
Private investment in Mexico's electricity sector

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Abstract

This report contains an update on Mexico's electricity sector, specially on its current and projected installed capacity and generation requirements including capital; the market share of private capitals in the national generating pool and the rate of investment flows into the country's power industry. Also, international trade patterns in electricity are discussed and the relationship between private investment in the planned exports of electricity.

Background

Market transformations and investment flows are crucial elements in the future configuration of the power industry in North America. In Mexico, a pending reform focused mainly to attract private investment into its electricity sector is—once again—being discussed and pondered by many stakeholders like power unions, assorted political forces represented at the Congress; and the relatively new federal administration presided by Mr. Vicente Fox, among others.

The views expressed by the opponents of a reform that would allow for private investment in generating plants (encouraged by Mr. Fox and advanced by forces linked to his party in congress and some private sector organizations) whose owners would be able to sell its kilowatt-hours [KWh] in an open market are based on items such as: a) current constitutional legal barriers that deter private participation in various aspects of energy production, transmission and distribution; b) the recent frustrating events like the California crisis, followed by the Enron affair and by c) Mexico's own sour experiences on previous reforms that took the shape of privatization in the banking sector, telecommunications and highways.

On a more technical basis, the opponents to private investment claim that electricity demand projections are somewhat exaggerated by public officials and, consequently, the proposed amounts of investment are overestimated, specially in the light of low start-up of the Mexican economy as a whole in the last two years as GNP growth figures show. Additionally, the issue of *sources of investment* is another controversial item in the agenda of the debate since there are two clearly opposing views: one that claims that the required capital for investment should and could be raised in the public coffers; the other claims for private capital, only.

Actually, an intermediate path, conceived as a joint venture based on the best social combination of public and private (foreign and domestic) funding for the expansion of Mexico's power supply, is a solution that would be acceptable and, regardless of the market structure in which the Mexican electric industry will develop in the mid and long term, there exists an ample consensus that the required flows of capital are quite substantial, even though the specific amounts vary according to different stakeholders' views.

A brief update on Mexico's power sector

Legal and historical framework

Mexico's Constitution does not allow private participation in most activities related to exploration and production of fossil fuels nor in the generation, transmission or distribution of electricity destined for public service (open market). The energy sector in Mexico is basically controlled by federal agencies and the electric industry carries its actions within a monopolist market structure.

From an economic perspective, the historical development of the electricity market in Mexico may be condensed into four consecutive, overlapping phases. In the first, from its beginnings during the late nineteenth century to 1910, the market operated on the impulse of Mexican capital primarily, with foreign capital serving as an adjunct. In this first stage, generating facilities were heterogeneous as to both capital 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 Canadian-owned *Mexican Light and Power Company* (incorporated in Toronto in 1902) and the *American and Foreign Power Company*.

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 (i.e. public funding), on the one hand, and the expansion in terms of territorial coverage and the vertical integration of the Mexican electricity utilities, on the other.

The fourth phase, from 1972 to the late 90's was characterized by an increasing consolidation of those utilities 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 and the electrification of large remote areas of the country. In 1992, however, some regulatory reforms were introduced in order to allow for a larger participation of private capital in the power sector, that today are heralding a new phase characterized by growing private participation in the market¹.

The current 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. companies not authorized to sell electricity to an end consumer on the open market. The law makes this the exclusive domain of two large public power utilities: The CFE (*Comisión Federal de Electricidad*), which generates more than 90 per cent of Mexico's electricity demand and LyFC (*Luz y Fuerza del Centro*), basically a large-scale transmission and distribution company operating in Mexico City and some surrounding areas. These two utilities are incorporated in what is called the National Electric System or SEN in Spanish.

In August 2002, the executive branch of the federal government, supported by the Ministry of Energy and the President's party (*Partido Acción Nacional* or PAN) submitted a proposal to the legislative bodies geared towards the redefinition of the concept of public utility and will incorporate the new notion of "qualified user", typically a large power consumer that voluntarily will not participate of the public power service offered by the State in an analogous manner as he can choose not to resort to his

¹ Commission for Environmental Cooperation, **Debate on Reform of the Electricity Sector in Mexico**, Report on its background, current status and outlook, Montreal, Canada, July 2000.

health, education or postal public services. Hence, he will be able to address his electricity demand to a private party if he wishes. Therefore, on the supply side, private producers will be able to generate, transmit, distribute and sell electricity to these qualified users.

The basic idea behind Mr. Fox's proposal is to create a parallel market (focused on large consumers) that will allow for private participation in all activities related to the power sector, promoting investment flows from private sources, thus alleviating the load on public finances. Most probably, the proposal will go through a very close scrutiny of the different political forces at both chambers at the congress and most certainly a new heated debate is in the making.

Investment requirements and rules

Regardless of the final outcome of the impending debate and the market model that will ultimately be implemented, any investment schedule for the Mexican electric sector in the next decade cannot vary markedly from the forecasts and inertial trends prevailing in the current local industry and, perhaps, eventually from the possible unexpected demands from U.S. consumers in border states. The make-up of electricity supply and the expansion of generating capacity in the near future will be determined by the life cycle of the existing facilities (public and private) by the *additional uncommitted generating capacity*² [UC] plus the *additional committed capacity* [CC] that Mexican energy planners have envisaged for the next decade.

The official expansion program for 2001-2010 contemplates total additions to the SEN in generating capacity of 32,219 Megawatts [MW] by the end of the decade. The UC for this period is estimated at 16,503 MW and the CC is close to 11,000 MW, the rest will be supplemented with private projects for "self supply". The overall financial requirements needed to achieve this expansion amount to almost \$74 Billion US dollars, which can be broken down as follows: \$26 Billion for generation; \$17 Bn for transmission; \$14 Bn for distribution; \$ 9 Bn for major maintenance works; \$1.6 Bn for engineering projects and other investments and; \$6.7 Bn for capital payments to private parties leasing generating facilities to the SEN.³

In the current context, Mexican government officials consider that the UC and related investments in transmission or distribution consist the area of opportunity for private investment and could reach up to \$40 Bn, representing more than half of the overall capital requirements for the electricity sector. Regarding UC, in the current regulatory framework in Mexico's power sector, a private party has basically two options: 1) power generation for self-sufficiency⁴ and 2) generation as an independent power producer (IPP) who can only sell its KWh to public utilities. 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 cases, the regulation provides that the public utilities, practically only CFE, may

² The term "Additional uncommitted capacity" [UC] refers to the additional capacity deemed necessary in order to meet future demand and whose facilities are not under construction or have not gone through a bidding process. According to the current legal framework, these additions can be financed by the private sector or with public investment. In contrast, *committed capacity* [CC] refers to projects that have already gone through a bidding process; are under construction or imply a power-purchasing contract. In all three cases, the financing –in principle- has been resolved.

³ Sener, **Programa Sectorial de Energía, 2001-2006**, p.47

⁴ See Annex 1["Modes of Participation for the Private Sector in Power Generation Activities"] for a broader explanation on what is considered "self sufficiency" and other modes of participation for the private sector in power generation activities in Mexico.

purchase up to 20 MW of capacity as well as all surpluses, provided that its price does not exceed the marginal cost to CFE at the point of delivery.⁵

The private sector financial resources involved in power generation in Mexico must participate in a bidding process in which the main parameter is the cost per KWh to CFE under three schemes: 1) Build, Lease and Transfer [BLT] or 2) the IPP scheme. A third scheme for supplementing the overall financing needs for the sector is based on Public Funding [PF] which to date has contributed with the largest proportion of total investment in the power sector in the country. In recent years, most additional capacity has been based on these schemes.[Table 1]

Table 1
Financing Schemes for the Power Sector in Mexico*

Schemes	Description
Build, Lease and Transfer [BLT]	Consists in the design, financing and commissioning of a power plant financed by private investors to CFE (or LFC) technical specifications and through a bidding process. Once in operation, the plant is leased to the CFE (or LFC) for a period of 20-25 years at the end of which ownership passes to the CFE (or LFC). During the leasing period, the CFE (or LFC) is responsible for operation and maintenance of the plant.
Independent Power Producer [IPP]	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.
Public Funding [PF]	The project developer (can be private) carries out all necessary investments required by the project and when the corresponding facilities are ready, CFE must liquidate the total amount invested. In order to carry out this liquidation, usually CFE must obtain long term financing. There exists the possibility of utilizing the public utilities own resources for funding generating facilities, but apparently this scheme is not viable due to insufficient investment funds.

* The schemes are applicable to power generation only. Private investors can participate in Transmission or Distribution projects *only under the BLT or PF schemes*.

Source: [CEC Debate, p. 28] and "Prospectiva del Sector Eléctrico 2001-2010" Secretaría de Energía, 2001. Mexico, pp. 56, 88.

The power market

The power market is among the most dynamic in the country and CFE is ranked as the fourth largest firm in sales revenues in Mexico. Covering practically all the "open" market, in 2001 CFE⁶ sold over

⁵ [CEC-Debate, 2000]

⁶ Approximately 95 per cent of the energy distributed and marketed by LFC is bought from CFE.

157,000 GWh at an average price of 6.92 U.S. cents per KWh and obtained a little over \$11 billion US dollars for energy sales and related services. Rates applicable to electricity are defined and authorized by the federal government and, in the past, the average sale price of electricity has lagged behind the corresponding average cost. Recently, some very severe adjustments have been implemented in order to align prices and costs especially in residential rates and, today, practically all direct subsidies to Mexico's power rates have been practically eliminated. Consequently, the overall revenues and profit margins for the SEN and return on investment will tend to improve in the near future.

As of June 2002, the national demand of electricity, addressed largely by public utilities and in a much smaller proportion by the private sector, is covered with generating facilities in operation equivalent to 36,233 MW by CFE and LFC plus, according to the *Comisión Reguladora de Energía* or CRE, 3,302 MW of installed capacity by IPPs (and a few BLTs) -supplying CFE- plus Autoproducers⁷ (including Pemex) with an estimated 4,696 MW, totaling 44,231 MW. [Figure 1]

National demand forecasts

In 2001, electric energy production in Mexico amounting to 201,180 Gigawatts-hour [GWh] was generated by the public utilities supplemented with a marginal contribution of approximately 3,400 GWh by the IPPs, which added up to a subtotal 204,580 GWh. To this amount one must add close to 27,284 GWh generated by Autoproducers (including Pemex), for a grand total of 231,864 GWh. [Figure 2]

Assuming that no major upheavals in the existing regulatory framework occur and that the envisaged trend of the economy remains, at a rate of growth for the Gross National Product [GNP] of 5.2 per cent on average annually for the rest of this decade, planners from the energy sector in Mexico are contemplating that total electricity consumption will grow at an average annual rate of 6.3 per cent during the 2001-2010 period. This assumption calls for various reflections on the future shape of the power sector in Mexico and perhaps in North America, basically in terms of financial requirements; the participation of the private sector in key activities of the power industry; and the implications in energy trade that extend to goods and services closely linked to the power industry.

Market shares (the large numbers)

In accordance with this scenario and in order to meet the corresponding demand, Mexico's total installed capacity would require a 60 per cent increase from its 2002 levels, i.e. 26,811 MW of additional new generating capacity in order to achieve 71,042 MW in 2010 a figure that, according to OECD figures would be closely equivalent to existing generating capacity in England (75,300 MW) or Italy (73,850 MW).

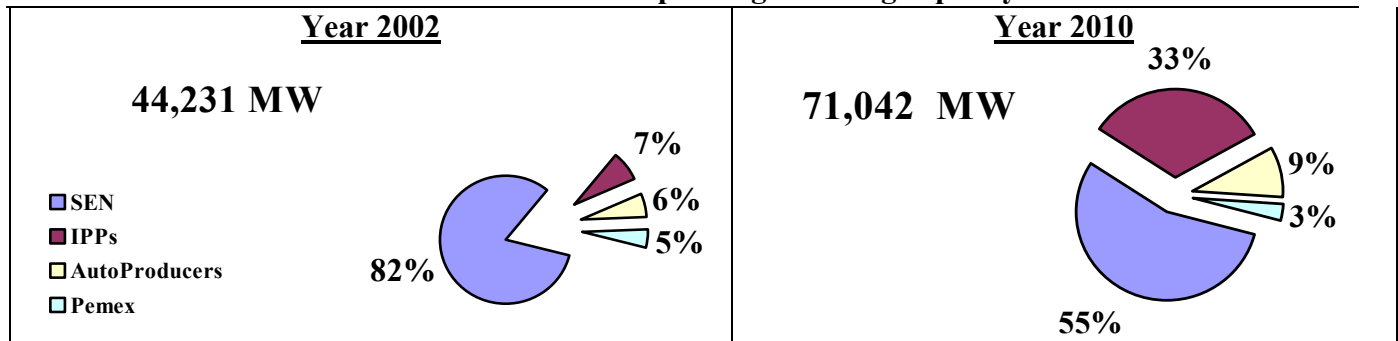
Taking these figures into consideration, one can deduce that, to date, the share of the private sector (including IPPs and Autoproducers) in Mexico's power generating pool, amounts to 18-19 per cent of the total. However, it should be noted that almost one third of this private, *non-SEN* capacity, or 5 per cent of the total installed capacity, is operated by Pemex (the oil and gas public firm). Assuming that all of the IPP or BLT projects that are under construction or in early development phases (around 9 thousand MW) and should the proposed bidding processes for 2003-2010 be successfully tackled basically by the private sector as IPPs (around 14 thousand additional MW according to the Ministry of

⁷ Autoproducers: Basically private or non-SEN power producers (*Small scale producers, Cogenerators, Exporters, Importers*) See Annex 1

Energy⁸) and Autoproducers' projects are carried out within the official forecasts, by the end of this decade the private sector, including a diminishing Pemex's share, in the generating pool could reach 32,000 MW or almost half the total installed capacity in the country. [Figure 1].

Figure 1

Mexico: total installed power generating capacity



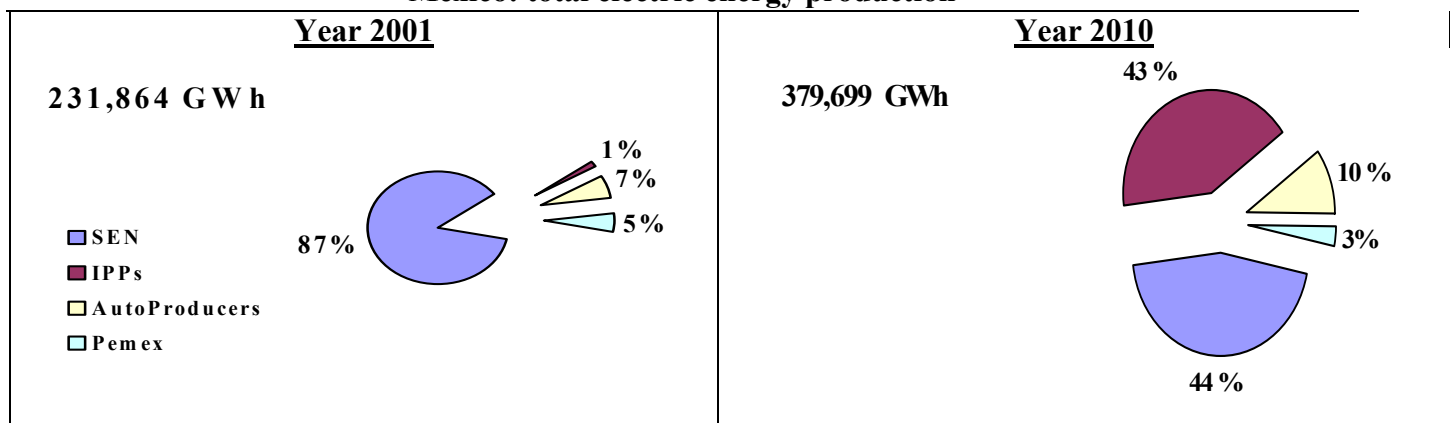
Source: "Prospectiva 2001-2010,..."Gráfica 17, Cuadro 30. Comisión Reguladora de Energía, <http://www.cre.gob.mx/registro/index.html> (Registro Público "Permisos Administrados") Data for the month of June 2002.

As for total gross electric energy production, 87 per cent of the year 2001 levels which amount to 231,864 GWh were generated by the SEN, basically by CFE's own plants, supplemented with only one IPP in operation that contributed with a mere 1 percent of the total (however, in 2002 six more generating facilities started operations and, presumably, by the end of the decade close to 50 private plants will be generating more than 160,000 GWh). In 2001, the rest, or approximately 6 per cent, was generated by Autoproducers (7 %) and Pemex (5 %). [Figure 2]

By the end of this decade, additional gross generation in the order of 148,000 GWh or more than 63 per cent of current generation will be required in order to meet demand. Private capital represented by IPPs and Autoproducers in the power sector in Mexico will be generating more than half of total electric energy production. [Figure 2]

Figure 2

Mexico: total electric energy production



Source: "Prospectiva 2001-2010,..."Gráfica 17, Cuadro 30. Comisión Reguladora de Energía, <http://www.cre.gob.mx/registro/index.html> (Registro Público "Permisos Administrados") Data for the month of June 2002.

⁸ See "Cuadro 15" (in) Secretaría de Energía, *Prospectiva del Sector Eléctrico 2001-2010*, México, 2001, p. 15 or <http://www.energia.gob.mx/inversion/oportu/oivveelectrico.htm#dos>

Rate of private investment flows into Mexico’s electricity sector

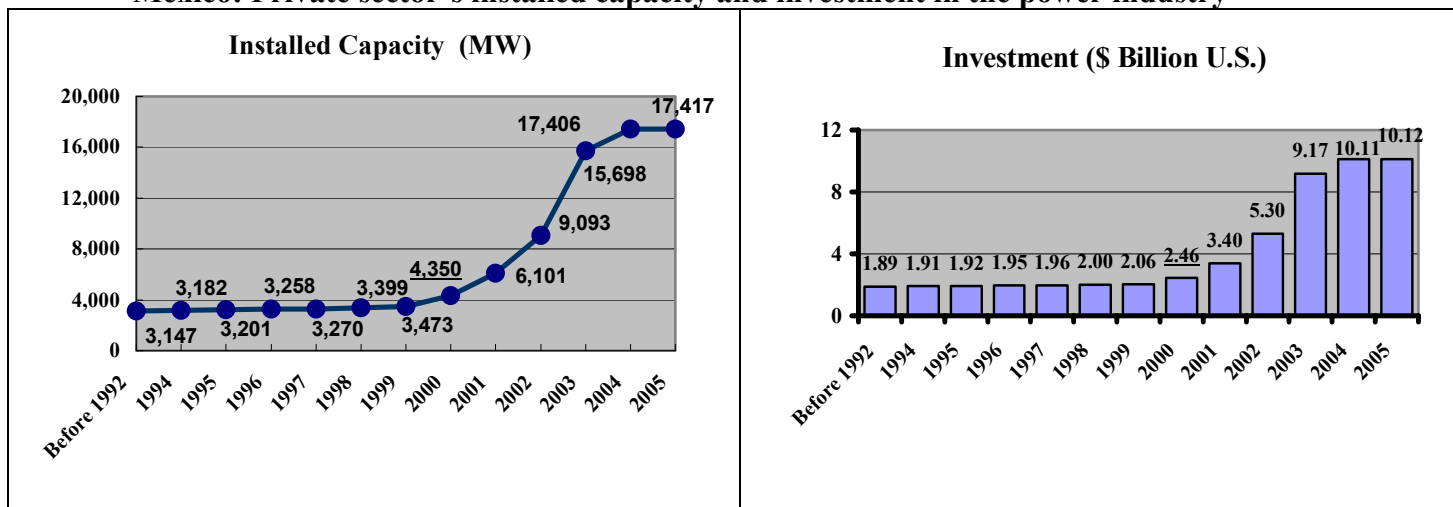
According to the CRE (*Comision Reguladora de Energía*), private investment in the electric sector has increased a great deal since 1994 when major reforms to the “*Regulation of the Public Electricity Utility Law*” made in 1993 allowed for a growing presence and legal validation of the private sector in Mexico’s power market [See Annex 1]. Hence, in the last eight years, more than 200 permits have been authorized for different modes of participation by private investors that, in July 2002, amount to approximately 17,417 MW of “authorized capacity”; with an annual power production estimated at 115,000 GWh. The corresponding potential investment to year 2005 has been estimated in the order of \$10.1 billion US dollars. Though, only a fraction of these potential funds has been applied to projects “*En operación*” as the CRE labels actual operating plants.

Before 1992, there were 3,147 MW of installed capacity that could be considered private or “non-SEN”, since it belonged to Pemex or some private generators who covered strictly their own needs and related investment was estimated in the order of \$1.89 Bn US. In 1993, with the foundation of the CRE and a new set of rules in place, a steady process of building new generating facilities and regularizing older ones, growing at an annual average rate of 4.1 per cent, started to increase installed capacity and reached 4,350 MW in 2000. During the same period (i.e. 1992-2000), the flow of investment grew at an annual rate of 3.3 per cent and reached \$2,461 Bn US.

The year 2000 can be considered as an inflection point with regards to the pace at which capacity and investment would increase in the following five years, i.e. until 2005, since, according to CRE’s projections based on actual authorized permits, both installed capacity and capital flows will grow at an annual rate in the order of 32.5 per cent. And even though, this rate underestimates actual capital flows from the year 2000 to 2003, it “catches up” and matches the expected values by the end of 2005. [Figure 3].

Figure 3

Mexico: Private sector’s installed capacity and investment in the power industry



Source: CRE, Dirección General de Electricidad, August 2002.

In the 90’s, the relatively larger growth rate of installed capacity –*vis a vis* that of investment- can be explained by the fact that some new additions to the generating pool came from old plants that had already been amortized, hence only fresh funds (from new plants) were included in the investment

account. Incidentally, besides the obvious correlation in the pattern of growth between flows of investment and installed capacity during the first half of this decade, the numbers in Figure 3 allow us to deduce that over the five year period 2000-2005, when 13,067 MW will be added to the generating pool, the corresponding investment will be in the order of \$7.655 Bn U.S., or an average of \$586 thousand dollars for each MW installed.

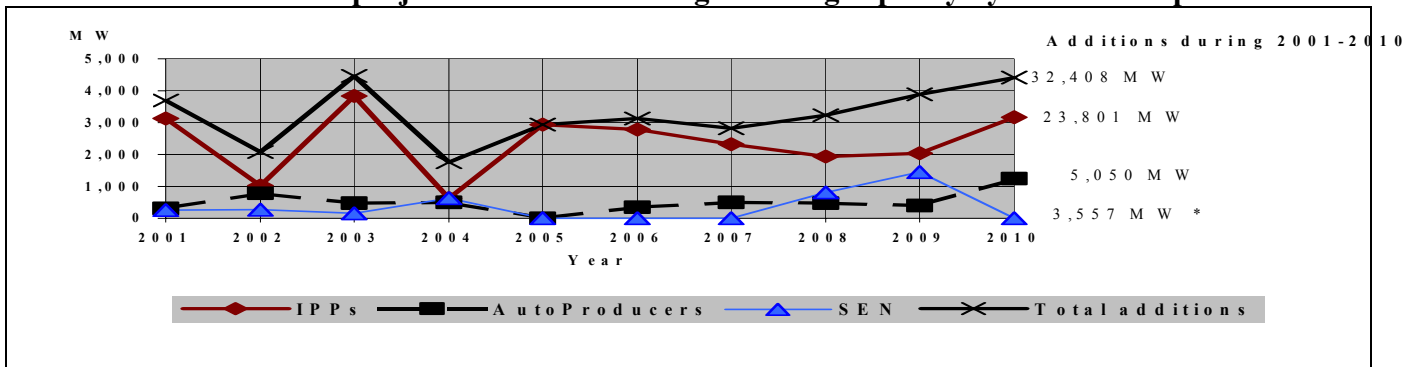
In order to meet the expected demand for power in the country, the private sector, supposedly generating 56 per cent of total electricity production, with an expected installed capacity of 32,000 MW in the year 2010, will require a slower pace of investment during the 2005-2010 period: in the order of 13 per cent annually, instead of 32.5 per cent as in the previous lustrum. Additional capacity requirements for this period amount to 14,583 MW and approximately \$8.546 Bn U.S. of new capital.

Sources of capital

At this moment, Mexico's strategy for expanding generating capacity is based on attracting private investment and specifically on the IPP scheme making the largest contribution to additional capacity throughout this decade [Figure 4]. Nevertheless, some local promoters of full privatization of the power sector claim that the IPP and BLT and, of course, the Public Financing (PF) scheme add to the overwhelming public debt, thus reducing the international credit standings of the country and the government's leeway in placing other debt instruments on international markets.

Figure 4

Mexico: official projections of additional generating capacity by source of capital



* For SEN's contributions we have assumed that all major hydro plants will be financed through Public Financing PF schemes in 2008 and 2009. However, this could not be the case and consequently additions by IPPs would be even higher. Source: Sener (in) **Prospectiva 2001-2010**, from Data in Cuadro 14, 15, 21, and 30.

On the other hand, many opponents of privatization in Mexico contest those claims on the basis that official forecasts for power demand expansion are inflated and that public debt levels are still quite manageable. Furthermore, in a recent report entitled "*Mexico Energy Project Financing*", published by the California Energy Commission, the authors assert that the country's "IPP program has been successful in attracting foreign investment" and point out that in contrast with other countries, "Mexico has adopted an incremental approach to bringing in foreign investment that allows investors and the host country to accommodate a regulatory framework that is not changing too quickly". The report concludes

that this approach has also been successful in avoiding the building of excess capacity and projects with payment deficiencies⁹.

Authorized permits for power generation granted by the CRE do not specifically call for details on the origin of capital, thus there is no rigorous way of clarifying the real sources of funding, specially since local national partners and foreign investors are normally incorporated in a joint stock company. However, different expert opinions coincide in the notion that at least 90 per cent of all private investment in Mexico's private power generating pool comes from different foreign sources. In particular, most large IPP projects¹⁰ have been supported by various multilateral and bilateral financing organizations. Large foreign energy companies who sponsor most of these large IPP projects obtain support from development banks usually based in their own countries. Some examples are presented in Table 2.

Table 2
Mexico: selected sponsors and financing of large IPP projects in Mexico

Country	Sponsor (Company)	Financing
France	EdF and Alstom	French export financing bank: COFACE
Spain	Union Fenosa and Iberdrola	Inter-American Development Bank
Japan	Mitsubishi	Japan's Export Import Bank
Canada	Transalta	Canadian government: Export Development Corporation
U.S.A.	G.E. and Intergen	U.S. Export-Import Bank

Source: California Energy Commission, **Mexico Energy Project Financing**, January 2, 2002, p.

Exports and imports of electricity

Energy planning officials in Mexico do not consider international electricity transactions to be relevant for the SEN generating pool in the future. The general view is that the U.S. power industry can satisfy the needs of their border states with relative ease, except perhaps in southern California where the recent shortages could be seen as feasible areas of opportunity for Mexican power exports, but no major consistent efforts are being exerted into that potential market niche on the part of CFE, as its strategy is basically focused on addressing the relatively fast-growing local demand in many urban centers in Mexico's northern border states and has very little power to spare on a short notice. Nevertheless, a temporary arrangement to supply southern California with 50 MW from Mexico was implemented during February of 2001, through the California Department of Water.

Some considerations have been made in the sense of exploring the possibility of installing new facilities along the border or upgrading some that are already running in Baja California, Mexico, in order to increase exports to neighboring adjacent border states but, at this point, planners conclude that most of the projects would previously require new interconnections and extending high voltage lines on both sides of the border. Only in the southern California (or northern Baja) area there seems to be some

⁹ California Energy Commission, Contract 500-00-015, **Mexico Energy Project Financing**, January 2, 2002, pp 7, 8

¹⁰ See Annex 2 for a listing of **Selected Large IPP Power Plants in Mexico** (page 14)

linkages that can operate adequately and handle large loads, since Mexican electrical systems have been “designed to supply their own loads and cannot carry out large power transactions.”¹¹

During the decade of the 90's, the electricity trade balance between Mexico's SEN and the U.S.A and Belize, showed a marked decline of Mexico's exports with a corresponding increase in imports. In 1991, Mexico cashed in 61 million dollars surplus, exporting 2 thousand GWh and, by 2000, had a deficit of 70 million dollars, exporting only 195 GWh, of which 127 GWh were exported to Belize and 68 GWh to the U.S. On the other hand, imports from the U.S. -basically from California- amounted to 1,069 GWh.

According to SEN's projected sales for 2001-2010, exports of electricity will have a constant value of 557 GWh per year (equivalent to less than 0.3 per cent of total domestic electricity sales in 2001) throughout the period. This is practically a no-export policy. However, last year Mexico's ministry of energy, together with the Department of Energy (DOE) of the U.S. proposed the integration of a joint study group to tackle “trans-border linkages” in order to define potential interconnection corridors in both sides of the border that would be developed by investors related to the energy industry¹². The general strategy to develop stronger trade in electricity seems to rest in 1) private power producers and 2) joint efforts of energy policy makers in North America, oriented towards the build-up of a solid transmission interconnected grid.

As of August 2002, CRE's authorized permit holders may destine part or all of their power generation for sale abroad. The CRE also grants permits for electricity imports to cover the holders' own needs. There are only five “Export” authorized projects currently under construction and four of them should become operational in 2003, the last one in 2004. All of them are gas fired combined-cycle plants and located in Baja California in the close vicinity of Southern California; their joint capacity amounts to 2,129 MW and will be able to generate up to 17 thousand GWh per year. They represent an estimated investment in the order of \$1.24 Bn US. The US companies that will be buying (importing) this power are *AES New Energy*, *Sempra* and *Coral Power*.

On the other hand, imports are practically insignificant, since there are six small power importers: five of them operating in Sonora in the *Maquila* (assembly plants) industry and one in mining activities in the state of Coahuila totaling 10.2 MW of contracted capacity. Two more facilities are under construction; the largest representing the bulk of total imports at the moment, supposedly importing a 112 MW capacity for the iron and steel industry in the states of Coahuila and Guanajuato, should have started operations this year, but apparently is facing difficulties that might cancel the project. The last power “importer” currently authorized is a power company based in Mexicali that will be contracting 12 MW in 2003, bringing total authorized capacity to 134 MW with an annual production of 991 GWh.

However, it should be noted that the situation depicted in the power export–import market will most certainly be evolving very rapidly towards additional generating facilities in Mexico dedicated to the U.S. market. Regarding “exporters”, in less than three years -since most permits were granted in 2000 and 2001- the authorized capacity is quite substantial: 2,129 MW or 25 per cent of total additional capacity during 2000-2005. Should this pace continue, a solid trend of growing exports of electricity could be set in motion, provided the right demand-pull signals from the U.S. become a fact and, concurrently, an adequate bi-national transmission grid is developed.

¹¹ [Prospectiva 2001-2010, p. 74]

¹² Sener, *Programa Sectorial de Energía, 2001-2006*, p. 48

Conclusions

- Regardless of the debate on the market structure that Mexico's power industry will take, a silent process of mounting private investment in generation facilities is taking place and, by the end of this decade, private generation could constitute almost half of total installed capacity in Mexico
- Foreign direct investment (FDI) in the power generation sector has increased consistently in the last eight years. But especially in the 2000-2005 period, the corresponding FDI will grow at an annual average rate of 32.5 percent (with already confirmed investment flows). The overall goal of reaching over 32 thousand MW of additional capacity during this decade, of which 90 per cent would be private, seems to be feasible
- In the near future, the SEN (Mexican public power utilities) will be concentrating its efforts on addressing local demand and practically withdrawing from export market niches, allowing practically free access to the private sector
- Two elements are crucial for a healthy development of trade in electricity between the US and Mexico: i) modernizing and upgrading a bi-national grid that can handle heavier loads and ii) well defined and clear demand-pull signals from the U.S.
- At this moment, one quarter of confirmed private additions to generating capacity in the country until 2005 are oriented specifically toward the export market located in the Southern California area. Hence, there seems to be a direct relationship between FDI and exports of electricity. This relationship, however, is independent of officially planned exports, since CFE will not be embarking on any major venture in export market niches

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 - 1.1. Contract 500-00-015, **Mexico Energy Project Financing**, January 2, 2002.

2. Comisión Reguladora de Energía, www.cre.gob.mx/english/index.html
 - 2.1 **Dirección General de Electricidad** (Direct communication with officials in charge) July-August 2002.

3. North American Commission for Environmental Cooperation, www.cec.org
 - 3.1 **Debate on Reform of the Electricity Sector in Mexico**, Report on its background, current status and outlook, Montreal, Canada, July 2000.
 - 3.2 **Electricity and the Environment**, An article 13 initiative of the North American Commission for Environmental Cooperation, Supporting Documents,

4. Secretaría de Energía, www.energia.gob.mx
 - 4.1 **Prospectiva del Sector Eléctrico 2001-2010**, México, 2001.
 - 4.2 **Programa Sectorial de Energía, 2001-2006**, México 2001.

5. Senado de la República, www.senado.gob.mx/gaceta
 - 5.1 **Dictamen de las Comisiones Unidas de Puntos Constitucionales; de Energía de Estudios Legislativos y de Medio Ambiente, Recursos Naturales y Pesca, con relación al Proyecto de Decreto que reforma los Artículos 27 y 28 de la Constitución Política de los Estados Unidos Mexicanos**, (in) “Gaceta Parlamentaria”, April 24, 2002, Mexico.

6. **Rate of exchange** applied in conversions in this report.

\$1.00 U.S. = \$9.1423 Mex

Annex 1

Modes of Participation for the Private Sector in Power Generation Activities

(As stated by the Ministry of Energy in Mexico)

The new legal framework allows the private sector to participate in activities previously reserved for the state alone. In this regard, the activities not considered as public services are:

Self-supply. The utilization electrical energy to end of one's own consumption, as own consumption, as long as said electricity comes from facilities destined to provide for the needs of given group of co-owners or partners.

Cogeneration. Production of electrical energy as well as steam or other types of secondary thermal energy, or both; direct or indirect production of electrical energy based on thermal energy not utilized in those process in which it is a byproduct; direct or indirect production electrical energy utilizing fuels produced in those process involved.

Independent production. The generation of electrical energy at a plant with a capacity higher than 30MW, exclusively for sale to the CFE or for exporting

Small-scale production. The sake of the totally of electricity generates to the CFE, in which case capacity may not be higher than 30MW in an area determined by the Secretary of Energy (SE).

Export. Permit holders for cogeneration, low-level production and independent production may destine a part of their generation capacity for sale abroad.

Import. To satisfy the holder's own needs with electrical energy originated in power sources abroad.

These modalities allow the private sector to participate in the development of projects for the generation of electricity for sale to the CFE as well as for satisfying the energy needs of national industries through partnerships for self-supply. The law also allows public, state governments and municipalities to generate electricity destined to public lighting, water works, etcetera.

The different modalities for private participation require a permit for generation of electricity. The Energy Regulatory Commission (CRE) is the entity responsible for said authorization.

It is important to point out that as refers to transmission, the private sector may build and operate lines for its usage. In the case of said lines interconnecting with the public service network, particulars must subscribe the corresponding contract with CFE and/or the LFC.

To support private projects for generation of electricity, permit holders may use transmission lines belonging to the national network to supply electricity generated at their own facilities to their partners in energy consumption if they are at reasonable distance.

... ANNEX 1 (continued)

Modes of Participation for the Private Sector in Power Generation Activities (Excerpts from the Law)

<p>Self-Supply</p> <p>...Self-supply is defined as the use of electrical power for one's own consumption where:</p> <ol style="list-style-type: none"> 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)
<p style="text-align: center;">Cogeneration</p> <p>To obtain and operate under a cogeneration permit, it is essential that:</p> <ol style="list-style-type: none"> 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)
<p style="text-align: center;">Independent Production</p> <p>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)</p> <p>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).</p>
<p style="text-align: center;">Small-Scale Production</p> <p>Small-scale production is defined as electrical power generation for:</p> <ol style="list-style-type: none"> 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 predetermined 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).
<p style="text-align: center;">Export</p> <p>...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).</p> <p>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)</p> <p>...The permit holder 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)</p> <p>...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)</p>
<p style="text-align: center;">Import</p> <p>...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)</p> <p>...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)</p>

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

Annex 2
Selected Large IPP Power Plants in Mexico

Project Name	MW	Sponsors	Fuel
Campache	250	Transalta	Gas
Tamuin-II	230	Termoelectrica; Sithe; Alstom	Pet-Coke
Monterey	245	Enron	Gas
Monterey-III	880	Iberdrola	Gas
Bajio	600	Energia Aztec; Intergen; AEP	Gas
Rio Bravo-II	495	EdF	Gas
Saltillo	247	EdF	Gas
Tamuin	230	Termoelectrica; Sithe; Alstom	Pet-Coke
Hermilloso	225	Union Fenosa	Gas
Ciudad del Carmen	500	Westcoast; Marubeni	Gas
Altamira	120	Enertek; Iberdrola	Gas
Altamira	15	Trigen	Gas
Merida-III	484	AES	Gas
Rosarito-III	540	ABB; Nissho Iwai	Gas
El Encino	435	Mitsubishi	Gas
Monterey-II	450	ABB; Nissho Iwai	Gas
Samalayuca-II	700	GE; Intergen; ICA/Fluor Daniels	Gas
Cerro Prieto	100	Mitsubishi	Geothermal
Chihuahua	259	Transalta	Gas
Altamira-III/IV	1,036	Iberdrola	Gas
Tuxpan-II/IV	983	Union Fenosa	Gas
Rosarito-IV	750	Aztec Energy ()	Gas
Tres Virgenes	100	Alstom	Geothermal
Tuxpan-II	450	Mitsubishi; Kyushu Electric	Gas
Altamira-II	495	EdF; Mistsubishi	Gas
Naco-Nogales	302	Union Fenosa	Gas
Baja	256	Energia de Mexicali; AEP	Gas
Veracruz	700	ABB Alstom; ICA	Gas
Monterey	445	TermoNoreste; Intergen	Gas
Pala	180	Ahmsa	Coal
Mexicali	600	Sempre	Gas
Los Ventanos	100	Princeton; EdF	Wind
TOTAL	13,402		

Source: CALIFORNIA ENERGY COMMISSION, Contract 500-00-015, **Mexico Energy Project Financing**, January 2, 2002, page 8.