price projections in Mexico (2000–2005)
- Review of international experiences on electric sector reform
- Design of a methodology for defining pollutant emission coefficients for the Mexican electric sector
- Study of the power plant market in North America
- Prospective on the natural gas market in North America
- Structure and functions of an entity in charge of electricity dispatch in competitive markets

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CITY OF TORONTO, ONTARIO, CANADA, AUGUST 23, 2000.

Figure 4.1
Present Model of Electric Market

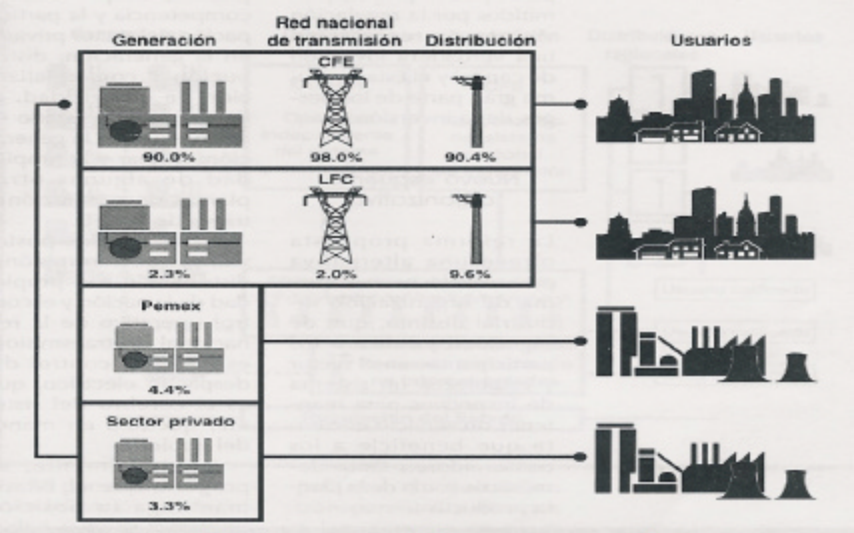

Figure 4.2
Competition Model of the Electric industry

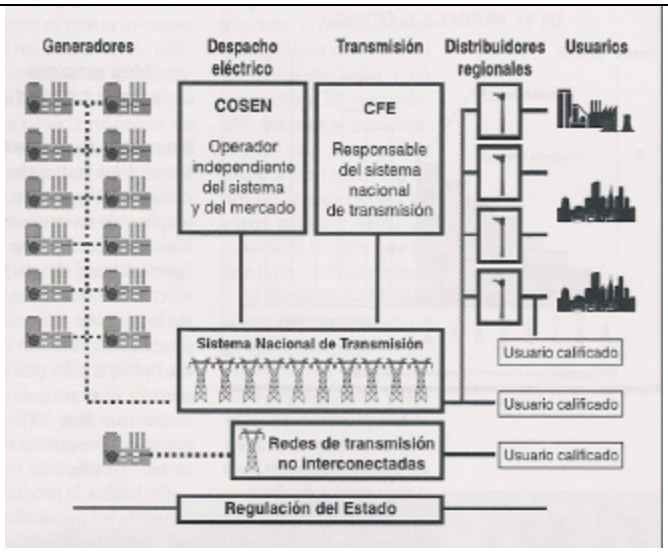

Figure 4.3
Operation and Regulation in the Competition Model