

Mexico's Energy Scene

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Mexico's Energy Sector in Numbers

The energy sector of Mexico has had mixed growth in the last few years as can be observed in the statistics shown in tables 1 to 5. While the electric subsector shows a steady growth, the oil and gas subsector shows both ups and downs. Nonetheless, the demand of natural gas and oil products as well as that of electricity has been satisfied, and the end users have not suffered any serious disruptions. In the first two, natural gas and oil products, imports have made the difference.

Crude oil production has increased slightly. Since oil refining products production has mainly remained constant, it was possible to somewhat increase crude oil exports. As stated by PEMEX's Director General, Mr. Raul Muñoz L., the past lack of investment in exploration activities has reduced the amount of total reserves. The same observation seems to apply to the transport infrastructure. Fortunately, recent investment to modernize refining facilities will start bearing fruit this year.

decreased. It is still much higher than the desirable value, due to a weak transmission and distribution system resulting from chronic underinvestment over the last decades and not due to the lack of generation capacity.

Table 3

Hydrocarbon Pipeline Transport Infrastructure (kilometers)

	1998	2001
Crude Oil	4297	4088
Natural Gas	9185	7516
Liquid Products	<u>12578</u>	<u>12017</u>
	26060	23621

Ref. Anuario Estadístico 1999, PEMEX
Anuario Estadístico 2001, PEMEX

Mexico's Reform Attempts

The 1992 Reform

The first reforms to the laws regulating electricity public service were approved by the Mexican Congress in December 1992. Prior to this, all activities related to the offering of this service were exclusive of the public sector through two

Table 1
Mexico's Primary Energy Reserves and Production

	1998			2001		
	Reserves	Production	R / P	Reserves	Production	R / P
Crude Oil	40.38x10 ⁹ b	3.07x10 ⁶ b/d	36.3	8.29x10 ⁹ b	3.13x10 ⁶ b/d	33.5
Natural Gas	1,712.5x10 ⁹ m ³	134.1x10 ⁶ m ³ /d	35	1,418x10 ⁹ m ³	126.3x10 ⁶ m ³ d	30.7
Coal	663x10 ⁶ mton	11.5x10 ⁶ mton/a	57.6	663x10 ⁶ mton	12.0x10 ⁶ mton/a	55.2
Hydroenergy	80 TWh/a	24.62 TWh/a	—	80 TWh/a	28.44 TWh/a	—
Geothermal	10.4 TWh/a	5.66 TWh/a	—	10.4 TWh/a	5.56 TWh/a	—
Uranium	10,600 mton	—	—	10,600 mton	—	—

Ref. Compendio de Información del Sector Energético Mexicano, Programa Universitario de Energía, Universidad Nacional Autónoma de México

Table 2
Oil Refining Products (10³ b/d)

	1998	2001
Gasolines	412	434
Diesel	290	292
Fuel Oil	446	436

Ref. Memoria de Labores 1999, PEMEX
Informe Estadístico de Labores 2000, PEMEX
Informe Estadístico de Labores 2001, PEMEX

With regard to the electric sector, the important increase in generation is due mainly to the so called external power producers which correspond to power plants built with private investment. But these have a different status than the independent power producers in other electricity markets as will be briefly described below. The transformation (substation capacity) and transportation (transmission and distribution) infrastructure has increased steadily. Until now, the average annual time of service interruption has slowly

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public utilities, Comisión Federal de Electricidad (CFE) and Luz y Fuerza del Centro (LyFC) which are administered by the executive branch, more as government agencies than public enterprises. Some exceptions were allowed: for example self generation of electricity for internal uses of the generator. The new law allows the following participations, in addition to public utilities, in electricity generation:

- Power generation for self supply. No permit is required if capacity is below 500 kW. A single or a group of industries may install their own power plant to satisfy their own needs. Excess capacity must be made available to CFE.
- Cogeneration. Power and heat generation in an industrial process may be carried out by a permit holder different from the process plant owner. Excess capacity must be made available to CFE.
- Small power generation. Power plants of less than 30 MW may be installed anywhere and may generate electricity to be sold to CFE. If it is to be used in rural isolated areas as self supply, the capacity must not exceed 1 MW.
- External power producer (EPP). This scheme allows private investors to install power plants, but all the electricity generated must be sold to CFE under long term

contracts. In practice, CFE defines the site and the power required, and through an open bidding process, assigns the project. Being a government owned public utility and paying for energy delivered as well as capacity availability, the risk is low for the private investor winner, as the government basically takes most of it. For all practical purposes, this is a virtual finance scheme by which CFE may have access to new generating capacity without directly incurring in the capital expense; it probably is more expensive than a direct loan or bond issue, but the arrangement apparently has other advantages for the Mexican government.

- Power generation for export and power imports. Individuals or entities may generate electricity for export. Also, they may import electricity for their own use. Both activities require a permit.

A common denominator is that only the public utilities, CFE and LyFC, can provide this service in the country. Thus, except in the EPP modality which provides the lowest cost scheme to CFE, this reform did not create any kind of competitive environment.

Table 4
Gross Electricity Generation (GWh)
(Effective Generation Capacity in MW)

	1998	2001
Hydroelectric Units	24,616 (9,700)	28,435 (9,619)
Fossil Fuel Fired Units		
Fuel Oil / Gas Fired	86,206 (14,283)	90,395 (14,283)
Coal Fired	17,957 (2,600)	18,567 (2,600)
Fuel Oil / Coal Fired	12,692 (2,100)	14,109 (2,100)
Combined Cycle	13,184 (2,463)	20,789 (3,733)
Gas Turbines	1,087 (1,929)	5,456 (2,381)
Diesel Int. Combustion	314 (120)	467 (143)
Nuclear Power Units	9,265 (1,309)	8,726 (1,365)
Geothermal Power Units	5,657 (750)	5,567 (838)
Wind Driven Power Units	5 (2)	7 (2)
Total	170,983 (35,256)	192,518 (37,064)

Ref. Informe de Operación 1998, CFE
Informe de Operación 2001, CFE

The 1999 Reform Proposal

In 1999, President Zedillo sent a reform proposal for the electrical sector following more or less the Argentinian model. The system would be unbundled, creating competition at the generation level through wholesale and spot markets.

Only the hydroelectric, and nuclear power plants as well as the transmission network would be kept under the administration of the public sector. An independent dispatch center would administer and control the spot market. An energy regulatory agency would supervise the whole scheme with its main mandate being to protect the consumer at the end of the process. As is well known, the political opposition, including the PAN (right-leaning) political party now in power, was overwhelming. The proposal never reached the senate floor for discussion, as the federal (presidential and congress) political campaign went into high gear and the last months of the administration drifted by.

Although the main argument to promote electrical reforms to open the electrical sector to private investors was the large future investments required for expansion and the lack of public funds to do this, in many instances, the weak

performance of the two utilities was also utilized. A benchmark exercise of CFE and LyFC was made (1), based on a previous publication (2) of a comparison between an Indian utility, Maharashtra State Electricity Board (MSEB), and an American utility, PacifiCorp (PC). The results (Table 6) showed that CFE fares quite well, while LyFC has more problems. The large difference of CFE with PC in the transmission and distribution losses is due, in part, to the large difference in territory covered by each (PC covers 460,800 km² while CFE covers 1,952,016 km²). Transmission losses directly correlate with the distances covered by the network. Non-technical losses (thefts) also contribute in the case of CFE while for PC these are probably non-existent. On the other hand, the average annual interruption of service time duration and the voltage and frequency variations are not reported in the original publication and thus are not compared; CFE and LyFC probably have a much worse performance index in these two areas due to the lack of robustness in their transmission and distribution networks.

Table 5
Electricity Transport Infrastructure
(kilometers)

	1998	2001
Transmission (150-400kV)	33,063	36,848
Subtransmission (69-135kV)	38,226	40,796
Distribution (< 34.5kV)	<u>516,187</u>	<u>554,374</u>
	587,476	632,018

Ref. <http://www.cfe.gob.mx>

President Fox's Reform Attempts

In May 2001, President Fox signed a decree allowing self-suppliers and cogenerators to sell their excess electricity to CFE above the limits set by the 1992 reform. Some senators and congressmen from opposition political parties contended that this was unconstitutional and requested the Supreme Court to analyze the case and rule on this issue. Earlier this year, the Supreme Court declared President Fox's decree unconstitutional by an 8 to 3 vote and agreed with the opposition parties that presidential decrees could not change laws passed by Congress. In their presentation of motives, some of the judges that voted with the majority went so far as to question the validity of the sale of excess generation since it appears to be in contradiction with articles 27 and 28 of the Constitution. These state that electricity generation, transmission and distribution are a public service and are reserved, exclusively, to be performed by the state through its public utilities. Such an interpretation has created uncertainty about the legal status of the EPPs, which now have 2548 MWe operating and 6016 MWe under construction.

In early August, President Fox sent his reform proposal to Congress which obviously included changes to article 27 and 28 of the Constitution. His proposal was immediately contrasted to the previously presented proposals of some PRI members and of the PRD (left-leaning party). The only common feature of the three proposals is that both electrical utilities should be given more administrative independence from the central government, that is, the utilities would become closer in status to a real enterprise and less of a government agency. In the remainder of their contents, President Fox's proposal takes completely opposite positions to the PRI and PRD ones.

The PRI and PRD proposals basically call for the maintenance of the status quo and oppose any alterations in articles 27 and 28 of the Constitution. They seem to agree to maintain the 1992 changes allowing EPPs in order that private investors continue to participate in the generation of electricity and, as mentioned before, they would grant much more administrative autonomy to the public utilities from the central government than what they have now. Yet, it is not clear what they would propose to reduce the uncertainty created by the Supreme Court ruling.

Table 6
Benchmark of Some Parameters Between an Indian, An American and the Two Mexican Electrical Utilities

	MSEB	PC	CFE	LyFC
Thermal Efficiency (*) (kcal / kWh)	3,103	2,678	2,469	—
Capacity Factors (*) (%)	62.3	76.5	72.4	—
Transmission and Distribution Losses(%)	16.2	5.7	14.5	22.5
Labor Productivity (No. of. clients /worker)	100	155	190	141
Labor Productivity (Workers / MW installed)	14	1	2.5	—

* This comparison is only for coal-fired power plants Reference (1)

President Fox's proposal, besides maintaining intact the two public utilities, calls for their increased administrative autonomy as the PRI and PRD proposals also do. But it further proposes changes in articles 27 and 28 so that the government does not have exclusive rights in the activities related to the electrical subsector and the creation of wholesale and spot markets in electricity generation.

The environment in which the discussions are taking place is quite interesting. In favor of President Fox's proposal, it is stated that public finances are meager because government tax revenues are quite small; they are only of the order of 18% of GDP. Thus the large amount of financial resources required for the accelerated infrastructure expansion (5-6% electricity demand annual growth rate) would quite seriously reduce the availability of funds for the pressing social investments the government has to make in health, education, housing, etc., to get the recently estimated 53 million Mexicans out of poverty status. Supporters of the President's proposal argue that in order to achieve both responsible energy and social goals, the electrical sector has to be opened to private investment without any legal uncertainties floating around. This argument has been widely accepted even by some in the opposition; some PRI state governors, senators and congressmen have publicly come out in favor of President Fox's proposal.

The opposition arguments run along the line that in the recent past, cases of private participation in previously public exclusive sectors as banking and the toll highway system have produced terrible failures, costing the Mexican taxpayer trillions of pesos (1 US\$ is equivalent to about 10 pesos). Moreover, the opposition adds that the electrical system is a strategic sector which should not be allowed to fall into the hands of foreign decision makers as this would affect Mexico's sovereignty. Finally, they point out the many examples of serious flaws in other reformed electricity markets that make it highly probable that Mexico's attempt will fail. A few

months ago, Governor Davis of the State of California, on a visit to Mexico, publicly recommended not to go the route of reform. Recently, Joseph Stiglitz, 2001 Nobel prize in economics, in a highly publicized telephone interview with one of the main Mexican newspapers, stated that electricity competitive market creation is a very difficult task and that market power and price manipulation is probable. He also stated that without an adequate regulatory framework in place, business and individuals will be confronted with a disaster. While the opposition agrees with the fact that current fiscal resources can not support the electricity expansion's required investment, they claim that a well managed publicly owned enterprise should be able to finance its own expansion, something that Stiglitz also stated as possible.

In the meantime, the multiple service contracts proposed by PEMEX to accelerate the expansion of dry natural gas exploration and production have been relegated to a second level of discussion. At present, gas sector distribution is 100% in the hands of private companies, and the transport area already has some private pipelines under construction. At some point, it is expected that the opposition will consider this new scheme unconstitutional as articles 27 and 28 also refer to oil and gas. It is likely they also will request the Supreme Court to judge their validity. Energy Secretary Martens recently declared that a reform proposal related to oil and gas activities will be sent to Congress. The PRD has made public their reform proposal for PEMEX which only calls for its administrative autonomy from the government, and the creation of a new energy planning commission. But at the moment, the spotlight is on the electrical sector reforms.

The PRI party president has declared that there will not be an official party position and that each senator and congressman will be allowed to vote according to his convictions. At present, the lobbying activity on both sides is very intense and the common perception is that President Fox hopes to be able to get his proposal through with the support of his party, PAN, and a split PRI. As there is no timetable set for the voting procedure at present, uncertainty is even greater.

In December, a newspaper poll made among 40% of congressmen and senators indicated that most agreed that private investment is required in the electrical sector (67% congressmen and 64% senators) but 58% of the polled senators and 45% of the polled congressmen said that they would vote against the reform proposal sent by President Fox (as it involves constitutional changes, it requires 2/3 approval from both chambers). A few days later, a report was published on a meeting of the PRI senators to discuss the electrical reform, where it said that unanimous consensus was reached that there should be no constitutional changes. The next day, one of them presented on the senate floor, a new proposal similar to President Fox's, but restricting foreign investment in the generation subsector to less than 49%. At present, the Senate has postponed again the electrical reform floor discussion until February 2003.

In conclusion, the situation is one that could briefly be described by one of those popular Chinese phrases; we shall live interesting times in the near future.

References

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