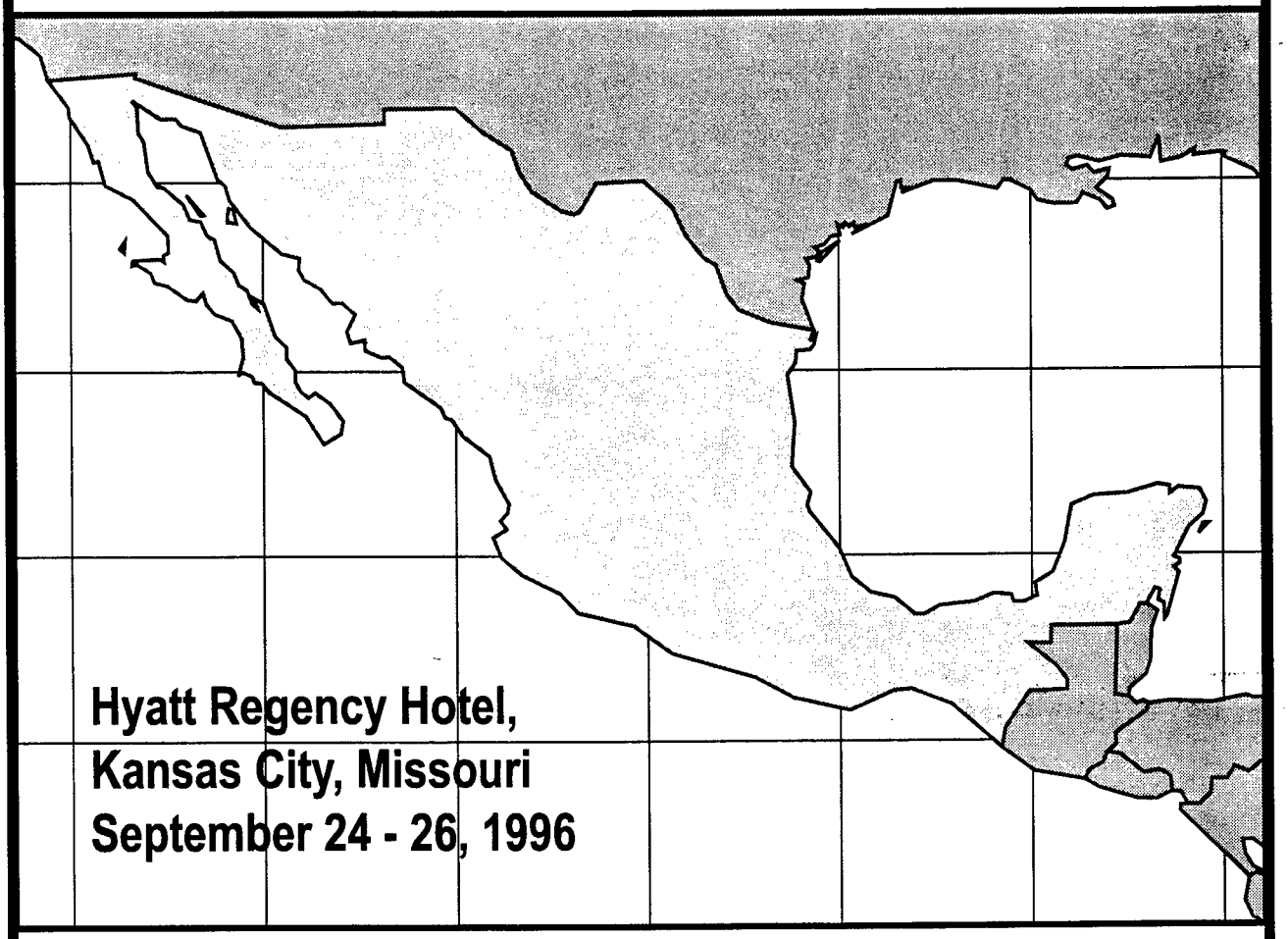
PB99-115628

Infrastructure Opportunities in Mexico: Getting Good Projects on Track



Hyatt Regency Hotel,
Kansas City, Missouri
September 24 - 26, 1996

CONFERENCE SPONSOR	U.S. Trade and Development Agency
PROJECT ANALYSIS	CG/LA Infrastructure
CONFERENCE COORDINATOR	Institute of International Education

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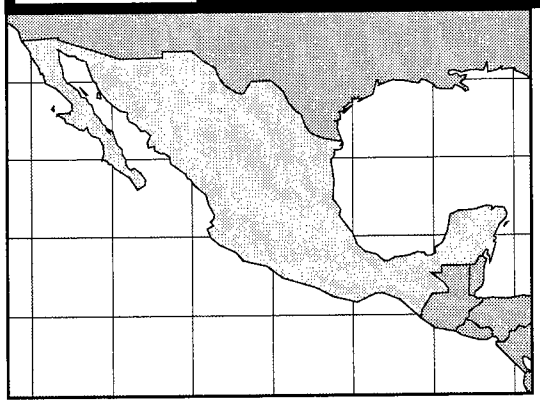

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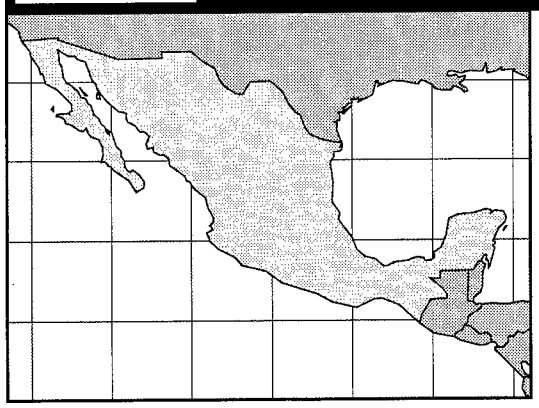
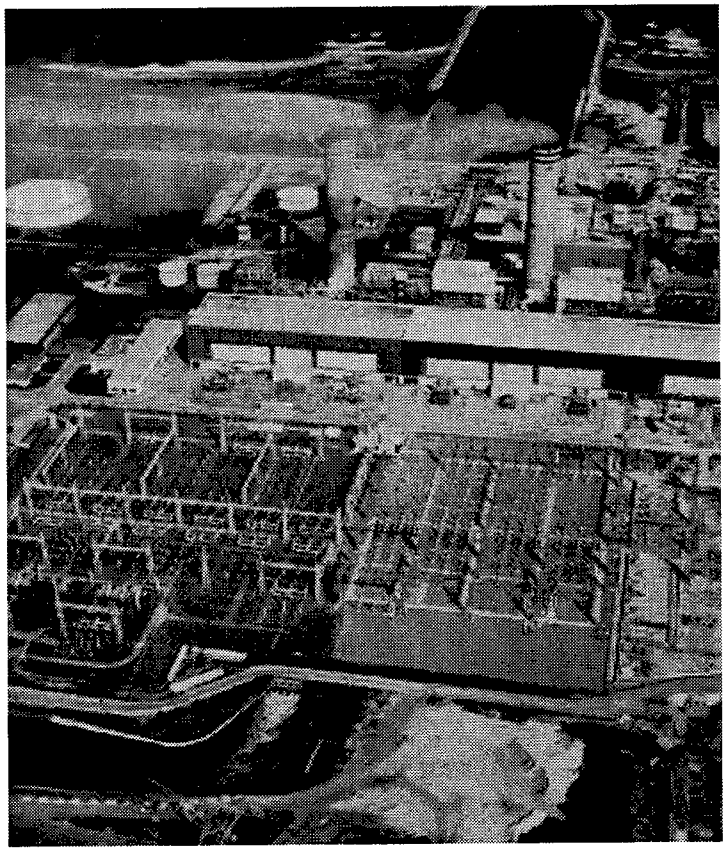
Energy Sector Overview

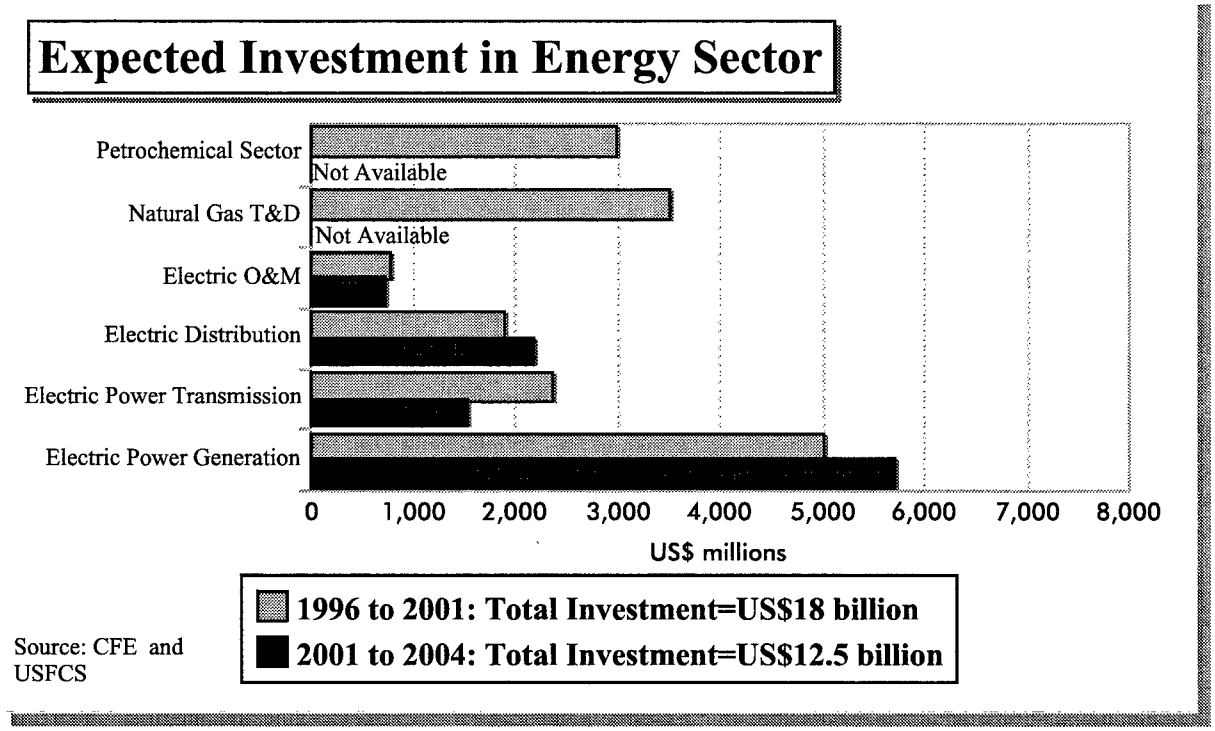


Mexico's energy sector is undergoing a profound transition from state ownership and operation, to private ownership and financing, with the state acting as referee and regulator. These sweeping changes began in 1992 with revisions to the Electric Energy Public Service Law, which opened up electric generation to private investment. The dramatic opening of the natural gas sector to private participants was made possible by constitutional changes enacted in 1995.

These sweeping regulatory and legal changes, combined with Mexico's continued strong demand for electricity and fuels, should create a total market valued in excess of US$25 billion over the next decade. In all likelihood, the Mexican government will continue to push further liberalization in the energy sector, opening up greater opportunities for the private sector than is currently anticipated.



Adolfo López Mateos Thermoelectric Complex in Tuxpan



Source: CFE and USFCS

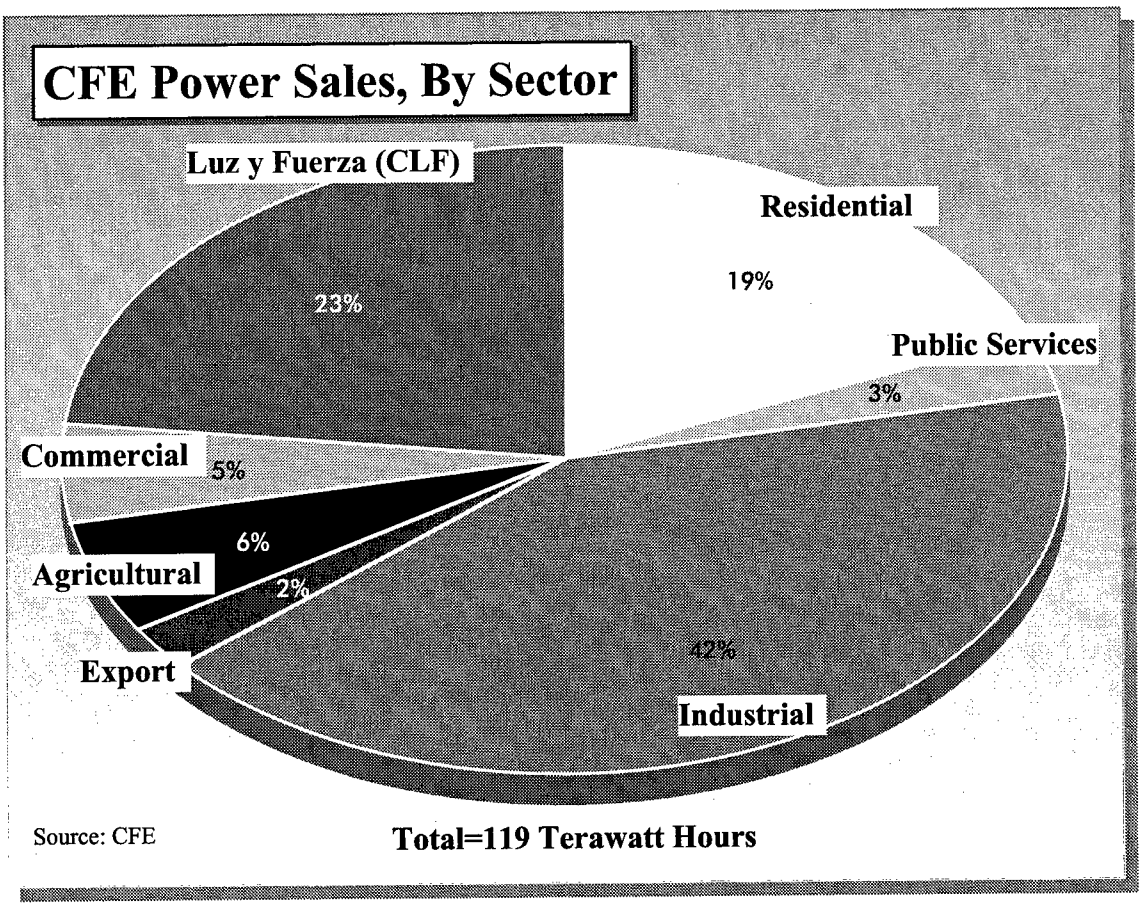
ELECTRIC POWER SECTOR

Overview

Strong growth in the demand for electricity remains a constant, in spite of the 1995 recession which saw a temporary drop in overall economic output. Demand still grew by a healthy 3.5 percent. Annual electric power demand from 1984 to 1995 grew by an average of 5 percent despite only modest economic growth during the same period. CFE forecasts similar growth in demand over the next eight years. This expansion will require a total of US$22 billion in new investments, including US$10.7 billion in new generation capacity.

Demand and Capacity Needs

Mexico's installed generation capacity was 33,038 megawatts at the end of 1995. This capacity was produced by 169 power plants made up of 577 generating units. Of these 169 plants, 90 were thermoelectric plants consisting of 356 units, 77 hydroelectric plants with 214 units, one nuclear plant with two units, and one wind-powered plant with seven units. CFE owns 524 of these units, making it among the top ten largest power utilities in the world.



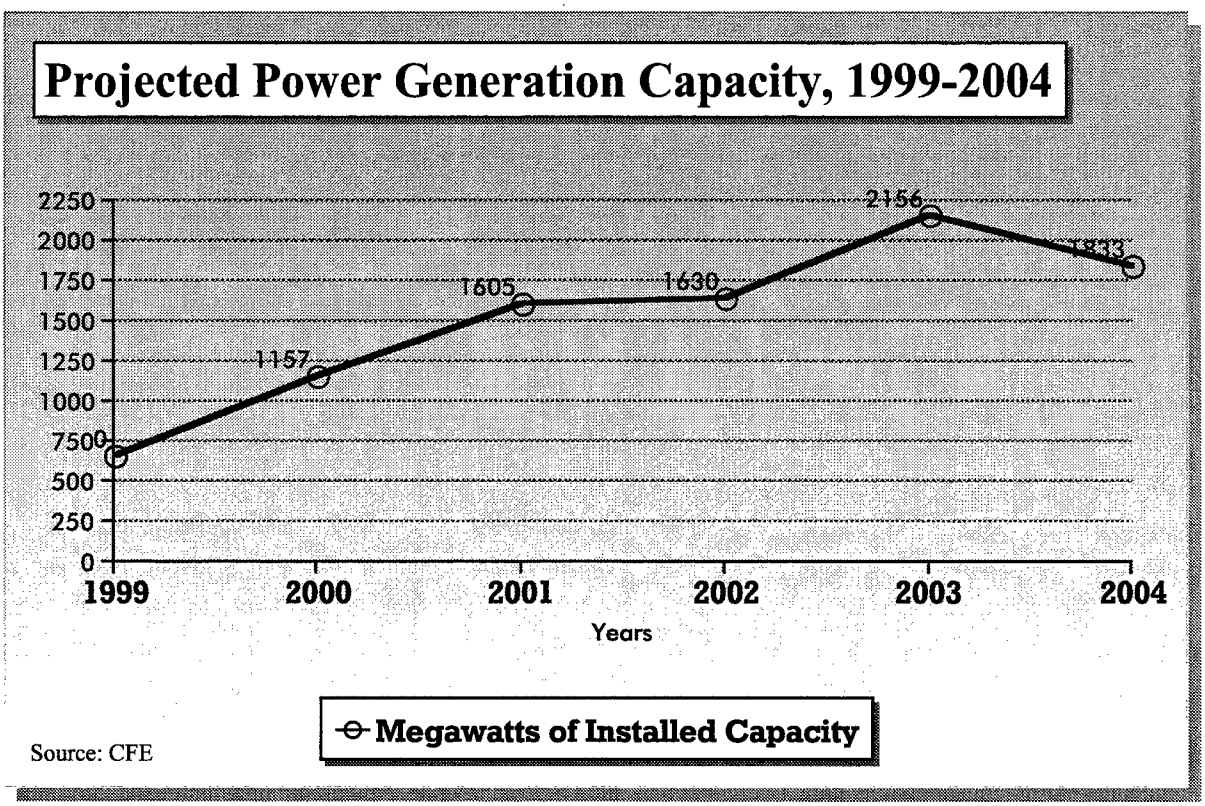
On a regional basis, each of the nine areas of the national electric system is expected to average at least four percent growth per year over the next eight years. The three regions expected to see particularly strong growth are:

- Baja California: This region is expected to continue its very high rate of growth in the range of 7.5 percent per year. Demand is fueled by growing industrialization of the U.S-Mexican border area.

- Yucatán: Demand for electricity in the Yucatán Peninsula grew by 8.2 percent per year over the last ten years. Growth is expected to continue at 7.2 percent as a result of growing tourism development on the Caribbean coast.

- Nuevo León/Tamaulipas: Growth in demand in this region was 7.7 per cent over the last decade and is expected to slow only slightly to 6.0 percent. Growth is driven by the industrial vitality of both the Monterrey area and the rapid expansion of chemical and related manufacturing on the gulf coast around Altamira.

CFE and the Secretariat of Energy forecast that an additional 11,474 megawatts will be required by the year 2004. Given that 3,032 megawatts of capacity are already under construction, this will require an additional 8,422 megawatts to come on line by the year 2004.

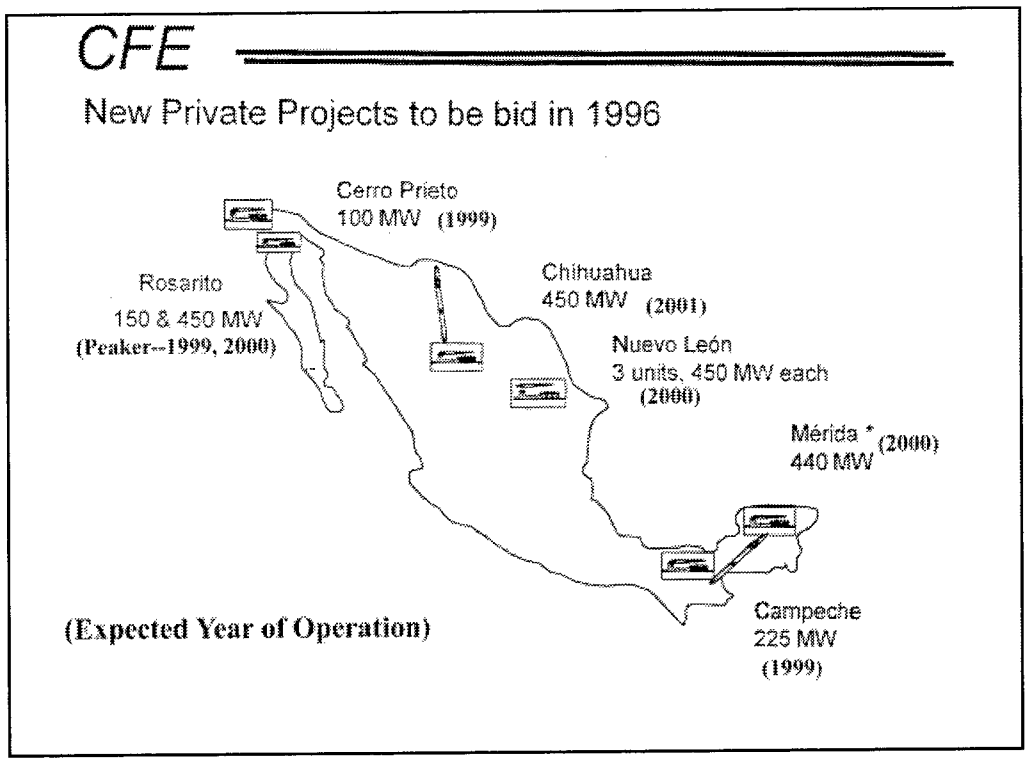


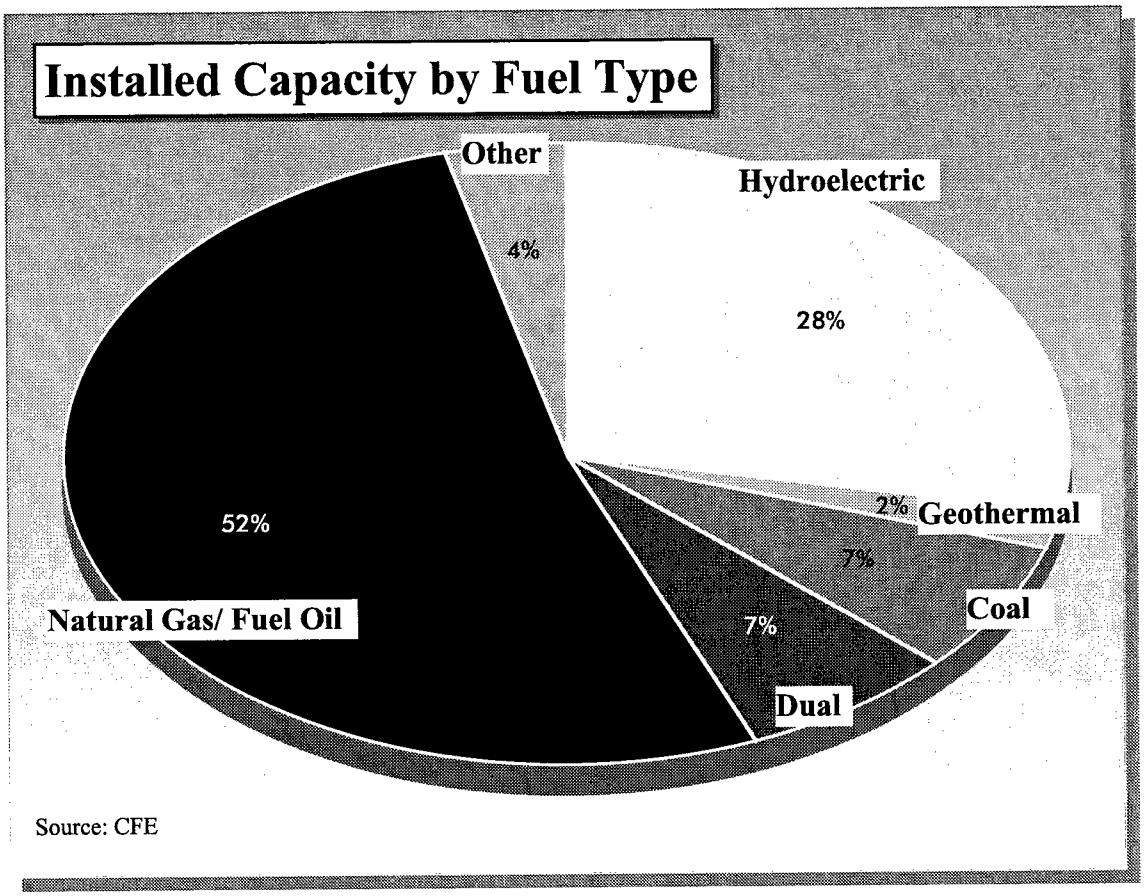
Source: CFE

The vast majority of this new capacity is expected to be generated by combined-cycle gas-fired facilities. Mexico expects a substantial contribution from hydropower and a small contribution from new geothermal plants. Mexico is still evaluating the further use of coal, but is currently stymied by environmental considerations and has no specific coal project planned. At the same time, if the environmental issue could be resolved, Mexico would be a candidate for coal-fired plants fueled by its extensive coal reserves in the country's Northern Region.

Mexico has no plans for expansion of its nuclear capacity beyond the two existing facilities in Laguna Verde.

New capacity will be added through a series of bids for each new power station. Six new plants will go to bid in late 1996 or early 1997, not including the Mérida III project.


CFE
New Private Projects to be bid in 1996
Cerro Prieto
100 MW (1999)
Rosarito
150 & 450 MW
(Peaker--1999, 2000)
Chihuahua
450 MW (2001)
Nuevo León
3 units, 450 MW each
(2000)
Mérida *
440 MW
(2000)
Campeche
225 MW
(1999)
(Expected Year of Operation)

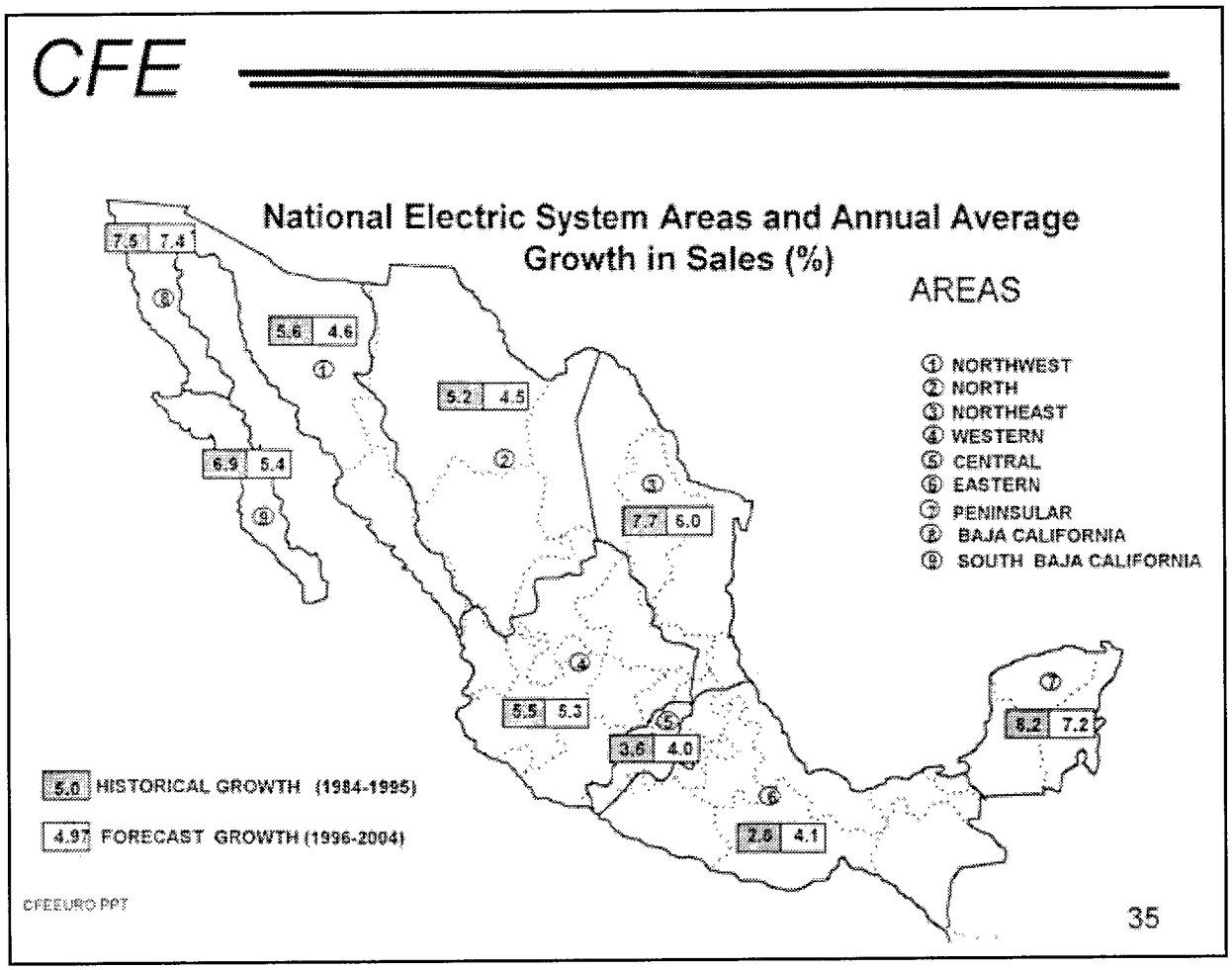

Installed Capacity by Fuel Type
Other
4%
Hydroelectric
28%
2%
Geothermal
7%
Coal
7%
Dual
52%
Natural Gas/ Fuel Oil
Source: CFE

Plant Units	Type	Bidding Date	1999 (MW)	2000 (MW)	2001 (MW)	2002 (MW)	2003 (MW)	2004 (MW)	2005 (MW)
Cerro Prieto 2 & 3	GEO	1996	100						
Mérida 3	CC	1996		440					
Rosarito 7	TG	1996	150						
Rosarito 8 &9	CC	1996		450					
Campeche 2	CC	1996	225						
Chihuahua 1 & 2	CC	1996			450				
Monterrey	CC	1996		450		450			450
Pto. San Carlos 4 & 5	ICDT	1997			37.5		37.5		450
El Cajón 1 & 2	HID	1997						636	
La Parota 1, 2 & 3	HID	1997						765	
El Chino	GEO	1997	50						
Copainala 1, 2 & 3	HID	1998							240
Rio Bravo 4 & 5	CC	1998			450				250
Central 1, 2, 3 & 4	CC	1998				450	450		
Rosarito 10 & 11	CC	1998					450		
León-Ags. 1 & 2	CC	1998				450			450
Altamira	CC/ TG	1998				450	225		450
Hermosillo 1 & 2	CC	1998					150	225	
Bajío 1&2	CC	1998					450		
Laguna 1	CC	1999						450	
Valladolid	CC	1999							225
Total (megawatts)			525	1,340	938	1,800	1,763	2,076	1,590

Source: CFE

The Secretariat of Energy, in conjunction with CFE and the Secretariat of Finance, is evaluating the future financial structure of these facilities. There is an ongoing debate as to whether new capacity should be built under a Build-Lease-Transfer (BLT) model as was done in Samalayuca or using an independent power producer model as in Mérida.

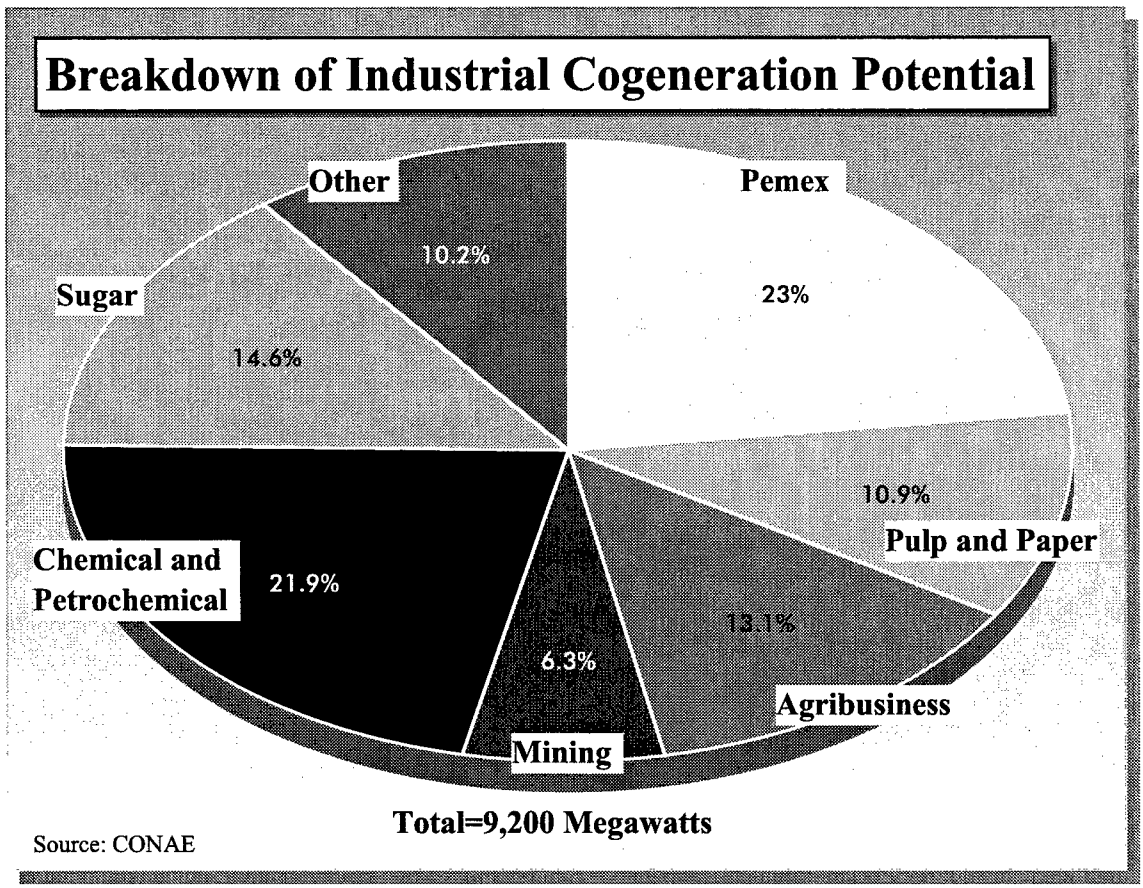
The Secretariat of Energy recently solicited comments from interested parties on a number of issues relating to the electric capacity program, including its preferred financial structure. These comments, received on July 15, 1996, are still being evaluated. It is possible that Mexico will use both schemes as part of its total investment program.



Industrial Cogeneration

Mexico has a high potential for cogeneration because of the country's large base of manufacturers which use large quantities of both steam and power. Although this sector has been slow to take off due to low electricity tariffs and regulatory uncertainty, the Secretariat of Energy is taking steps to improve the situation. In June 1996, three major cogeneration projects were approved with a combined capacity of almost 1,000 megawatts. These projects include expansion of the Alfa-PEGI project in Monterrey to 620 megawatts, the Enertek 120-megawatt project in Altamira, and a 250-megawatt coke-fired plant being planned by Cemex.

A 1993 study by CONAE, a unit within the Secretariat of Energy that promotes cogeneration and energy savings, revealed a significant market for cogeneration among Mexico's large industrial base in the paper, chemical, petrochemical, steel and food processing sectors. In fact, the study showed that even prior to the 1992 law which liberalized the sector, Mexican industries had installed 600 megawatts of power on their own. The study estimated that overall potential for cogeneration in Mexico could reach 9,200 megawatts of capacity. The study found that demand was concentrated as follows:

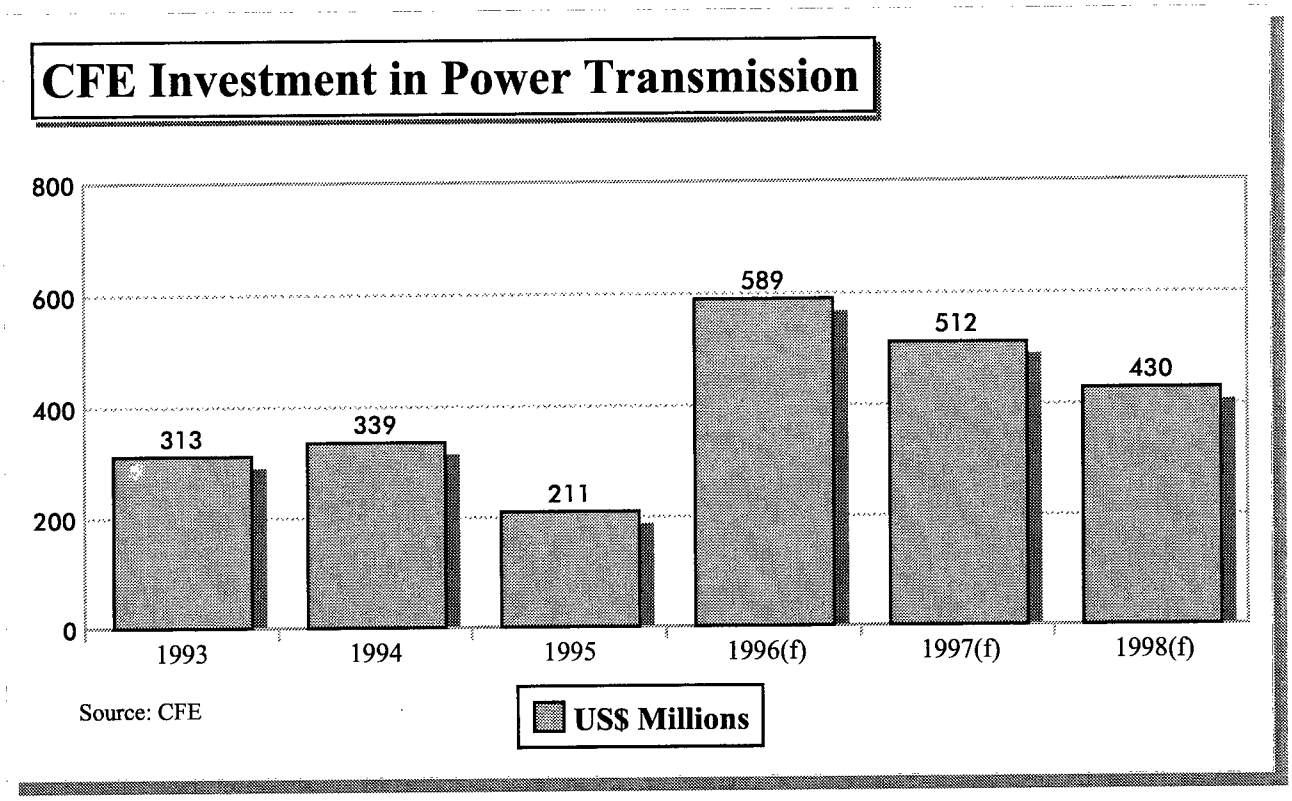


Distribution and Transmission

CFE operates the National Interconnected System which consists of a transmission grid of mainly 400, 230, and 115 kilovolts lines. The total length of distribution and transmission lines owned and operated by CFE is 343,877 kilometers. Of this total 18 percent are dedicated to transmission and 82 percent to distribution. Only Baja California is not part of the national grid.

Financial constraints at CFE have led to underinvestment in transmission in recent years. There now

exists a backlog of transmission projects necessary to meet new demand and fully take advantage of new power plants coming on line. CFE has established an investment program that envisions substantial increases in transmission capacity.



Under Mexican law, transmission and distribution of electric power is the sole prerogative of the Mexican government. In order to meet its investment targets, CFE is seeking to attract private capital into its transmission program through the use of BLT contracts for major construction projects. This program began before the economic crisis and is expected to return to full swing during the latter half of 1996.

PRICING AND REGULATIONS

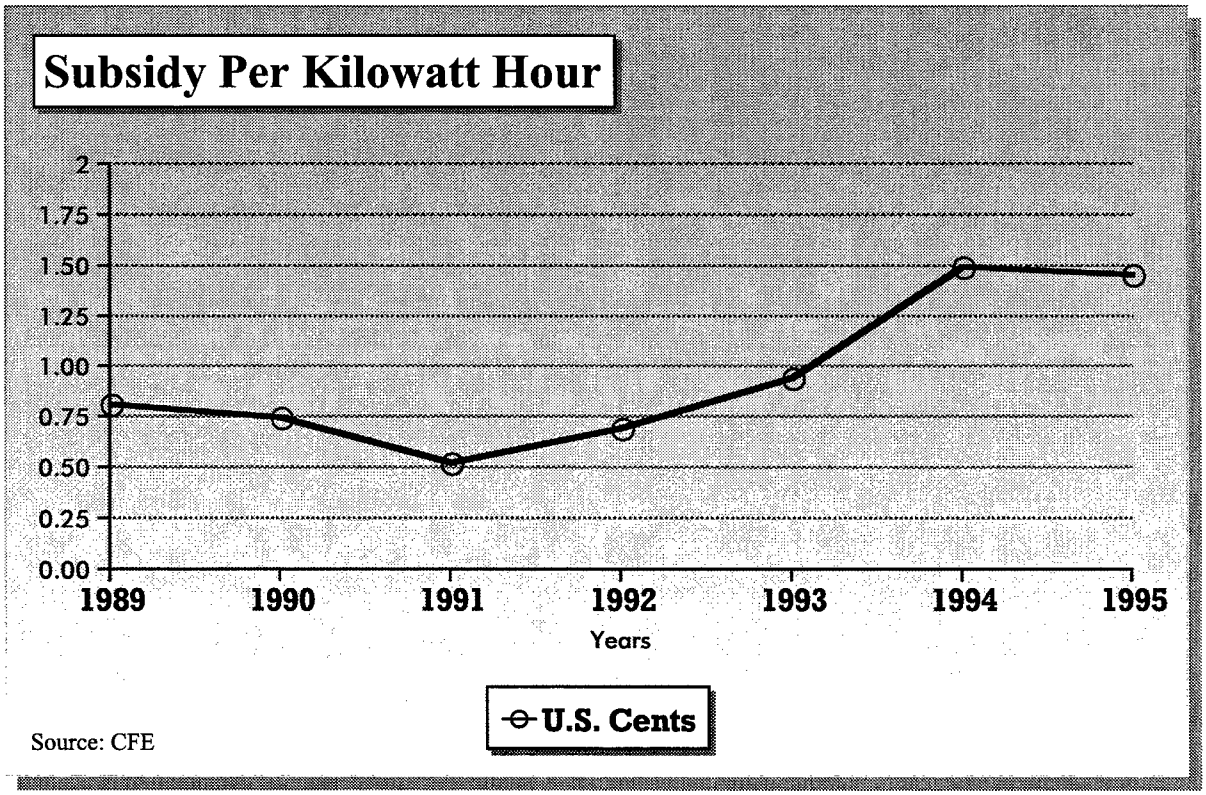
Pricing

Subsidized electricity pricing in Mexico and the lack of a stable pricing structure has been one of the largest impediments to the development of private power — especially cogeneration and self-supply in Mexico. The Mexican Government is developing a policy to restore pricing to reflect actual costs.

The graph below shows how Mexican electricity tariffs have changed over time and assumed a general

downward trend late in 1993 as a result of increased subsidies provided to consumers. Note that this came at a time when overall subsidies in Mexico were being drastically reduced.

Electricity rates in U.S. dollar terms have been extremely low in Mexico following the peso's devaluation, since electricity prices were not adjusted accordingly in peso terms. The government has implemented a gradual plan of price increases, but in general industrial electricity prices remain at historic lows in Mexico and well below levels that make industrial cogeneration or self supply viable.



A working group has been formed within the Secretariat of Finance to come up with a formula to return electricity tariffs to levels that reflect the true costs of generation and transmission.

Regulatory Framework

Private and foreign participation in Mexico's electric sector was made possible by amendments made to the Mexican Electric Energy Public Service Law in May of 1992. Under these amendments, private sector participation was allowed in electric power generation under the following situation:

- Power cogeneration with the sale of energy to industrial users.

- Power generation by a company for its own exclusive use.
- Power produced for export.
- Power produced for exclusive sale to CFE in response to requests for new capacity (i.e. Independent Power Producers).

The law also required that CFE, the Secretariat of Energy, and the National Energy Regulatory Commission set forth regulations for the purchase of up to 20 megawatts of power from private firms involved in either cogeneration or self supply, as well as regulations for back-up power and wheeling.

Although these regulations were implemented slowly, in 1996 the first industrial cogeneration project was approved to start construction. This is the 120-megawatt Enertek project in Altamira sponsored by CSW and the Alfa group. This project also involves the first wheeling agreement with CFE to send power from the facility to other industrial plants in Nuevo León and Guanajuato.

Mexico's Electricity Sector has five major players:

Secretariat of Energy

The Secretariat of Energy is the primary policy-making authority in the energy sector. Among its most important functions are:

- Overseeing the activities of CFE and Pemex.
- Promoting private participation in the energy sector. The Secretariat of Energy recently established a special office of Investment Promotion.
- Granting concessions and permits.
- Making short, medium and long term plans for Mexico's energy sector.
- Regulating and establishing standards for energy production, selling, buying, and for overseeing quality control for the sector.

National Energy Regulatory Commission

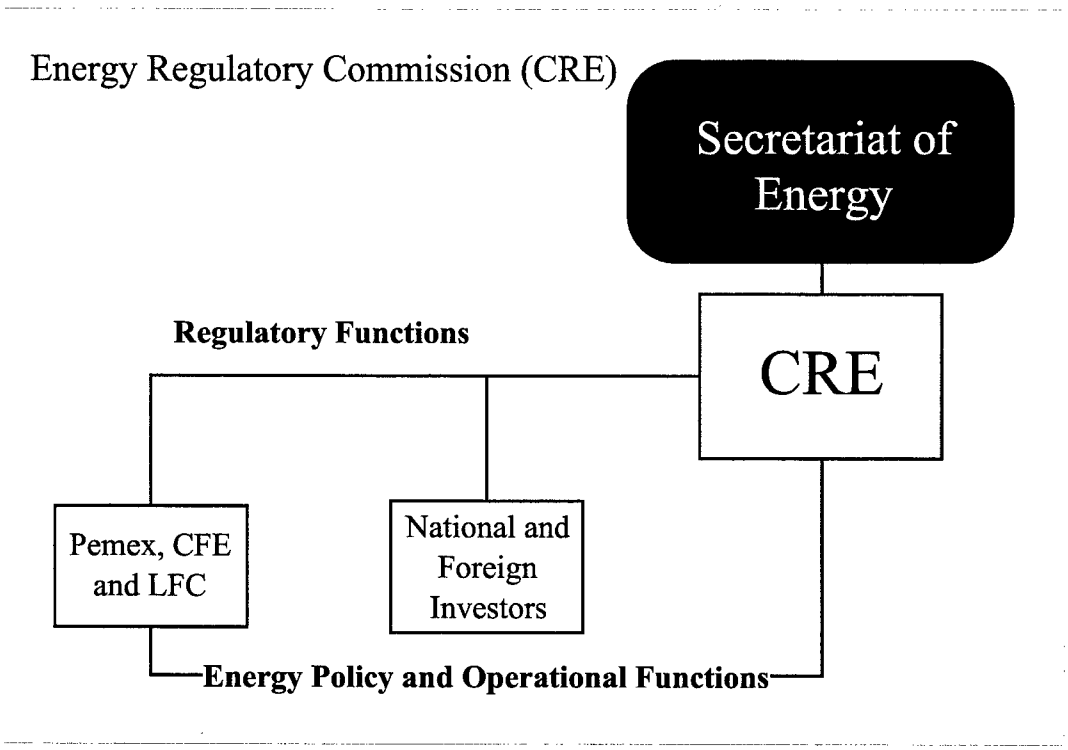
In 1995, Mexico established the National Energy Commission as an autonomous agency within the Energy Secretariat to centralize regulatory authority over development of the gas and electric power sectors. In many ways, the CRE functions as the U.S. Federal Electricity Regulatory Commission (FERC) in that its role is to be an impartial entity with a focus on issuing regulations that promote competition as well as arbitrate between private parties and government entities.

CRE objectives are to promote private and foreign investment in the energy sector by ensuring clear, transparent, stable, long term and equitable rules of the game outside of traditional political circles.

Although CRE is a small institution, it performs functions critical to creating business opportunities in the electric power sector. These include:

- Approving CFE's methodologies for wheeling power for private generators.

- Approving CFE's methodologies for buying power from private generators.
- Advising on the approval of permits for private generation.
- Serving as an impartial arbiter between private parties and government bodies on regulatory matters.



Federal Electricity Commission (CFE)

CFE is the sole national utility that has operational control over the generation, transmission and distribution of electricity. As mentioned, its monopoly over generation was ended by the 1992 reforms to the Energy Public Services Law. On an operational level, CFE will continue to be a central player in the expansion of Mexico's electricity grid and private and foreign investors will need to work with CFE to accomplish their goals.

CFE will continue to play a central role in system planning and thus far has been the entity directly responsible for issuing and overseeing bids for new capacity. CFE is also the entity that signs either the long term power purchase agreement or lease agreement with private developers. Industrial firms interested in cogeneration and self supply will deal directly with CFE on a number of key issues including back-up power services, wheeling, interconnection issues, and excess power purchases.

Compañía de Luz y Fuerza (CLF)

Compañía de Luz y Fuerza is primarily an electric power distribution company that supplies electricity to Mexico City and surrounding areas. It plays little policy role and is not involved in decisions regarding new capacity. It acts as a re-seller from CFE.

Pemex

Pemex's role in the electricity sector is lessening with the new constitutional amendment allowing private transportation and distribution of natural gas. Prior to this, the only supplier of fuel oil or natural gas in Mexico was Pemex, making Pemex an essential player in most private power projects. Pemex will continue to be the only supplier of fuel oil in Mexico.

Pemex has begun to participate in the energy sector liberalization by acting more and more like a private company. For example, for the first time Pemex is willing to negotiate long-term fuel contracts with private parties on power projects. Pemex has signed such a long-term agreement with Enertek on the 120-megawatt cogeneration facility in Altamira.

Secretariat of Finance

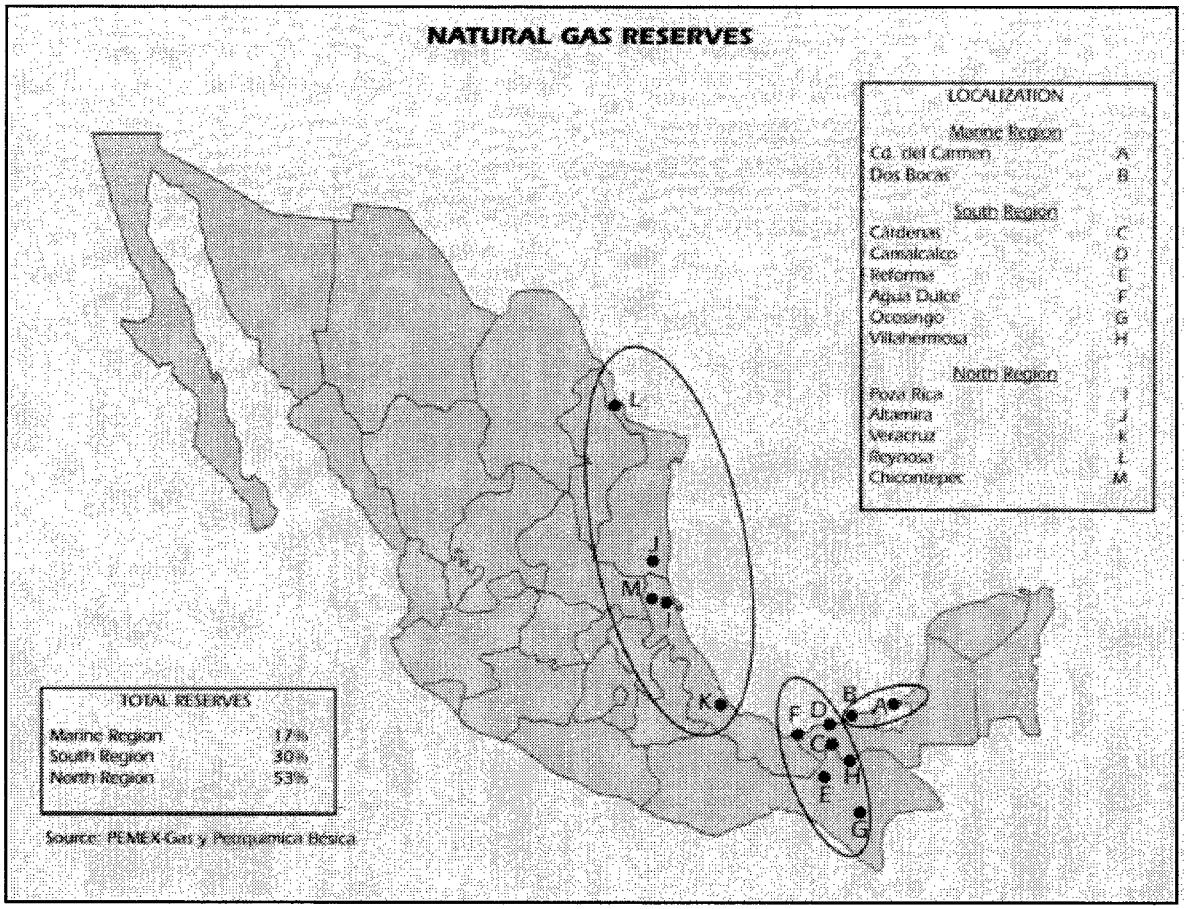
The Secretariat of Finance has two key roles in the energy sector. First, it sets electricity rates that directly impact the demand for self supply and cogeneration investment. Second, it plays a key role in determining the structure of future major thermoelectric units in Mexico by specifying whether they will function as IPPs or BLTs and what financial terms and guarantees will be offered.

NATURAL GAS

New Opportunities

In May of 1995, in an effort to expand the role of natural gas in the Mexican energy mix, the Mexican congress approved sweeping changes to Article 27 of the Mexican Constitution to allow private participation in the storage, transportation and distribution of natural gas. Implementing regulations were issued in November 1995 and these set the basis for active private participation in natural gas.

The U.S. Embassy estimates that this will open up US$3.5 billion dollars of investment opportunities in Mexico's gas sector over the next four years. The Secretariat of Energy has set a target of raising the percent of gas in natural energy consumption from 37 percent to 53 percent. This implies raising production and consumption by almost 700 million cubic feet per day to reach a consumption level of 4.2 billion cubic feet per day.



To meet this goal, the Mexican government has encouraged private sector participation in the storage, distribution, and transportation of natural gas. Exploration and production of gas reserves remain under the sole purview of the Mexican government through Pemex. Natural gas can be freely imported into Mexico without permission. Although it currently carries a tariff of ten percent, this tariff is to decline to zero over time under NAFTA rules.

The industry will be regulated by the CRE. To engage in transportation, distribution or storage activities, companies must obtain a permit from the CRE. The CRE will set maximum rates for transportation, storage and distribution services for each type of service and customer. These rates can include incentive factors and also can be adjusted for inflation. Rates are to be reviewed every five years by the CRE and the permittee. Private parties are free to negotiate their own tariffs with permittees as long as they fall below the maximum tariff established for that component of service. All services must be offered to consumers on an unbundled basis with no cross subsidies, that is, consumers are billed with a separate approved charge calculated for each service component provided.

Both transportation and storage permits are granted when an application demonstrates technical competence. These permits, however, do not confer exclusivity. Also, both transportation and distribution are considered public benefits and CRE can be petitioned to exercise eminent domain, as required.

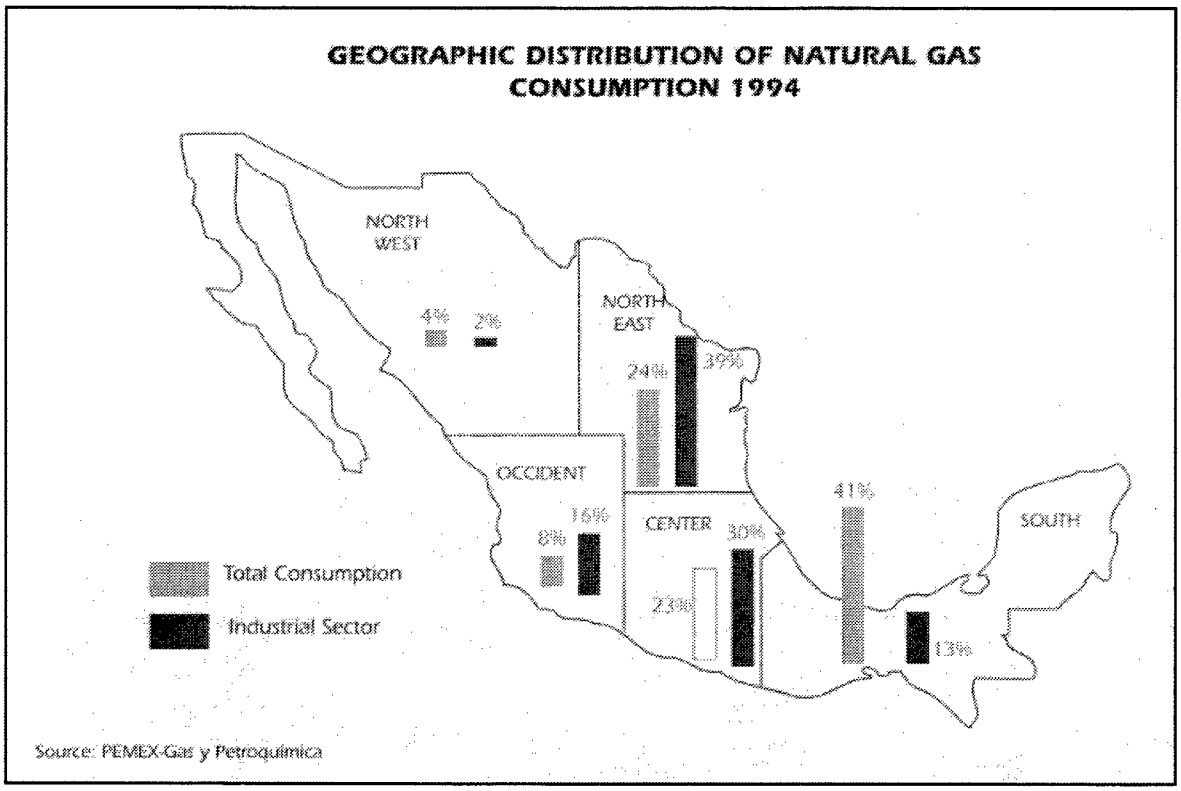
Mexican foreign investment law is in effect in this sector. This limits foreign participation in the construction of pipelines to 49 percent, although this can be exceeded with permission from the Foreign Investment Commission. There is no limitation on foreign ownership of gas systems.

Distribution permits are granted after a bid procedure which begins when a company expresses interest in providing distribution services within a given geographic zone established by the CRE. This interest is published in the Diario Oficial and if other qualified firms express interest then a bid is established. If no other firms express interest, then the concession is granted after a detailed technical review. To date, the CRE has established the following zones:

1. Mexicali	Awarded on August 13, 1996 to a binational consortium consisting of Próxima, San Diego Gas and Electric, and Pacific Enterprises' Southern California Gas Company.
2. Chihuahua-Delicias-Cuáuhtemoc-Anahuac	established May 1996
3. Mexico City	established June 1996
4. Querétero	established June 1996
5. Tampico-Altamira-Ciudad Madero	established June 1996
6. León-Guanajuato, Celaya and Irapuato	established June 1996
7. Cuernavaca	established June 1996
8. Hermosillo	established June 1996
9. Torreón, Gómez Palacio, Ciudad Lerdo	established June 1996
10. Pachuca	established June 1996
11. Toluca and surrounding areas	established June 1996
12. Tijuana, Rosarito, Ensenada, and Tecate	established June 1996

A distribution permit does establish exclusivity within the zone for a period of 12 years, in order to provide an incentive to invest in a strong distribution system. This permit does not establish exclusivity to sell within the zone however. Any user can contract with any supplier for natural gas. Regulations provide for open access to distribution lines according to maximum rates set by the CRE and for commercial bypass by major gas consumers that wish to build their own transportation system.

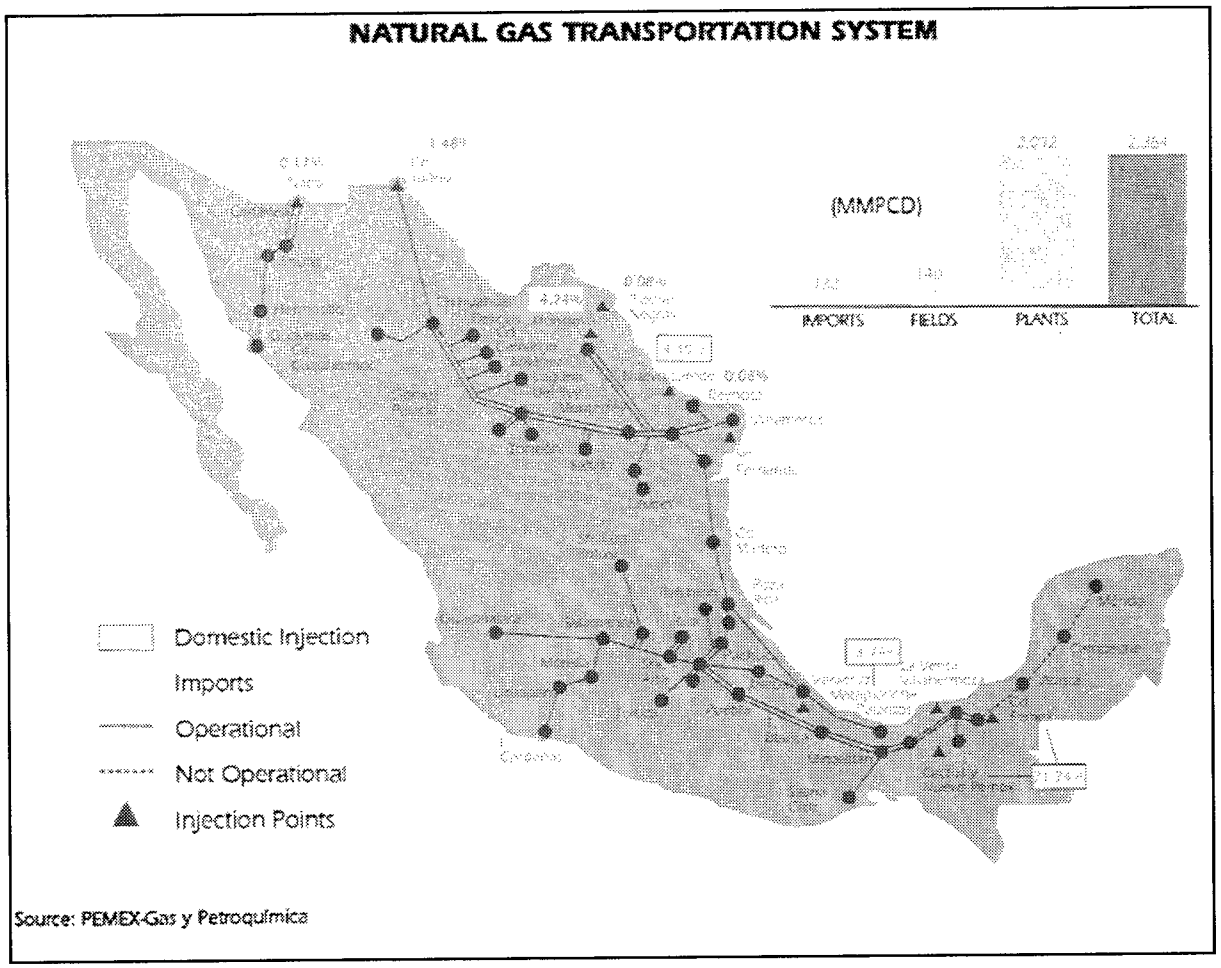
Generally, a company cannot hold a permit for both transportation and distribution within the same zone. However, special exemptions can be granted through the CRE.



Under this new regime, Pemex is automatically granted a provisional permit for its gas transportation services. Pemex must submit a request for a definitive permit within eight months and comply with the same regulatory provisions as private providers. Pemex is also required to provide open access to its transmission system. This access is to be provided as soon as is technically feasible, and no longer than 24 months from the effective date of the new regulations.

Existing Infrastructure

Pemex has never focused on exploration or distribution of natural gas and therefore the country has never fully realized the potential of natural gas as a clean energy source in Mexico. A majority of the country's 3.6 billion cubic feet per day produced is associated with oil production. 62 percent of this total gas is transformed into dry gas and the rest into other products. Of Mexican gas reserves, 53 percent are located in the Northeast Region, 30 percent in the Southeast Region and 17 percent in the Gulf Region. It is estimated that at 1994 consumption levels, Mexico's reserves have between 40 to 60 years of use remaining.



In 1994, Mexico imported about 6 percent of its natural gas consumption. The government's overall goal is to increase production to exceed the increase in expected consumption so that Mexico actually becomes a natural gas exporter.

Pemex's pipelines cover about 10,000 kilometers but are heavily concentrated in meeting the needs of its own plants, CFE plants, and a few large industrial customers. Currently most of the transportation network is underutilized and therefore should be able to supply gas for expanded distribution networks.

A key aspect of Mexico's natural gas reforms is to stimulate the use of natural gas as a clean alternative. Currently, CFE, which consumes 20 percent of the country's total, is planning an ambitious program of new gas fired plants and conversions of oil-fired plants to natural gas. While industry consumes 35 percent of total gas, this consumption is highly concentrated and can be greatly expanded. Currently, only 9 companies in Mexico account for 45 percent of total industrial gas consumption.

PETROCHEMICAL SECTOR

In November of 1995, the Mexican government issued its General Guidelines for Privatization of the Secondary Petrochemical Industry. Under these directives, facilities producing secondary chemicals, as defined under Mexican law, would be privatized with Pemex retaining a minority share during the first five years of transition to ensure a level of continuity.

The government announced that it would initiate this effort with the privatization of ten major Pemex complexes consisting of 61 separate facilities. The U.S. Commercial and Foreign Service in Mexico estimated that this would result in approximately three billion dollars of new investment. On this list were:

1. Cosoleacaque Complex — Carbonic Anhydride, Ammonia, Paraxylene, Hydrogen, Ammonia Sulfate.

2. Cangrejera Complex — Pentanes, Ethylene, Xylenes, Toluene, Benzene Polyethylene L.D., Paraxylene, Ethylbenzene, Oxygen, Styrene, Acetaldehyde, Ethylene Oxide, Aromatic Solvent, Orthoxylene.

3. Morelos Complex — Ethylene, Oxygen, Ethylene Oxide, Ethylene Glycols, Acetaldehyde, Polyethylene, H.D. Polypropylene, Acrylonitrile.

4. Pajaritos Complex — Perchloroethylene, Vinyl Chloride, Ethylene, Rafinado II, Chloride Acid, Methanol, Acetaldehyde.

5. Salamanca Complex — Carbonic Anhydride, Ammonia, Isopropanol.

6. Texmelucán — Methanol, Petrochemical Polymer, Acrylonitrile, Dodecylbenzene, Propylene Tetramer.

7. Camargo Complex — Carbonic Anhydride, Ammonia

8. Escolin Complex — Ethylene, Polyethylene H.D., Polyethylene L.D.

9. Tula Complex — Acrylonitrile

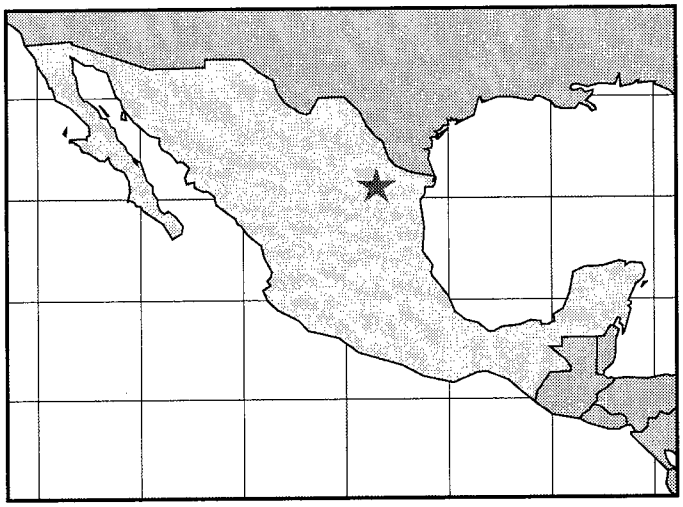
10. Reynosa Complex — Ethylene, Polyethylene L.D.

In November of 1995, the government also announced the first bid for the complex at Cosoleacaque. In March, the government released bid information for two new complexes, also announcing that it was invoking a NAFTA provision that would allow the Mexican government to require that these facilities be majority-owned by Mexican investors. However, Cosoleacaque would continue as an open bid without nationality restrictions.

Although the original calendar which called for privatization of Cosoleacaque to conclude by April 26, 1996 was not met, a new schedule has been released. This privatization has encountered significant legal and political obstacles such opposition from labor unions. At this point, there is a good chance that the original bid for Cosoleacaque will be declared void, leaving the government the choice of re-issuing new bids or allowing the privatization program to expire. However, the Secretariat of Energy continues to insist that the privatization program is in the country's interest. The outcome of these political battles over privatization is unclear.

Energy/ Power Generation

Alfa-PEGI Industrial Cogeneration Project



Project Summary

Project No:	**ENE-01**
Subsector:	**Power Generation**
State/Region:	**Nuevo León**
Project Cost:	**$400 million**
Export Potential:	**$300 million**
Owner:	**Alfa-PEGI**

Alfa-PEGI is the oldest functioning privately owned and operated cogeneration system in Latin America, having supplied electricity and steam to industrial consumers in Monterrey for over 50 years. Currently, Alfa-PEGI produces 177 megawatts of electricity transmitted through a private 60-kilometer grid to 25 industrial consumers. Alfa-PEGI also maintains its own infrastructure for water treatment, water supply, and natural gas which is supplied by a pipeline from Reynosa, Tamaulipas. In 1994, U.S.TDA provided funding for a study on the modernization of the PEGI cogeneration system.

Technical Description

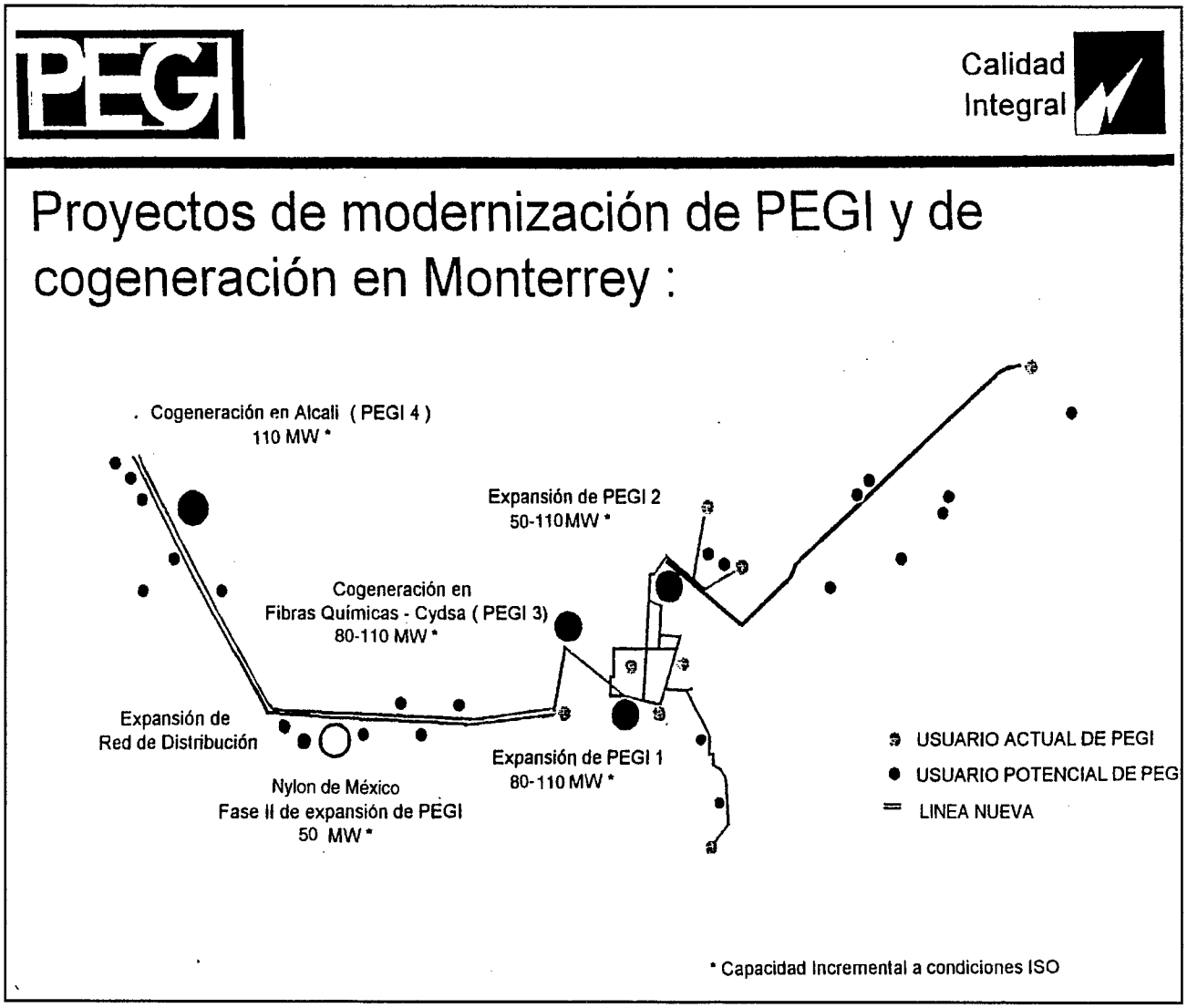
The project will proceed in stages that will include a repowering of two existing cogeneration facilities and the construction of three new facilities. In total, the project consists of the following:

Unit	Scope	Additional Capacity (MW)
PEGI I (Monterrey)	Repowering	80-110
PEGI II (San Nicolás)	Repowering	50-110
PEGI III (Monterrey)	New Cogeneration	80-110
PEGI IV (Villa de García)	New Cogeneration	110
PEGI V (Santa Catarina)	New Cogeneration	50
Total New Capacity		370-490

The project will also expand existing transmission and gas lines.

Site

PEGI's current generation capacity and transmission grid are located in the industrial zone of metropolitan Monterrey. The grid has a breadth of 60 kilometers and crosses the cities of Apodaca, San Nicolás and Monterrey. The expansion will include the industrial zones in Santa Catarina and Villa de García.



Project Status

Alfa-PEGI is in the process of optimizing the internal configuration and phasing of this project. The project will begin with repowering the plant and will continue with development of new cogeneration sites.

The project received its cogeneration permit from the Secretariat of Energy in June of 1996.

Alfa-PEGI will issue an RFP in the second half of 1996 for an EPC contractor and for a supplier of natural gas. Construction is estimated to begin in early 1997. Phase 1 is scheduled for completion in 1998 and Phase II for completion in 1999 to 2000.

Equipment & Services Demand

This is a very ambitious project with a high demand for services and equipment related to electric generation, transmission and the supply of natural gas. Opportunities exist for:

- Financing
- Gas and Steam Turbines
- Heat Recovery Steam Generators (HRSG's)
- Substations
- Transformers
- Distributed Control Systems
- Gas Pipe
- Compressors
- Boilers
- Feedwater Boiler and Circulating Pumps
- Wastewater Treatment Systems
- Conceptual, Basic and Detailed Engineering Services
- Construction Management

Nature of Demand

Alfa-PEGI will expand service from its existing base of 25 industrial consumers to 47. Consumers are major Mexican firms with strong balance sheets and strong dollar revenues. Among these major consumers are leading industrial firms such as Alfa, Axa, Cemex, Cydsa, Femsa, Gidusa, Orion, Peñoles, Ucar, and Vitro.

This project is driven by continued industrial expansion in the Monterrey area. Electric power con-

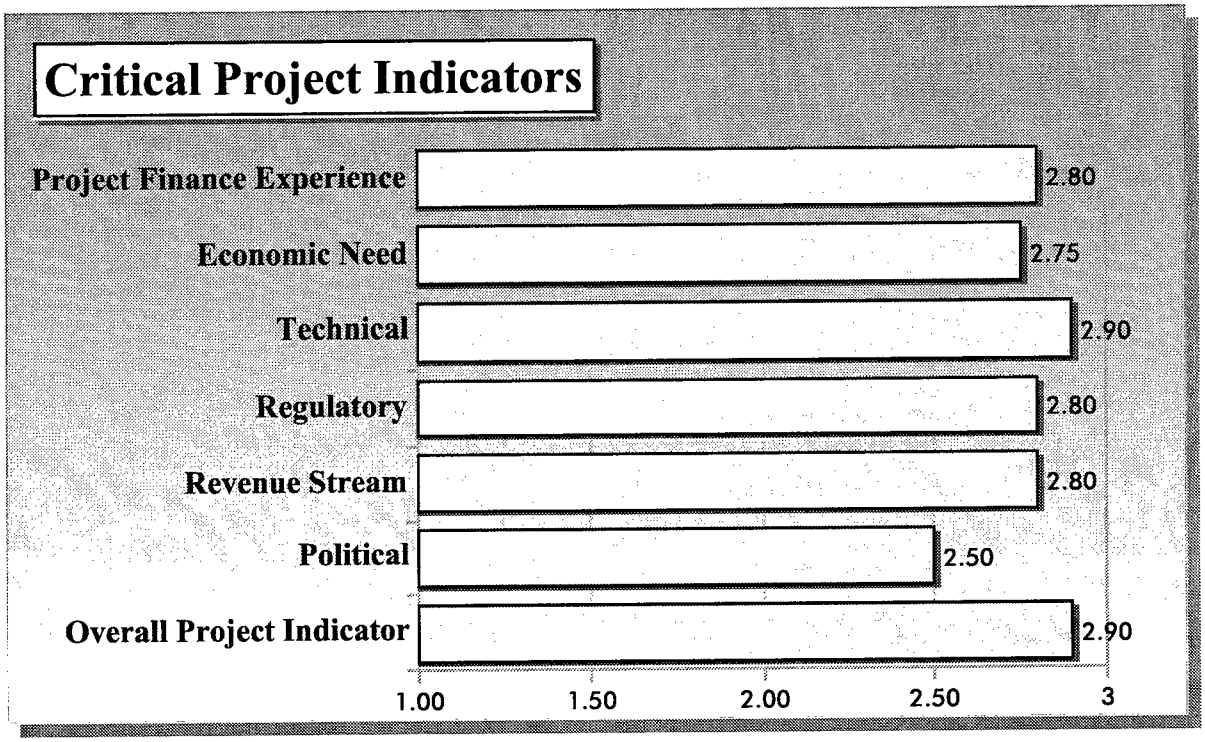
sumption grew in Monterrey in 1995 by 7 to 8 percent despite the overall economic recession during that year. However, only half of the 1,800 megawatts consumed in the Monterrey area is generated within the region — and consumption in Monterrey is expected to grow by another 1,400 megawatts over the next nine years. Therefore, expansion of Alfa-PEGI is an important component in meeting this growth in demand. Demand for this project is also enhanced by expanding thermal requirements of several major factories in the zone.

Project Assessment

As yet no firm financial structure exists for this project. Alfa-PEGI expects to establish long-term project financing through a variety of sources including multilateral banks, development banks and commercial funds.

- Overall, we evaluate this to be a highly feasible project with many strong characteristics from a financial perspective. These include:
- A diversified set of industrial offtakers with strong balance sheets and strong dollar-denominated revenues.
- Expected high demand growth for power in the region.
- Ready access to fuel supply including the potential to import U.S. gas.
- The existence of infrastructure that allows the project independence from CFE and Pemex if necessary — i.e. the project will not require CFE wheeling, backup power agreements or Pemex fuel supply agreements.
- The long and successful history of Alfa-PEGI — demonstrating technical, financial and operational capacity in managing a multi-user cogeneration facility.

Critical Project Indicators



Key Decision Makers

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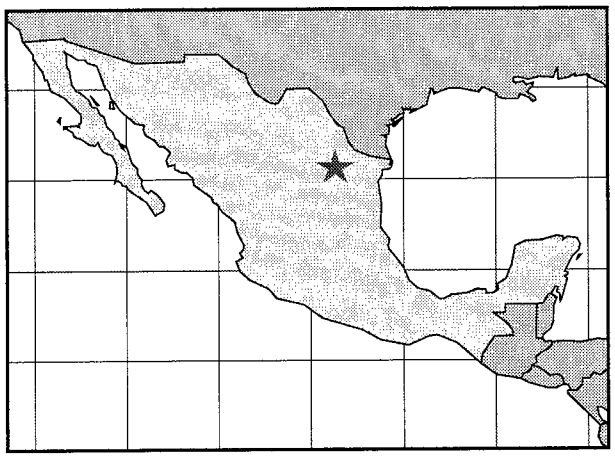
Energy/ Power Generation

Monterrey Gas-Fired Power Project



Project Summary

Project No:	**ENE-02**
Subsector:	**Power Generation**
State/Region:	**Nuevo León**
Project Cost:	**$450 million**
Export Potential:	**$337 million**
Owner:	**CFE**

Late in 1996, in order to meet increasing demand in the industrial state of Nuevo León, the Secretariat of Energy will issue a request-for-proposals for two 225 megawatt units.

Technical Description

The facility will consist of two 225 megawatt gas-fired combined cycle units to supply a total of 450 megawatts. The plant will interconnect with the Monterrey ring transmission grid.

Natural gas is readily available in Monterrey, as it can either be imported from the U.S. or supplied through Pemex pipelines terminating in Monterrey from production fields spanning the Gulf Coast.

Site

The plant will be located in Huinala, Nuevo León, which is located near the international airport.

Project Status

The request for bids is expected between late October and mid November 1996, with the contract to be awarded in mid to late 1997. The facility is expected to begin commercial operations in the year 2000.

The Secretariat of Energy has not made a final determination as to whether the plant will be bid under a Build-Lease-Transfer (BLT) or an Independent Power Producer scheme.

Equipment & Services Demand

Equipment and services for the facility will include:

- Gas and Steam Turbines
- Compressors
- Feedwater and Circulating Pumps
- Conceptual, Design and Basic Engineering
- Construction Management
- Water Systems
- Air Pollution Control Systems
- Heat Recovery Steam Generators
- Electric Switchgear
- Distributed Control Systems

Nature of Demand

Monterrey is a major industrial center for all of Mexico and home to many of the country's leading heavy industrial groups. The region is critical to the country's industrial output and it is a leading generator of industrial exports.

From 1984 to 1995, electric power demand grew by 7.7 percent on an annual basis and is expected to continue to increase by six percent over the next eight years. Even during the recessionary year of 1995, electric demand in Nuevo León grew by over seven percent.

Grupo Alfa, a private Monterrey conglomerate, estimates that the Nuevo León area will require an additional 1400 megawatts over the next nine years. Currently only about one-half of the region's 1800 megawatts of demand is produced within the region.

Project Assessment

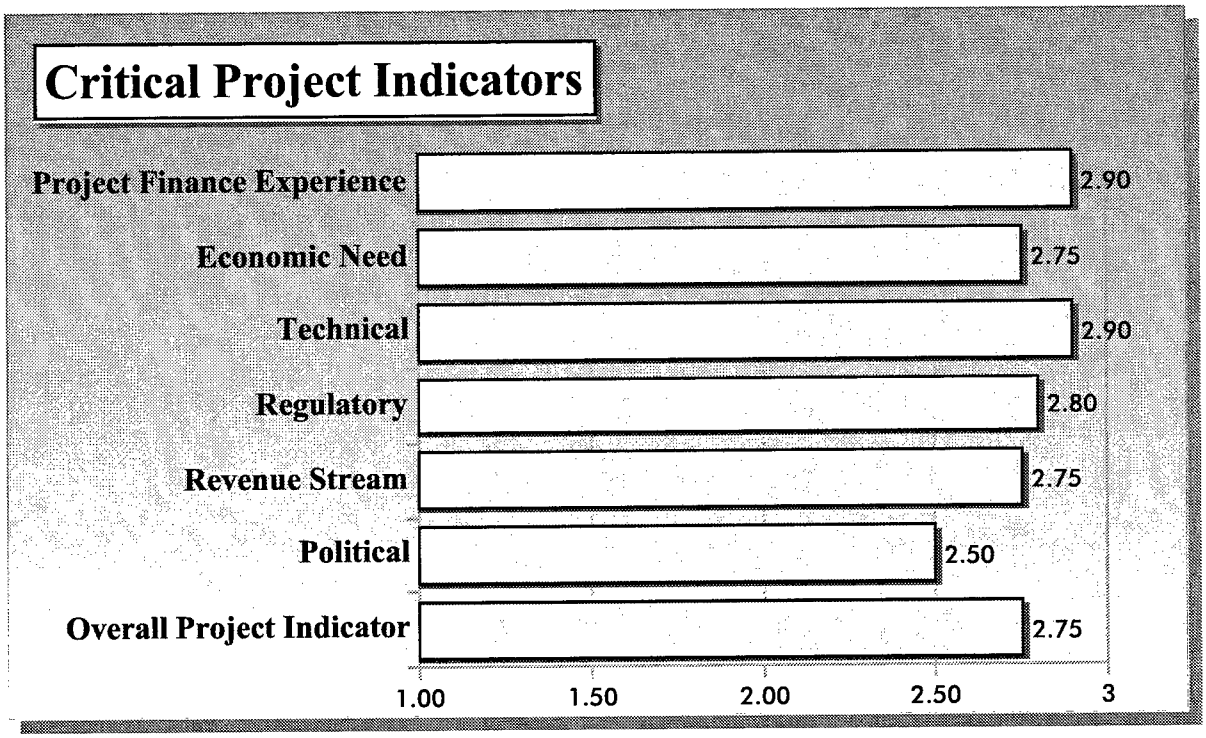
Whether the project is structured as a BLT or IPP it will involve a long term commercial contract with CFE. The recent financial closure of the Samalayuca project indicates that developers and equipment suppliers are willing to accept the risks that CFE credit represents.

Gas is readily available in Monterrey and the facility will have the flexibility of either importing gas or

buying domestic gas through Pemex.

The project has strong economic drivers because of the region's importance to Mexico as an industrial center. The project is expected to be necessary even if private sector plans emerge to build new cogeneration production capacity in the region.

Critical Project Indicators



Key Decision Makers

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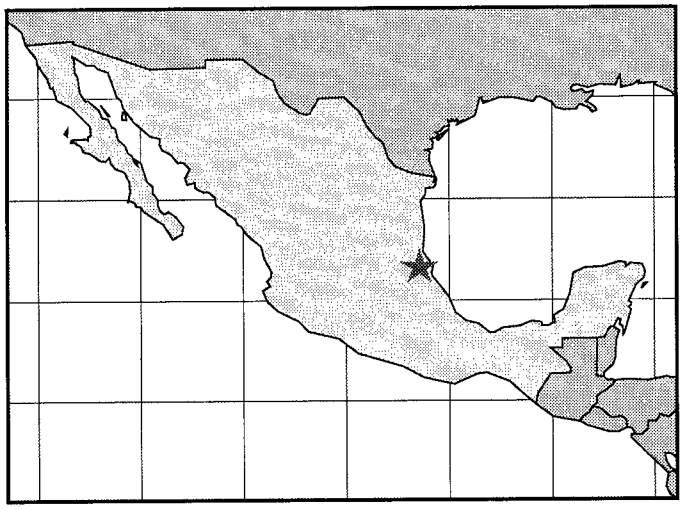
Energy/ Power Generation

Enertek Industrial Cogeneration Project



Project Summary

Project No:	**ENE-03**
Subsector:	**Power Generation**
State/Region:	**Tamaulipas**
Project Cost:	**$55 million**
Export Potential:	**$40 million**
Owner:	**Enertek S.A. de C.V.**

Enertek is a joint venture between Alpek, the chemical subsidiary of Grupo Alfa, and the U.S. firm CSW International, the non-regulated subsidiary of CSW--the largest utility in Texas. Enertek recently received all necessary permits and signed contracts to build a 120 megawatt cogeneration project. Construction began in July, 1996. This will be the first industrial cogeneration project to begin construction under the recent reforms of Mexican electricity law.

Technical Description

The plant, a 120-megawatt gas-fired cogeneration facility, will provide 800,000 pounds of steam per hour and electricity to the Altamira industrial complex together with Alfa facilities in other Mexican states. In total, the facility will supply power to at least ten major industrial consumers.

The project will involve the construction of a cogeneration facility with an auxiliary boiler, five kilometers of gas pipeline, an internal transmission grid, and a main substation. Studies are already underway to determine the feasibility of expanding this plant to 450 megawatts to take advantage of growing industrial demand.

ICA-Fluor Daniel has been selected to provide Engineering-Procurement-Construction (EPC) services. Opportunities still exist for providing equipment and services to the project.

The plant will be privately owned and operated by Enertek. Alfa has over 50 years of experience in

owning and operating industrial cogeneration projects as a result of its experience with the Alfa-Pegi project in Monterrey.

Site

The plant will be located in the industrial zone of Altamira in the state of Tamaulipas. It will be located adjacent to Alfa's Petrocel chemical facility. Because of recent modernization, growing trade ties and the general economic dynamism of the region, this location offers a strong base for development.

Project Status

Plant construction began in July of 1996 and has received bridge financing for construction. The project has already achieved the following milestones:

- Long term fuel supply contract with Pemex.
- Long term interconnection contract with the Federal Electricity Commission (CFE), Mexico's national power utility, to provide back-up power and wheeling to Alfa facilities outside of Altamira.
- Power and steam purchase agreements with consumers.
- EPC contract with ICA-Fluor Daniel.
- Received a permit by the Federal Energy Regulatory Commission (CRE) to cogenerate.
- Commercial operation is expected to begin in the first quarter of 1998.

Equipment & Services Demand

Opportunities exist for providing financing, electricity and steam generation equipment, gas distribution and electrical transmission equipment. Specifically, the plant will require:

- Gas and Steam Turbines
- Main and Auxiliary Boilers
- Water System Equipment

- Gas Compressors
- Heat Recovery Steam Generators
- Boiler Feed and Circulating Water Pumps
- Transformers
- Electrical Substations
- Distributed Control Systems

Nature of Demand

Altamira is one of four major industrial zones in Mexico and a major site for Mexico's chemical and petrochemical facilities, which are attracted by fuel availability in the region. Overall demand for new generation in the region is forecast to be 6 percent per year.

The offtakers of the project will include a number of major chemical firms including several now expanding that will require additional steam and power. The offtakers participating will benefit from reduced prices of steam and electricity--due to the inherent thermal efficiencies of cogeneration--versus those forecast from CFE. These include:

- Petrocel (DMT Producer — already forecasting US$450 million in investment in new plants)
- Temex (DMT/PTA — one of the largest producers in world)
- Indelpro (Polypropylene — Alfa and Montell — new plant)
- Hercules (Polypropylene)
- Pecten (PET — owned by Shell)
- Polioles (Petrochemicals — Alpek and BASF)
- Univex (Caprolactum)
- Fibras Químicas (Synthetic Fibers)
- Nylmex (Synthetic Fibers— Alfa and Dupont)

Enertek is already in the process of studying the feasibility of expanding the project to 450 megawatts by the year 2000.

Project Assessment

1. Power purchase agreements are in place. The project's power and steam offtakers are major multinational chemical and petrochemical facilities with strong balance sheets. In addition,

many have strong hard currency cash flow from exports, insulating the project substantially from peso/dollar volatility.

2. Demand for power and steam in the zone is high and the offtakers are in agreement that private cogeneration will be competitive with long term CFE rates.

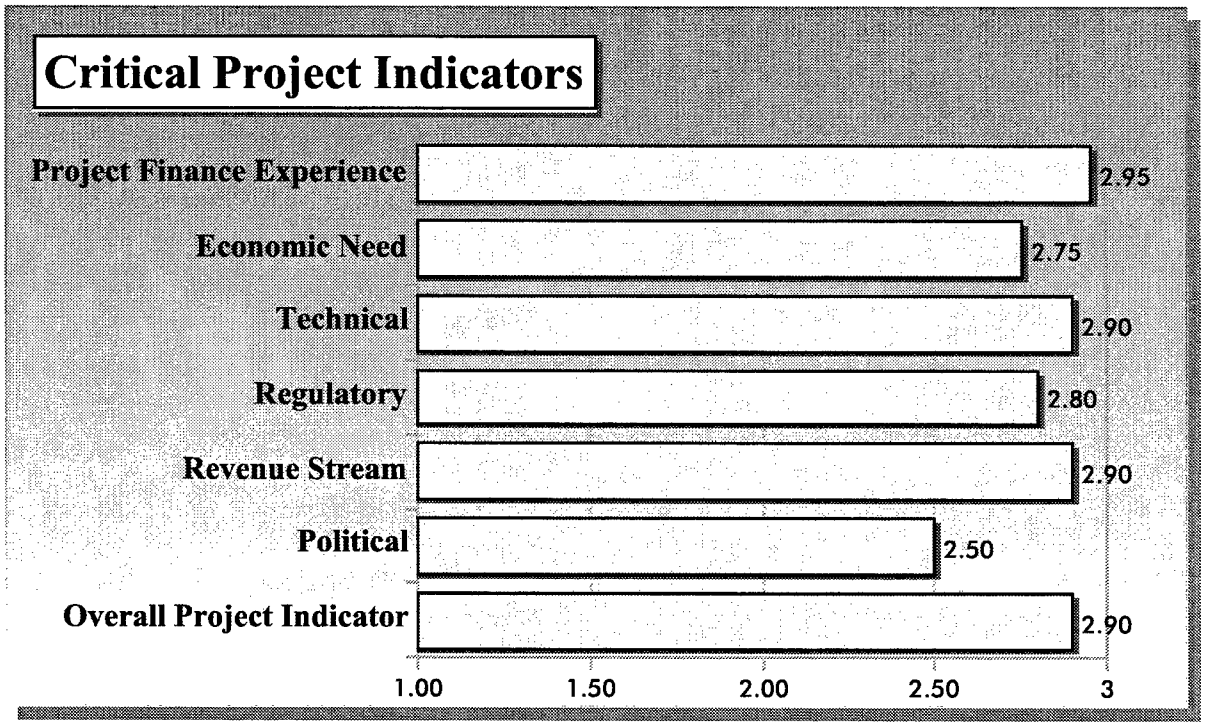
3. Contracts have been signed for fuel with Pemex and for back-up power, wheeling, and power purchase with CFE.

4. The owner and operator has a long and successful history of operating and owning cogeneration facilities in Mexico.

5. Natural gas infrastructure is already in place.

While Pemex and CFE long-term contracts are a new phenomenon in Mexico, Alfa's strong relationship with both of these entities mitigates the risk of non-performance on these contracts.

Critical Project Indicators



Key Decision Makers

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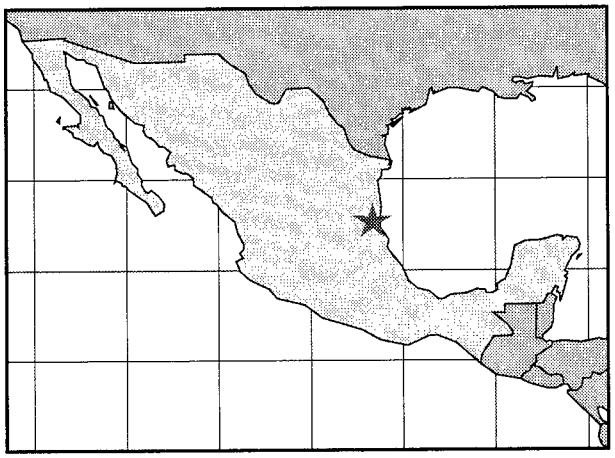
Energy/ Natural Gas

Tampico Gas Distribution Project



Project Summary

Project No:	**ENE-04**
Subsector:	**Natural Gas**
State/Region:	**Tamaulipas**
Project Cost:	**$49 million**
Export Potential:	**$13 million**
Owner:	**CRE**

As a result of new legislation passed in 1995, Mexico has opened natural gas transportation and distribution to private sector participation. The Secretariat of Energy has officially invited both foreign and domestic investors to present proposals to build and operate distribution systems in ten separate natural gas zones. These zones encompass the following areas:

Zone	Area
Bajío	León, Samalayuca, Celaya, Irapuato
Mexico City	Federal District and surrounding municipalities
Cuernavaca	Cuernavaca
Hermosillo	Hermosillo
La Laguna	Torreón, Coahuila, Gómez Palacio, Lerdo
NW Baja California	Tijuana, Rosarito, Ensenada, Tecate
Pachuca	Pachuca
Querétaro	Querétaro, San Juan del Río
Tampico	Tampico, Madero, Altamira
Toluca	Toluca and surrounding municipalities

Source: Secretariat of Energy

Technical Description

The project will consist of the design, construction, and operation of a gas distribution system for both residential and industrial use in the Tampico zone. Transmission will also be destined to CFE gas powered plants and existing plants which are being modified to use gas. The exact technical specifications are to be determined by the winning bidder, though the project must conform to international safety and environmental standards. Natural gas for the project will be supplied by Pemex, which retains exclusive control over the production of oil and gas.

The winning bidder will be granted a12-year operating permit. Specific terms will be determined following an analysis of the level of interest expressed by potential bidders. The project area has been defined and final project details will be made available by the end of 1996.

Site

The Tampico gas distribution zone includes the municipalities of Tampico, Madero and Altamira, all located on the Gulf Coast in the State of Tamaulipas.

Project Status

The Secretariat of Energy has officially announced the Tampico gas distribution project, and determined the exact geographic area which the project is to cover. The Secretariat is scheduled to define final project specifications by the end of 1996, after which the project should go to immediate bid.

Equipment & Services Demand

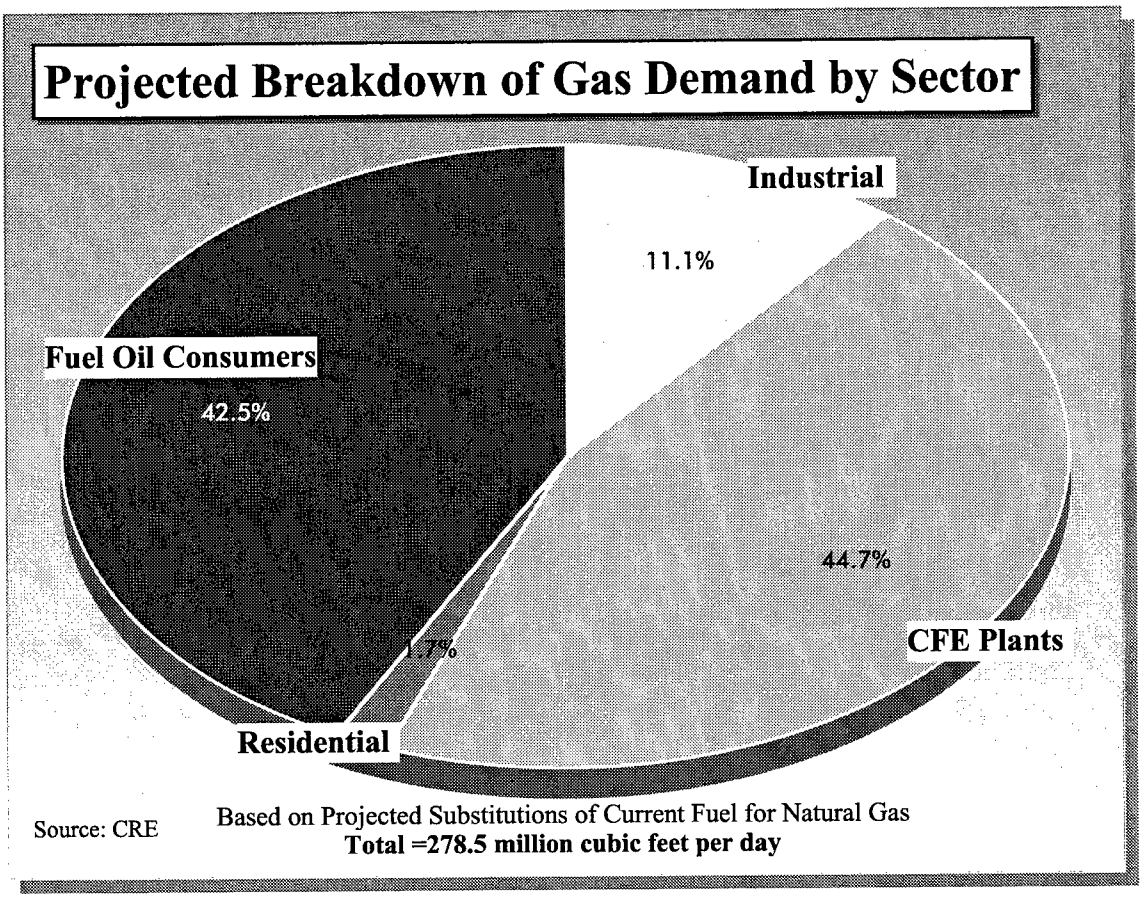
The project will require the following equipment and services:

- Steel and Polyethylene Piping
- Supervisory Control and Data Acquisition (SCADA) Systems
- Hardware and Software Billing Systems
- Gas Meters
- Compressors
- Pressure Regulating Stations
- Engineering and Construction Services
- Legal Services

Nature of Demand

Power consumption in the Tampico region is driven by both industrial and residential demand. The region has a population of approximately 600,000 and an industrial base which is regaining its strength following the recent economic crisis. Both sectors should benefit from the installation of a natural gas distribution system, provided that consumers can be convinced to switch to natural gas fuel.

Demand also exists based on CFE's new gas-fired, combined-cycle thermoelectric plants to be commissioned and with the conversion of existing power plants to natural gas. Projected consumption for the region is 278.5 million cubic feet per day as follows:



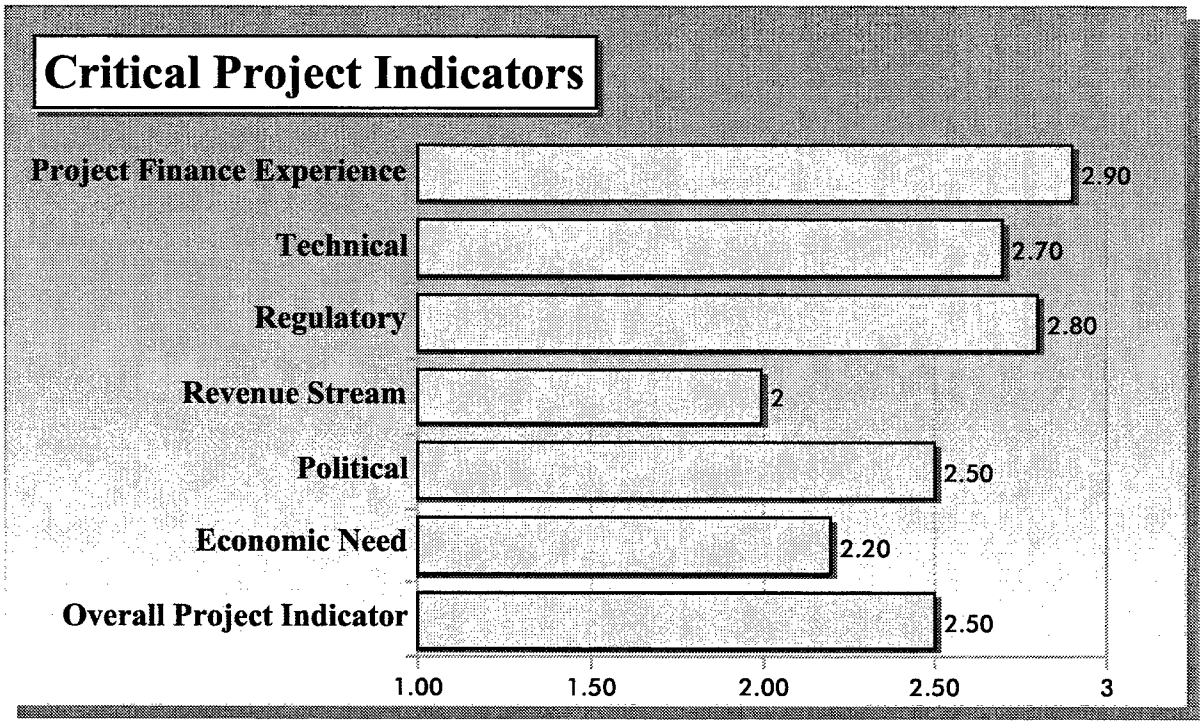
Residential demand is based on a daily household consumption of two cubic meters.

Project Status

Project sponsors will need to undertake an aggressive marketing effort to convince residential, commercial and industrial users to switch or choose natural gas over existing fuels. The environmental benefits of natural gas are not as important in Tampico as they are in the Mexicali and Mexico City zones. Natural gas prices will fluctuate since Pemex sets its prices based on a basket of international gas prices. Natural gas will be competitive against some fuels currently in use.

Given the gas distribution system is located in an urban area that will primarily use existing public rights of way, it is not anticipated that right of way issues will negatively impact the project. Under the natural gas regulations, the CRE can declare rights of way across private lands, but this authority has yet to be tested under the new program. Because of the urban environment, it is unlikely that these will be problematic. However, this project will involve peso revenue streams for a dollar denominated commodity, which could cause payment difficulties in the result of currency fluctuations.

Critical Project Indicators



Key Decision Makers

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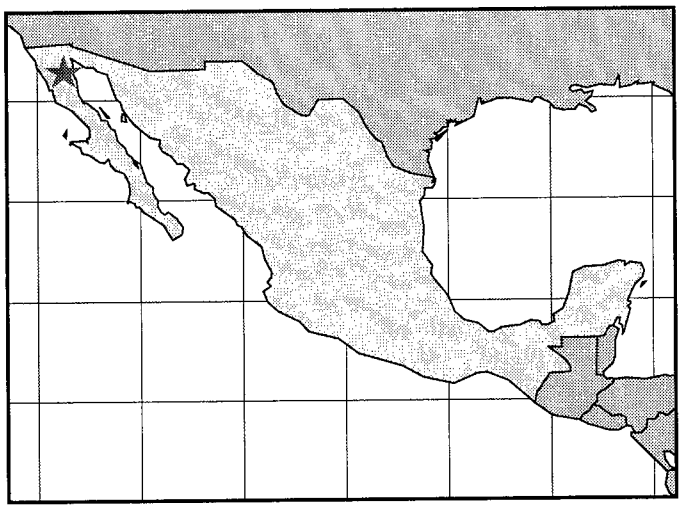
Energy/ Power Generation

Cerro Prieto Geothermal Project



Project Summary

Project No:	**ENE-05**
Subsector:	**Power Generation**
State/Region:	**Baja California Norte**
Project Cost:	**$120 million**
Export Potential:	**$80 million**
Owner:	**CFE**

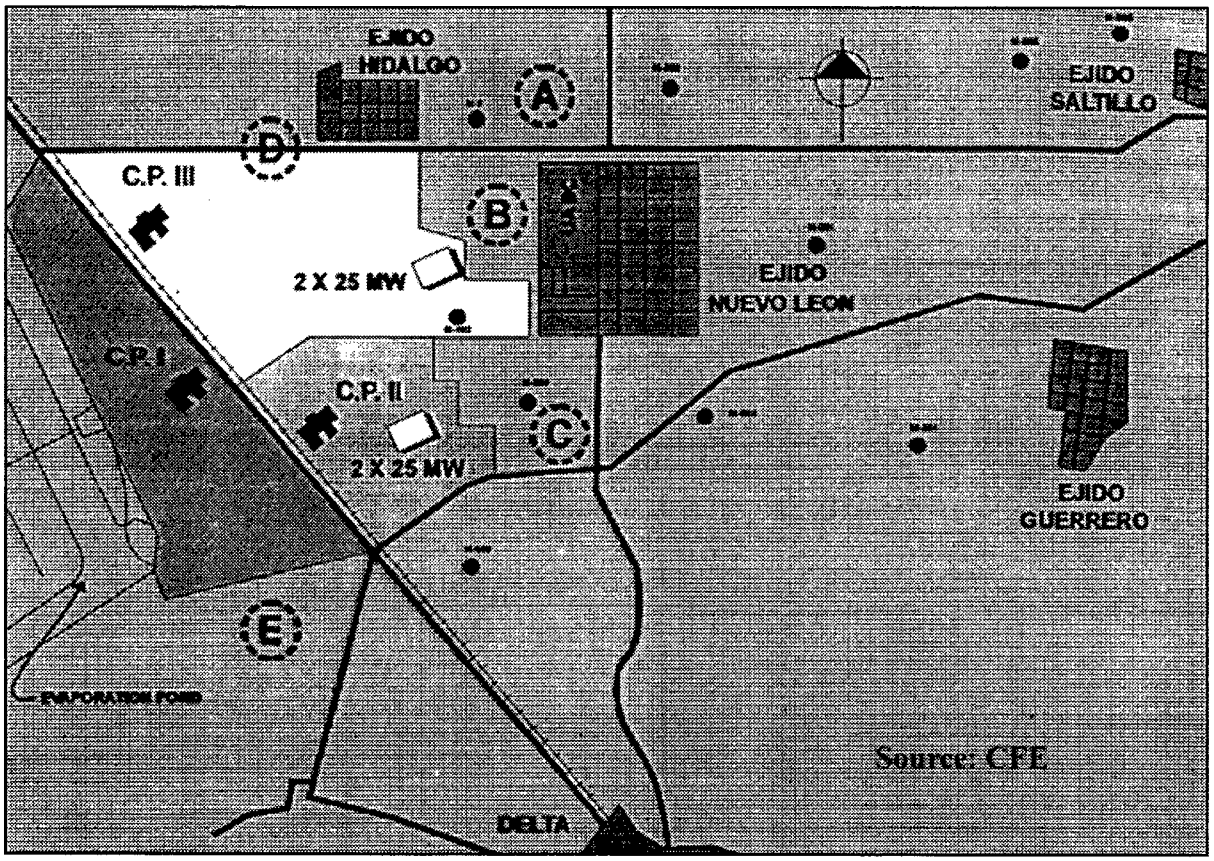
The Cerro Prieto geothermal field located in northern Baja California is productive, generating approximately 620 megawatts of electricity. Since 1973 the field has produced 56 trillion watt hours of electricity. The Mexican government plans to add 100 megawatts of capacity from the field over the next several years.

Technical Description

This current field has 132 production wells in operation and in 1995 produced 42 million tons of steam and 4700 gigawatts of electricity. The existing generating plants operate at an average factor of 88.6 percent. It is estimated that the total additional potential of the field is between 160 to 280 megawatts.

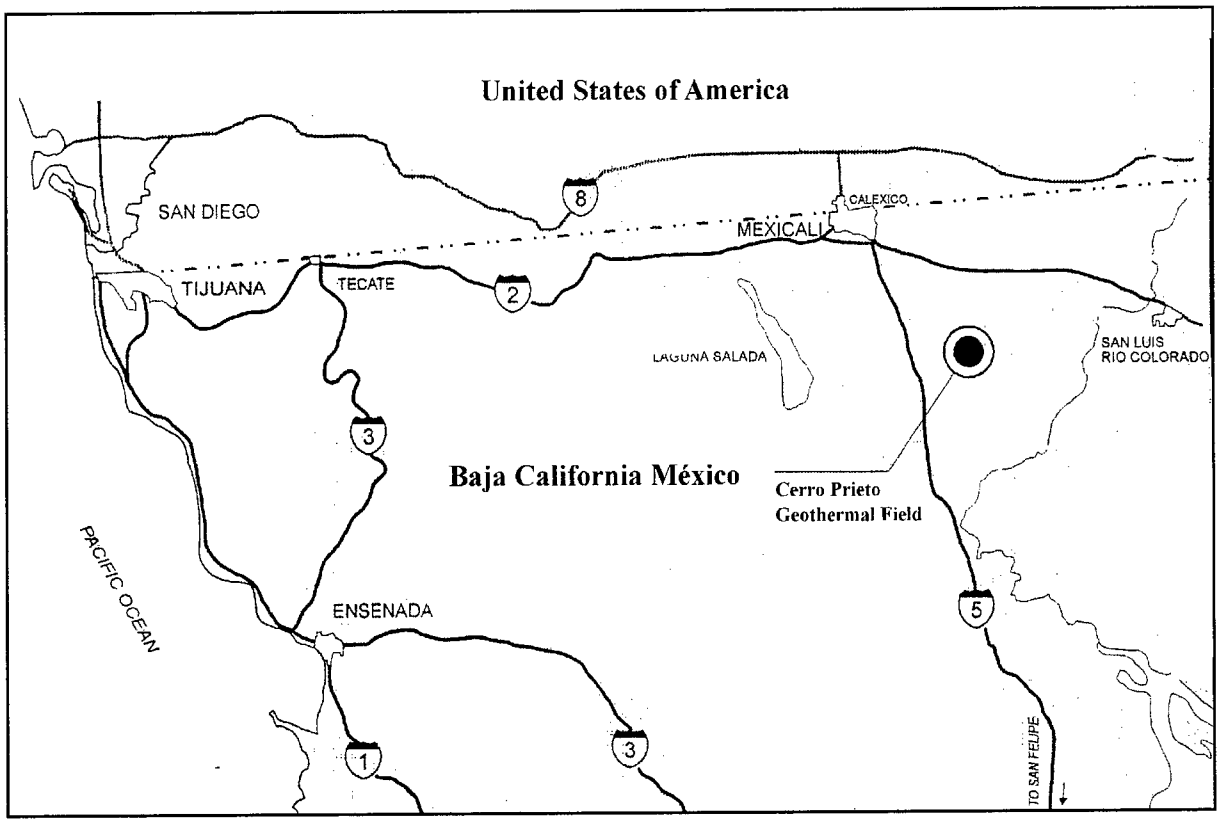
This project calls for development of an additional 100 megawatts in two stages of 50 megawatts each. Each stage will consist of two 25 megawatt geothermal generating units. The project will require an additional 800 tons of steam per hour in addition to current production of 5000 tons per hour. The schematic on the next page shows the location of the existing three units — Cerro Prieto I, II, and III — with the location of the two additional units along with the five zones A, B, C, D, and E that will serve as the sources of steam.

The Plant



Site

The new plant will be in the Cerro Prieto geothermal field located in northern Baja California to the southeast of Mexicali.



Project Status

The Mexican government announced that it will issue a request for bids for the plant during the latter half of 1996. The contract will be awarded in the first half of 1997 with commercial operation expected to begin in 1998. The government has not yet announced whether the project will be bid as a Build-Lease-Transfer (BLT) or an independent power producer (IPP).

Equipment & Services Demand

The project will require engineering and drilling services, pumps, piping, demineralizing water systems, boilers and heat exchangers.

Nature of Demand

Baja California has its own electric grid not interconnected to the national Mexican grid. In addition, Baja California has the highest forecast rate of demand growth in all of Mexico — at 7.4 percent per

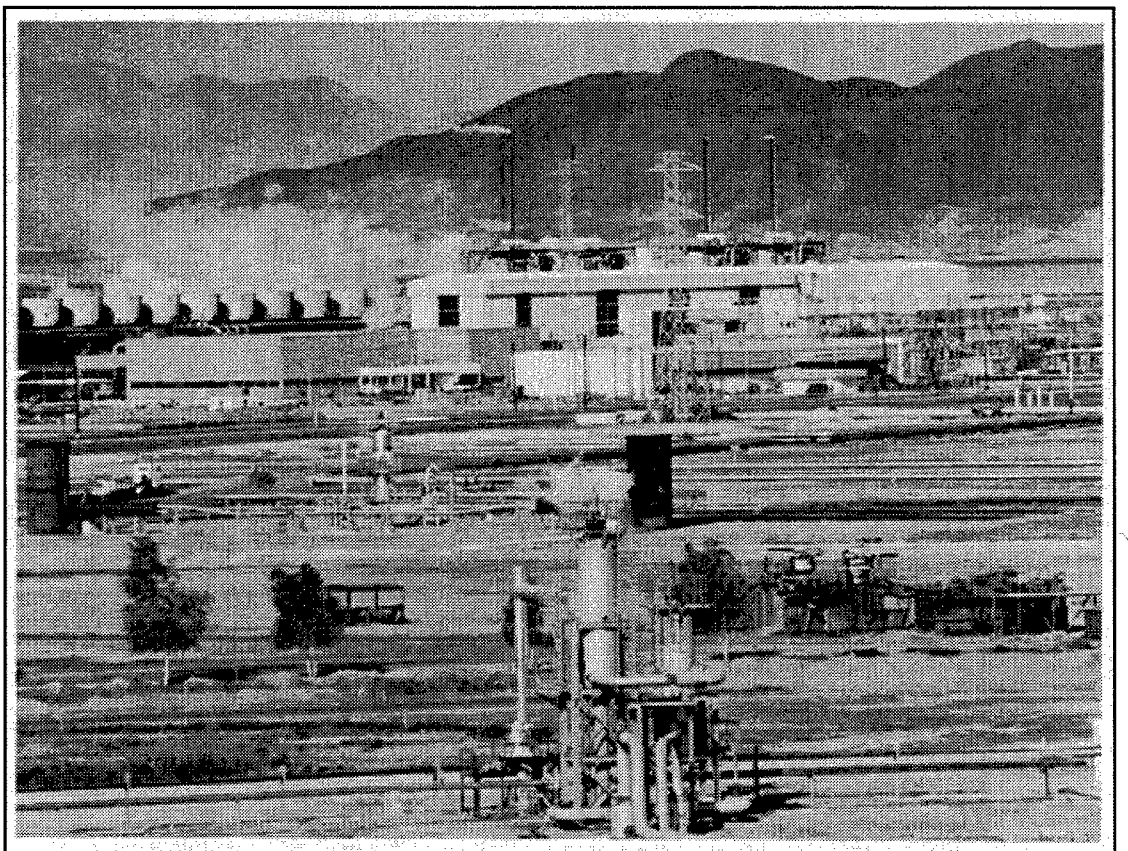
year. From 1984 to 1995, the demand for electricity grew by 7.5 percent on an annual basis. This growth is fueled by the rapid development of Tijuana, Mexicali, and other Mexican border cities.

The Cerro Prieto project meets this growing demand in an environmentally-friendly, low-cost way. For this reason the project is a priority for the Mexican government.

Project Assessment

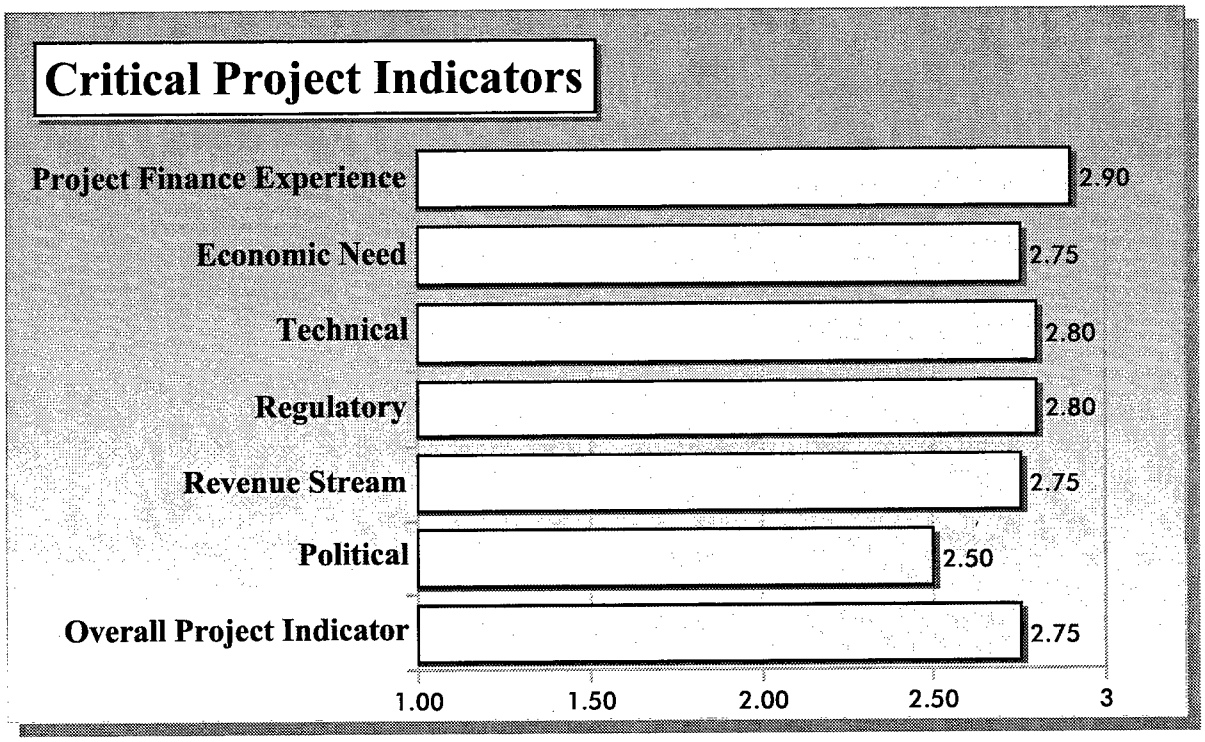
Whether the project is structured as a BLT or IPP, it will involve a long-term commercial contract with CFE. The recent financial closure of the Samalayuca project indicates that developers and equipment suppliers are willing to take CFE credit risk. In addition, the project is made more viable since it does not require the signing of a long term fuel supply contract.

The Cerro Prieto geothermal field has seen growing and consistent production since 1973. Engineering studies reveal that the field has remaining potential that can be tapped to produce the additional 100 megawatts of electricity.



Central Geotermoeléctrica Cerro Prieto, Baja California

Critical Project Indicators



Key Decision Makers

Company	**Federal Electricity Commission (CFE)**
Name	Mr. Eric R. Butcher
Title	Deputy Director of Construction
Location	México, D.F.
Phone	(52-5) 553-8932
Fax	(52-5) 286-6836

Company	**Federal Electricity Commission (CFE)**
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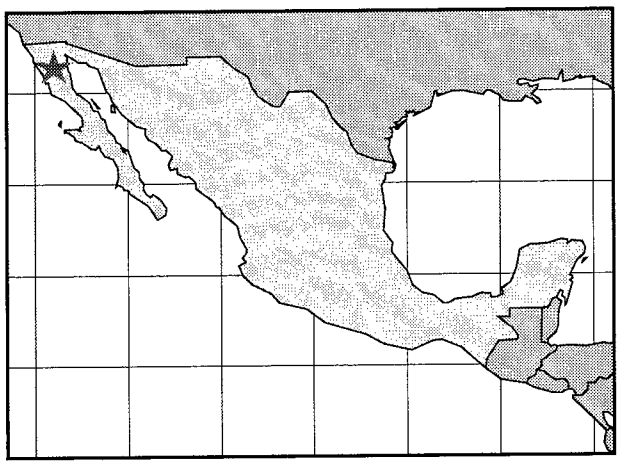
Energy/ Power Generation

Rosarito Gas-Fired Power Plants



Project Summary

Project No:	**ENE-06**
Subsector:	**Power Generation**
State/Region:	**Baja California Norte**
Project Cost:	**$600 million**
Export Potential:	**$450 million**
Owner:	**CFE**

The Federal Electricity Commission (CFE) will be bidding out two additional major gas-fired power facilities in northern Baja California.

Technical Description

CFE will be issuing separate bids to build two facilities to be built in Rosarito, Baja California, near the existing Presidente Juárez generating station. The bids are for the following facilities:

- Rosarito 7: This will be a 150 megawatt gas turbine peaker plant designed to meet peak demands primarily during the summer months.
- Rosarito 8 and 9: This facility will consist of two 225 megawatt gas-fired combined cycle facilities producing a total of 450 megawatts.

CFE will be issuing separate bids for a gas pipeline from the U.S. to Rosarito to supply fuel to these projects. The existing power plant is fuel oil-fired and there is no existing supply of gas available. As a separate project, CFE also plans to convert the existing 620 megawatt facility from fuel oil to natural gas.

Both of these new facilities will link with the existing substation and transmission network available at the existing facility.

Site

The project site will be Rosarito, Baja California, near the Presidente Juárez 620 megawatt fuel oil-fired thermoelectric facility. This location is just south of San Diego on the Pacific Coast of northern Baja California.

Project Status

Both bids are expected to be published between late October and mid November 1996, with the contract to be awarded in mid to late 1997. Commercial operation of the peaker plant is planned for 1999 and for the combined cycle facility the year 2000.

The Secretariat of Energy has not made a final determination of whether the plant will be bid under a build-lease-transfer (BLT) or an Independent Power Producer (IPP) scheme.

Equipment & Services Demand

Equipment and services for the facility will include:

- Gas and Steam Turbines
- Compressors
- Feedwater and Circulating Pumps
- Conceptual, Design and Basic Engineering
- Construction Management
- Water Systems
- Air Pollution Control Systems
- Heat Recovery Steam Generators
- Electric Switchgear
- Distributed Control Systems

Nature of Demand

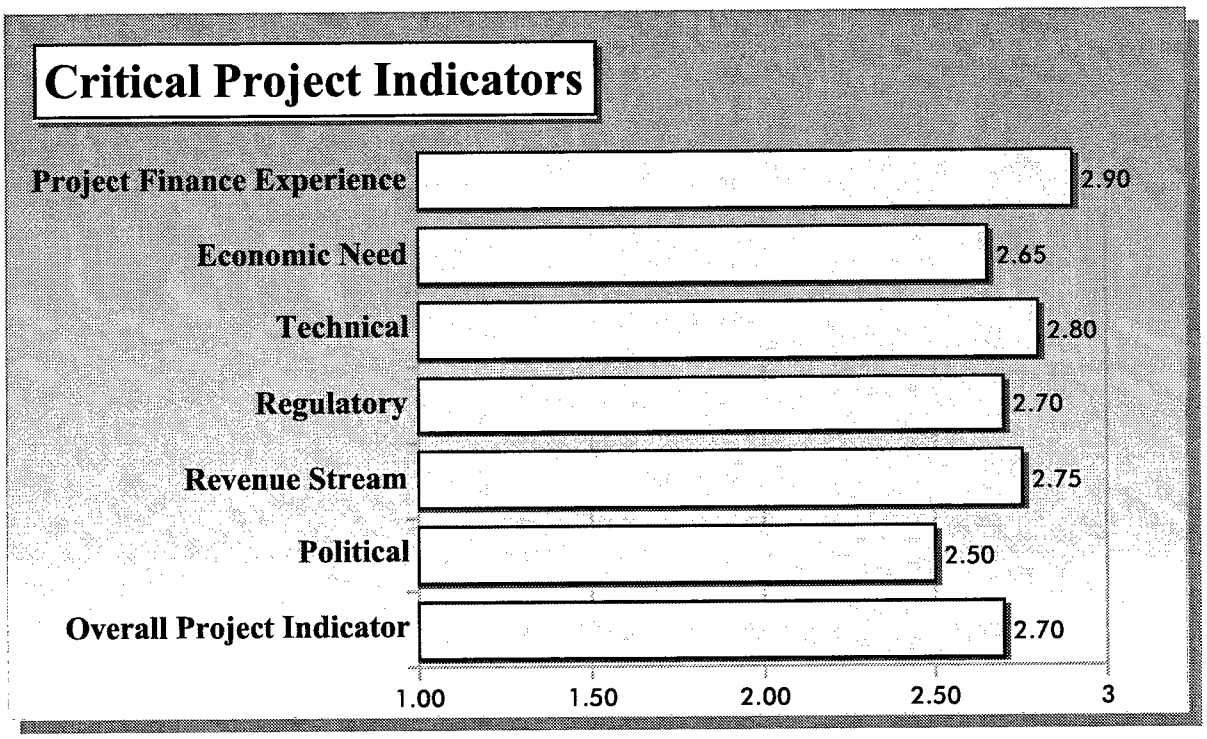
Baja California has its own electric grid not interconnected to the Mexican national grid. In addition, Baja California has the highest forecast rate of demand growth in all of Mexico, at 7.4 percent per year. From 1984 to 1995, electric power demand grew by 7.5 percent on an annual basis. This growth is fueled by rapid development of the Mexican border cities of Tijuana and Mexicali, among others. The plant is required in order to ensure that the growing needs of this industrial zone can be met through capacity located within Mexico.

Project Assessment

Whether the project is structured as a BLT or IPP, it will involve a long-term commercial contract with CFE. The recent financial closure of the Samalayuca project indicates that developers and equipment suppliers are willing to take CFE credit risks. The project also requires construction of a gas pipeline and completion of a long term gas supply agreement. This latter agreement should not be problematic as this can be arranged with a U.S. gas supplier.

There has been discussion that perhaps some power could be purchased from U.S. sources, thereby reducing the need for capacity in Baja California. While Baja California has a long history of cross border sales and purchases of electricity, Mexican authorities appear intent on locating a majority of the capacity to meet Mexico's internal needs within Mexico itself.

Critical Project Indicators



Key Decision Makers

Company	**Federal Electricity Commission (CFE)**
Name	Mr. Eric R. Butcher
Title	Deputy Director of Construction
Location	México, D.F.
Phone	(525) 553-8932
Fax	(525) 286-6836

Company	**Federal Electricity Commission (CFE)**
Name	Ing. José J. Castellanos Román
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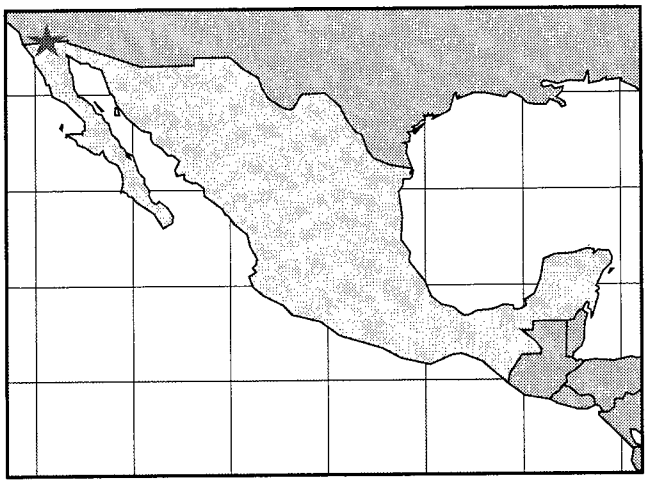
Energy/ Natural Gas

Mexicali Gas Distribution Project



Project Summary

Project No:	**ENE-07**
Subsector:	**Natural Gas**
State/Region:	**Baja California Norte**
Project Cost:	**$25 million**
Export Potential:	**$15 million**
Owner:	**DGN**

On August 12, 1996, the first ever private permit to sell natural gas directly to residential and industrial consumers was awarded for the City of Mexicali in Baja California. This is significant as Mexicali is expected to be the first of dozens of geographic zones to be put up for bid in the coming months. The bidding process, overseen by the Energy Regulatory Commission, was extremely orderly and occurred according to schedule.

The winning consortium Distribuidora de Gas Natural (DGN) will have the exclusive right for 12 years to develop a distribution system in Mexicali. DGN was awarded the permit based on its low bid for distribution services. DGN offered a price of US$1.14 per gigacalorie. Other bidders included the Spanish firm Repsol, and Tenneco.

Technical Description

Under the terms of the permit, DGN will design, construct and operate a complete natural gas distribution system for Mexicali, a city of 750,000 inhabitants. The zone also includes 546 industrial complexes and another 446 commercial enterprises. Under the proposal, DGN expects to be servicing the needs of 25,346 clients, 90 percent residential, within five years with a total of 7 billion cubic feet per year. Revenues after 5 years are projected to be US$20 million with 80 industrial customers representing 91 percent of total sales.

The system will consist of a steel transmission system and a polyethylene distribution system. Com-

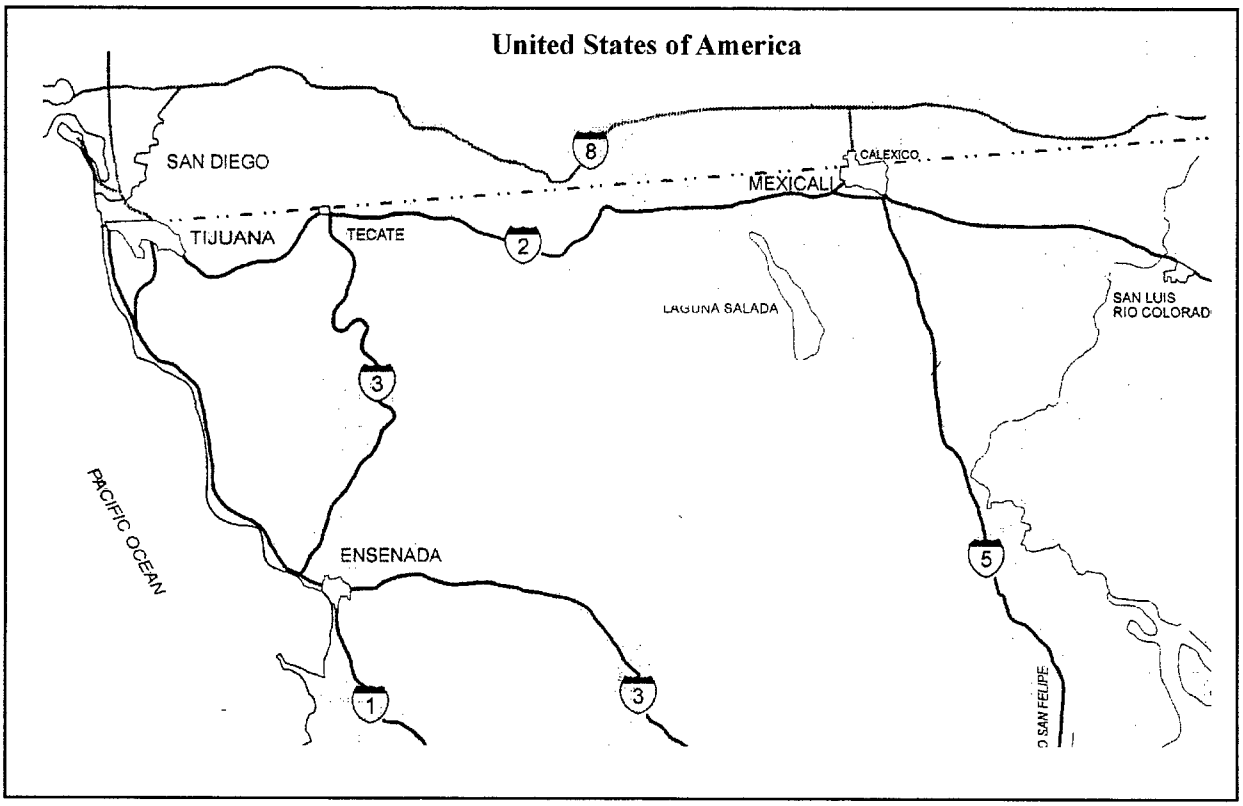
mercial and industrial customers will be serviced from the transmission system with residences from the distribution system. The system will meet or exceed all international regulatory standards.

The transmission system will be comprised of 63 kilometers of 10, 8 and 6 inch steel pipe qualified to operate at 720 pounds per square inch. The system will initially operate at between 350 to 600 pounds per square inch. All material will be purchased from sources with full qualification. To prevent corrosion the pipe will be blasted and coated. The distribution system will initially consist of approximately 340 kilometers of 4,3, & 2 inch pipe that will operated at a maximum pressure of 60 pounds per square inch. The distribution system will receive gas through pressure regulatory stations. All pipe will be installed with metallic tracer wire to facilitate the location of pipes after burying.

There is currently no natural gas pipeline serving Mexicali. Natural gas will be imported from the U.S. or Canada.

Site

The distribution area covers the City of Mexicali, Baja California.



Project Status

The bid was awarded on August 12, 1996. The bidding process began in April of the same year. DGN has full authority to begin design and construction of the distribution network. DGN is now actively undertaking the necessary technical, legal, and financial planning to reach construction.

Construction is expected to begin in February of 1997 with the first service provided by July of 1997. Residential service is expected to begin in the first quarter of 1999.

Equipment & Services Demand

The project will require the following equipment and services:

- Steel and Polyethylene piping
- SCADA systems
- Hardware and software billing systems
- Gas meters
- Compressors
- Engineering and construction services
- Legal services

Nature of Demand

Mexicali currently has no natural gas availability although 25,000 households currently use propane. The demand in the zone is expected to be strong because of the high and growing concentration of industrial users in the zone. This industry consists of general manufacturing as well as other important potential gas users such as steel, glass, food processing, beverage, and cement companies. Mexicali also has approximately 750,000 residents.

Also, because Mexicali is a border city, there is pressure on manufacturers to utilize natural gas for environmental reasons.

DGN forecasts that it will be able to offer natural gas at price to industry at a much cheaper price than propane and competitive with fuel oil. Residential prices will be competitive with current propane prices.

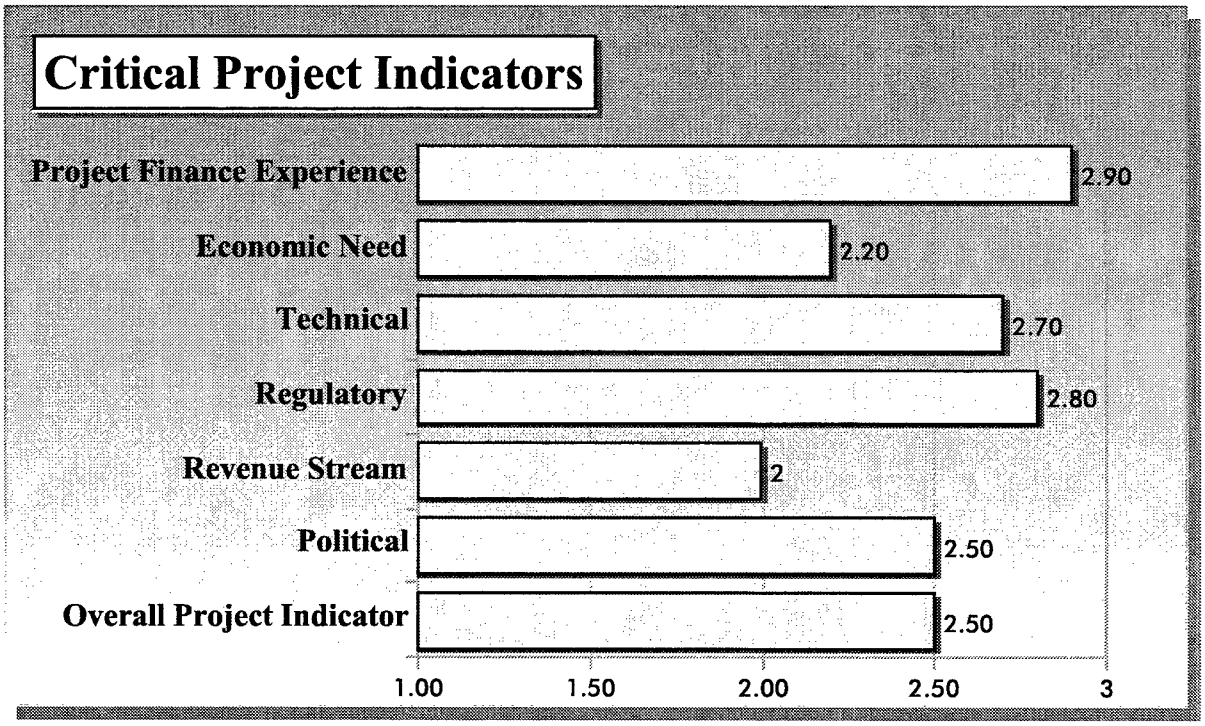
Project Assessment

As the first natural gas permit granted in an area currently not served by natural gas, the biggest question the project faces is accurately forecasting demand in the region. Obviously the project sponsors will need to undertake an aggressive marketing effort to convince residential, commercial and industrial users to switch or choose natural gas over existing fuels. While Mexicali, as an industrial city certainly has a strong potential gas demand, DGN will have to work hard to convert this into effective demand.

Given the gas distribution system is in an urban area that will mostly utilize existing public ways, it is not anticipated that rights of way issues will negatively impact the project. Under the natural gas regulations, the CRE can declare rights of way across private lands, but this authority has yet to be tested under the new program. Likewise because of the urban environment, it is unlikely that these will be problematic.

The project will involve peso revenue streams for a dollar denominated commodity. Although Mexicali has a somewhat dollarized economy, this could cause payment difficulties in the result of peso devaluation.

Critical Project Indicators



Key Decision Makers

The consortium Distribuidora de Gas Natural (DGN) is made up of San Diego Gas and Electric and the Mexican firm Próxima.

Company	**San Diego Gas and Electric**
Name	George Liparidis
Title	Project Director
Location	San Diego, CA
Phone	(619) 696-4516
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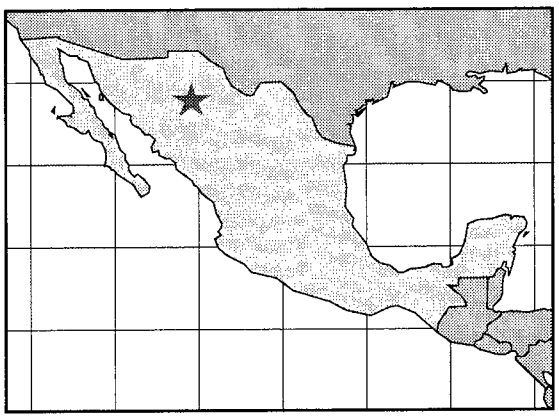
Energy/ Natural Gas

Chihuahua Gas Distribution Project



Project Summary

Project No:	**ENE-08**
Subsector:	**Natural Gas**
State/Region:	**Chihuahua**
Project Cost:	**$52 million**
Export Potential:	**$13 million**
Owner:	**CRE**

As a result of legislation passed in 1995, Mexico has opened the transportation and distribution of natural gas to private sector participation. The Secretariat of Energy has officially invited both foreign and domestic investors to present proposals to build and operate distribution systems in ten separate natural gas zones. Among the first zones to be made available is the Chihuahua zone which has strong drivers in both the industrial and residential markets.

Technical Description

The project requires the design, construction and operation of transmission and distribution lines for both residential and industrial use. Gas transmission will be critical for CFE's new power plants and others which will be modified to use natural gas.

Exact technical specifications are to be determined by the winning bidder, though the project must conform to international safety and environmental standards. Natural gas for the project will be supplied by Pemex, which retains exclusive control over the production of oil and gas. Natural gas is supplied through three pipelines to the region and is widely used by industry.

The winning bidder will be granted a twelve-year operating permit. Specific terms will be determined following an analysis of the level of interest expressed by potential bidders.

Site

The Chihuahua gas distribution zone is comprised of the following:

Population Growth in the Chihuahua Zone

Municipality	Population	Average Annual Population Growth
Chihuahua	516,153	4.90%
Cuautémoc-Anáhuac	69,895	2.80%
Delicias	88,197	3.90%

Source: Energy Regulatory Commission (CRE)

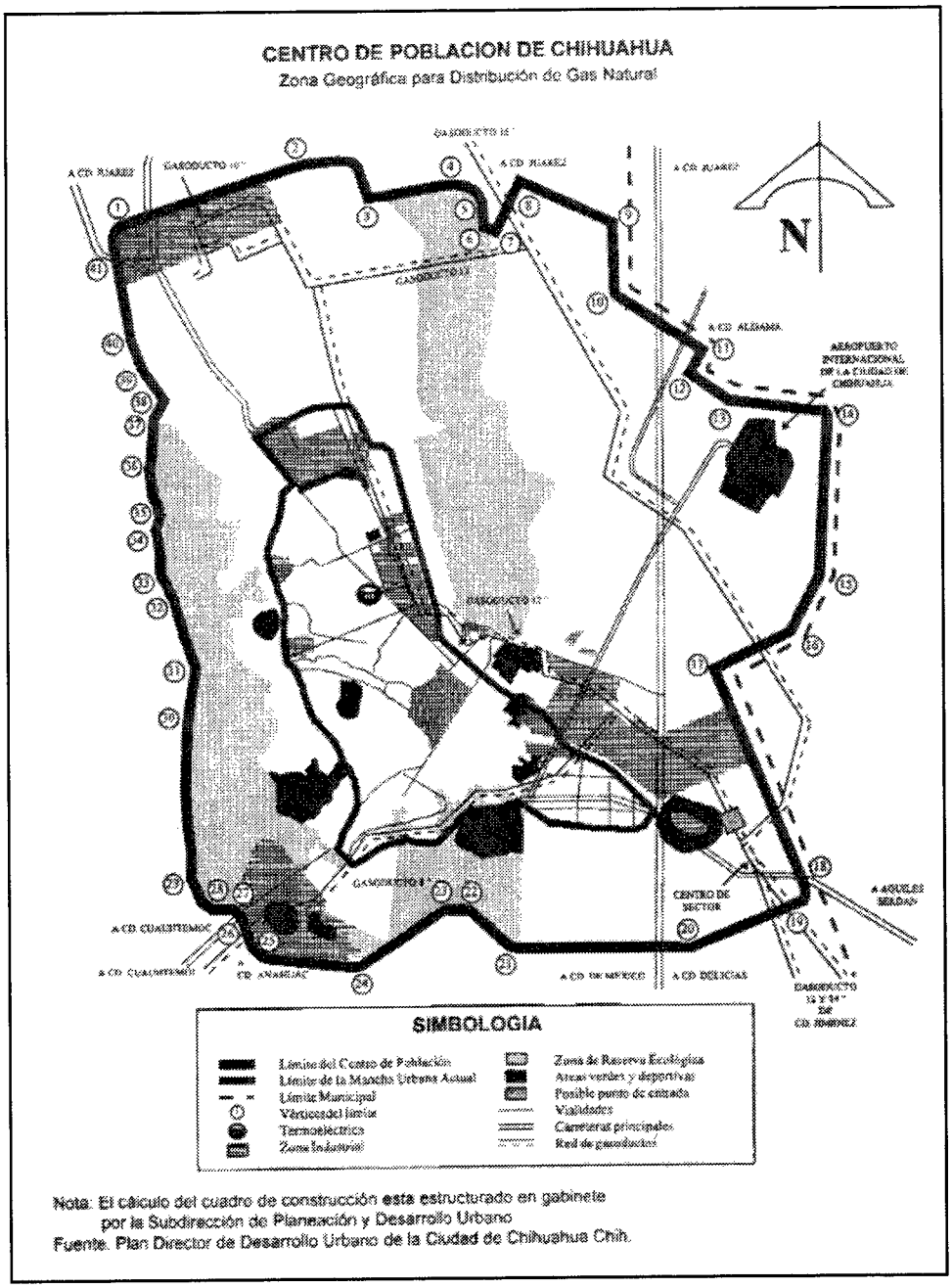
Project Status

In May 1996, the Secretariat of Energy officially announced the Chihuahua Gas Distribution Project and determined its geographic boundaries. The Secretariat of Energy is scheduled to define the final project specifications by the end of the second quarter of 1997, after which the project should go to bid.

Equipment & Services Demand

The project will require the following equipment and services:

- Steel and Polyethylene Piping
- Supervisory Control and Data Acquisition (SCADA) Systems
- Hardware and Software for Billing Systems
- Gas Meters
- Compressors
- Pressure Regulating Stations
- Engineering and Construction Services
- Legal Services


CENTRO DE POBLACION DE CHIHUAHUA
Zona Geográfica para Distribución de Gas Natural
N
SIMBOLOGIA
Límite del Centro de Población
Límite de la Mancha Urbana Actual
Límite Municipal
Vértices del límite
Termoelectrica
Zona Industrial
Zona de Reserva Ecológica
Areas verdes y deportivas
Posible punto de entrada
Vialidades
Carreteras principales
Red de gasoductos
Nota: El cálculo del cuadro de construcción esta estructurado en gabinete
por la Subdirección de Planeación y Desarrollo Urbano
Fuente: Plan Director de Desarrollo Urbano de la Ciudad de Chihuahua Chih.

Nature of Demand

Natural gas is already widely used in the Chihuahua area. The region has a high concentration of industry and agribusiness. The industrial base is diverse and has high energy needs. The industrial base in the Municipality of Chihuahua has the highest current natural gas consumption in the region with an average daily consumption of 5.3 billion kilocalories. Chihuahua's industrial base includes: cement production, smelting, automobile motors, auto parts, food processing, and ceramics.

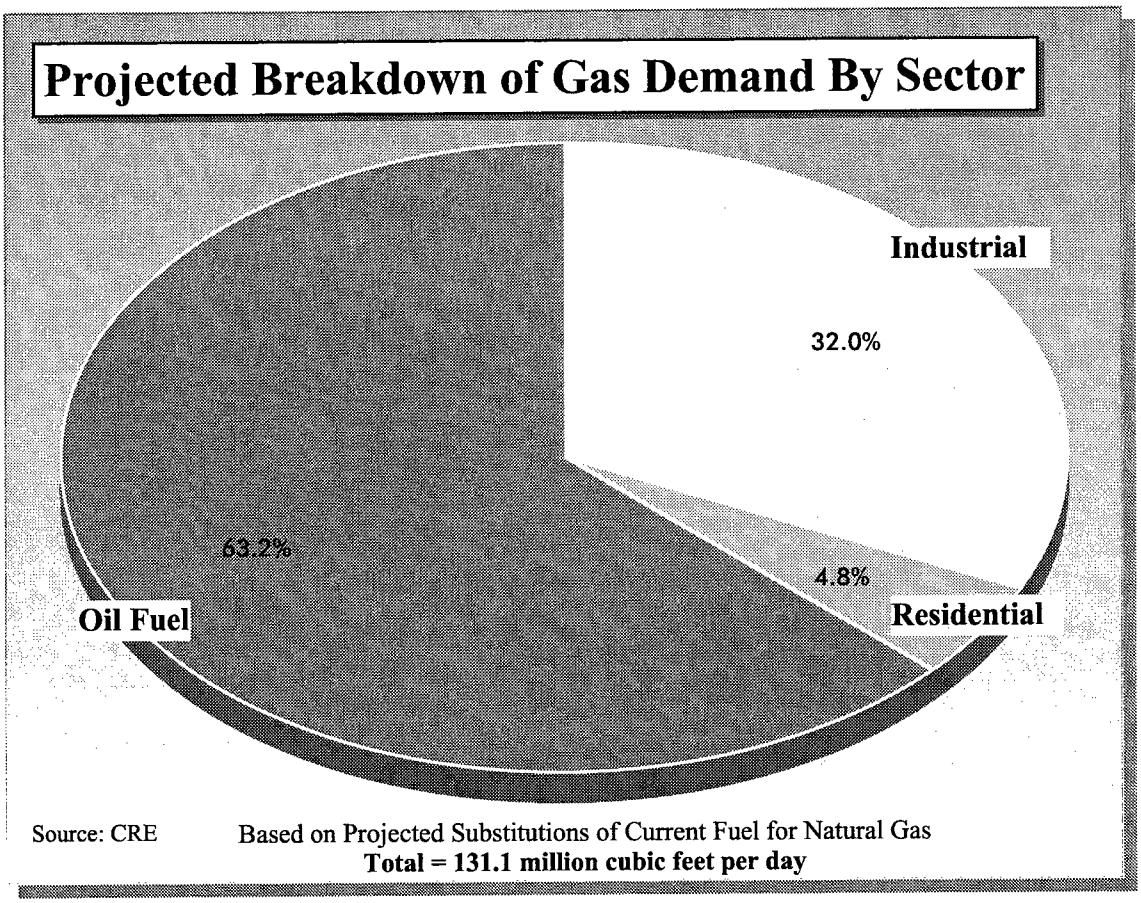
Cuauhtémoc and Anáhuac are important cities located on the Chihuahua-Pacific Railroad, Chihuahua's link to the Gulf of California. In addition to agriculture, these two municipalities have an industrial base comprised principally of wood processing and fertilizer production. The region surrounding the Municipality of Delicias has an industrial base of food and beverage processing, chemical plants, and smelting facilities.

Projected natural gas consumption for the region is 131.1 million cubic feet per day:

Projected Gas Consumption Based on Current Fuel Use in Chihuahua

Sector	Projected Volumes (cubic feet per day)
Residential	6.3
Fuel Oil Consumers	82.8
Industrial	42
Total	131.3

Source: Secretariat of Energy

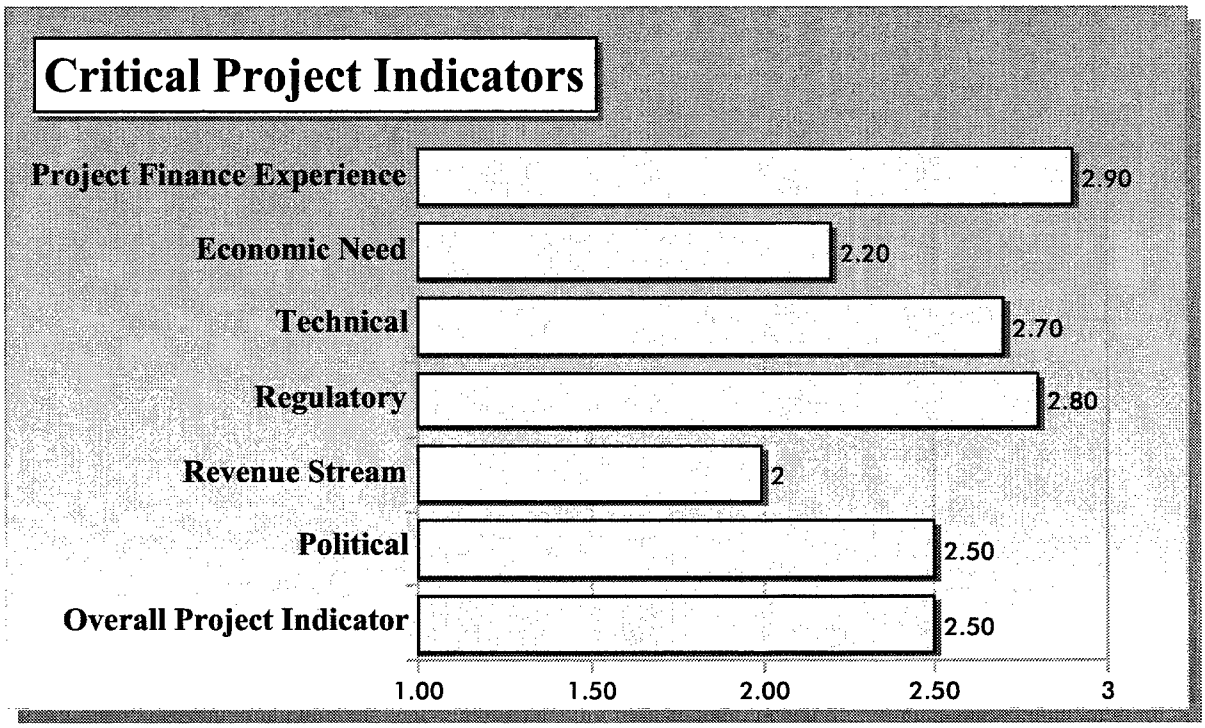


Project Assessment

Industries in this region all have high energy demands, and would favor a clean source of energy. The growth in industrial output is expected to be both strong and sustainable, which drives the demand for natural gas. Industries in Chihuahua expressed an interest in natural gas prior to CRE's involvement in this project, which means that marketing efforts, at least for industrial users, will be favorably received.

Given that the gas distribution system is in an urban area that will mostly utilize existing public rights of way, it is not expected that right of way issues will negatively impact the project. Under natural gas regulations, the CRE can declare rights of way across private lands. This authority has yet to be tested under the new program, but because of the urban environment, it is unlikely that this will be problematic.

Critical Project Indicators

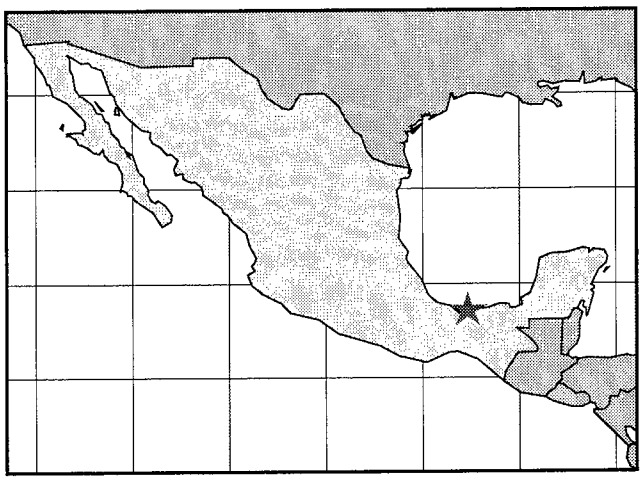


Key Decision Makers

Company	**Energy Regulatory Commission (CRE)**
Name	Mr. Alejandro Breña
Title	General Director for Gas
Address	México, D.F.
Phone	(52-5) 520-9370
Fax	(52-5) 520-9494

Energy/ Natural Gas

Campeche Gas-Fired Power Plant



Project Summary

Project No:	**ENE-09**
Subsector:	**Natural Gas**
State/Region:	**Campeche**
Project Cost:	**$200 million**
Export Potential:	**$150 million**
Owner:	**CFE**

In order to meet increasing demand for electricity in the Yucatán Peninsula, the Mexican government will issue a request-for-proposal for a 225-megawatt unit in the State of Campeche, in late 1996.

Technical Description

The plant will be a single unit, gas-fired, combined cycle, 225-megawatt facility, consuming 40 million cubic feet of gas daily. It will be designed with the capability of using diesel as an alternative fuel.

Gas for the facility will be provided by the same pipeline currently being bid for the Mérida III power project. The gas will be provided by Pemex at Ciudad Pemex and will be transported along the pipeline to the Campeche plant.

Site

The plant will be located 150 kilometers southwest of the town of Escárega, in the State of Campeche.

Project Status

CFE is planning to issue its request for bids during the first four months of 1997. The bid period is expected to last about 6 months. The plant is scheduled to begin commercial operation by the end of 2000 or the beginning of 2001.

The Secretariat of Energy has not made a final determination whether the plant will be bid under a Build-Lease-Transfer (BLT) or an Independent Power Producer (IPP) scheme.

Equipment & Services Demand

Equipment and services for the facility will include:

- Gas and Steam Turbines
- Compressors
- Feedwater and Circulating Pumps
- Conceptual, Design and Basic Engineering
- Construction Management
- Water Systems
- Air Pollution Control Systems
- Heat Recovery Steam Generators
- Electric Switchgear
- Distributed Control Systems

Nature of Demand

With demand expected to grow at an annual rate of 7.2 percent over the next eight years, the Yucatán Peninsula is expected to have the second highest electric demand growth for all of Mexico. Over the past ten years, electric power demand on the Peninsula has grown by 8.2 percent. Growth in demand is driven by the region's strong tourist industry which is expected to continue to expand. Without new power capacity on the Peninsula, Mexico will face a threat to its important tourist industry and the jobs and foreign exchange that it generates.

With delays in construction of the Mérida project, CFE is forecasting that by the time this project comes on line in the year 2000, it will already need additional power from the Campeche facility.

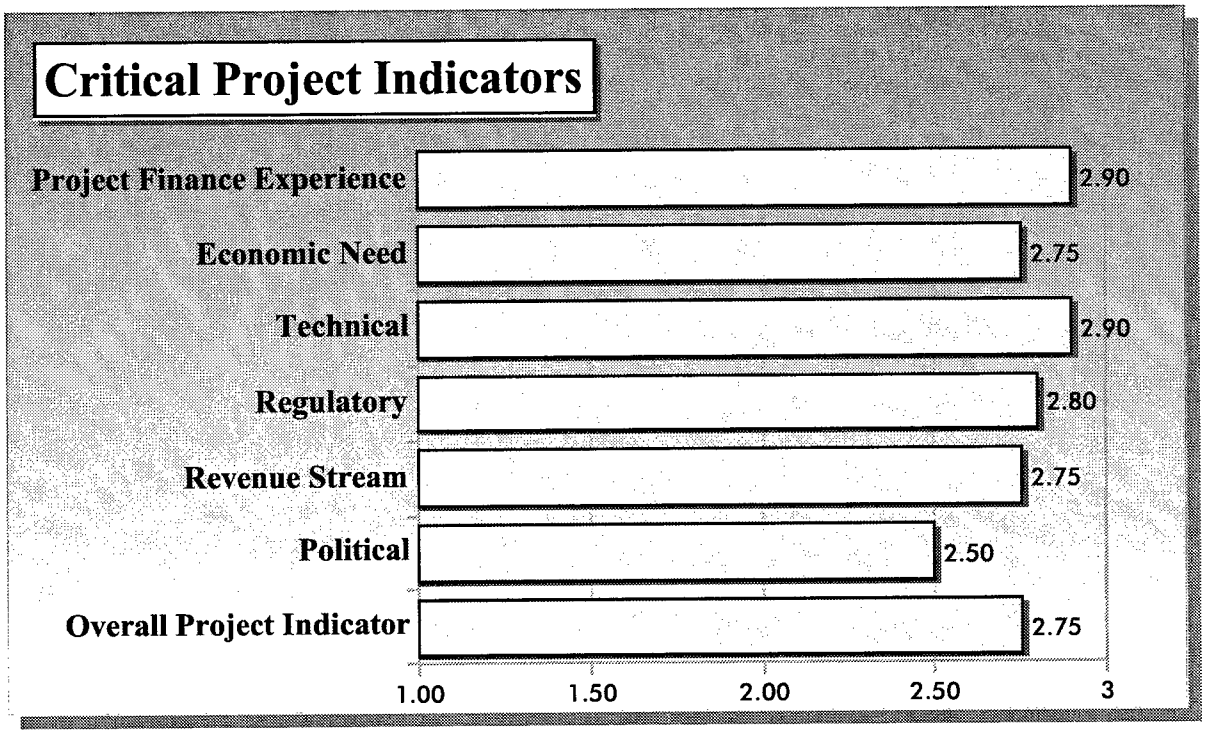
Project Assessment

Whether the project is structured as a BLT or IPP, it will involve a long term commercial contract with CFE. The recent financing of the Samalayuca project indicates that developers and equipment suppliers are willing to take CFE credit risk.

The project will rely on gas provided by the proposed pipeline to the Mérida III thermoelectric facility. Although the previous pipeline ran into delays, the new natural gas law will allow the pipeline to be built by private parties, thereby reducing the risk of construction delays. Under the pipeline contract, CFE will purchase the gas directly from Pemex and assume the risk of delivery to the facility.

Although draft contracts are not yet available for this project, it is hoped that CFE will use contracts similar to those used for Mérida III. Under these contracts, CFE took currency risk and environmental risks for siting.

Critical Project Indicators



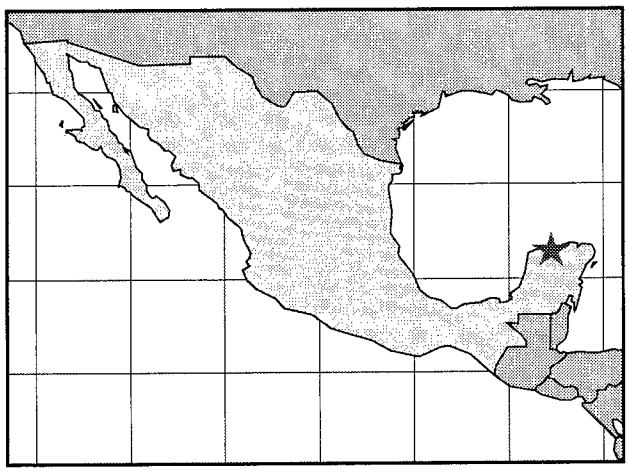
Key Decision Makers

Company	**Federal Electricity Commission (CFE)**
Name	Mr. Eric R. Butcher
Title	Deputy Director of Construction
Location	México, D.F.
Phone	(525) 553-8932
Fax	(525) 286-6836

Company	**Federal Electricity Commission (CFE)**
Name	Ing. José J. Castellanos Román
Title	Coordinator of Thermoelectric Projects
Location	México, D.F.
Phone	(525) 511-1363
Fax	(525) 229-4400 ext. 8069

Energy/ Power Generation

Mérida III Gas-Fired Power Plant



Project Summary

Project No:	**ENE-10**
Subsector:	**Power Generation**
State/Region:	**Yucatán**
Project Cost:	**$400 million**
Export Potential:	**$300 million**
Owner:	**CFE**

Technical & Site Description

Mérida III will be Mexico's first independent power project in which a private developer will build, own, operate, and finance a plant and sell power to the national utility, the Federal Eletricity Commission (CFE). Mérida III will be a combined-cycle facility with two units each generating 220 megawatts (plus or minus ten percent) net. The 440-megawatt facility will burn natural gas, with diesel fuel as the alternative.

The Federal Electricity Commission (CFE) is responsible for the project and lists four possible technical schemes for the facility. The options are:

- One steam turbine and two gas turbines.
- Two steam turbines and two gas turbines.
- One steam turbine and three gas turbines.
- Two steam turbines and four gas turbines.

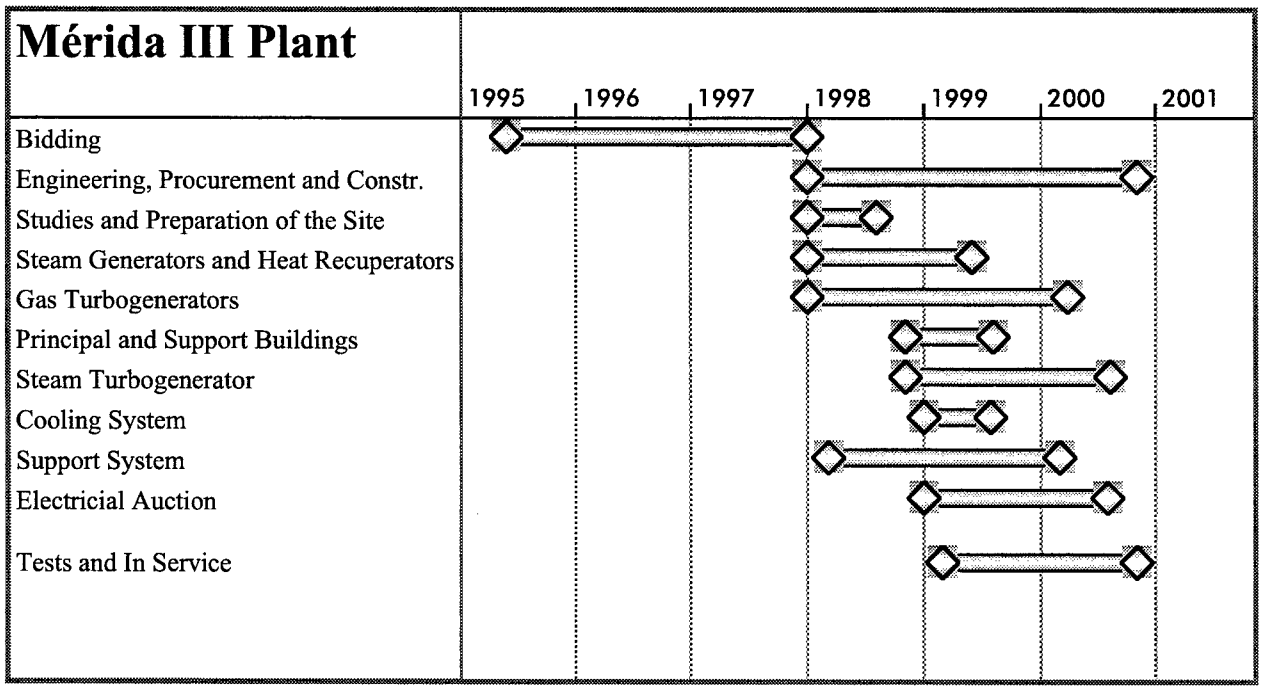
CFE will sign a 25-year power purchase agreement based on a capacity and energy payment. CFE will also sign a 26-year fuel supply agreement with the owner. A gas pipeline to meet this demand is being bid separately. (See Profile ENE-11.)

The plant will be located in the Felipe Carrillo Puerto Industrial Park, on the outskirts of the City of Mérida, located on the Yucatán Peninsula.

Project Status

After a false-start on the original bidding procedures for Mérida III, a new bid process was reinitiated in April 1996 with the release of modified model contracts for the project. A series of informational meetings have been held and final revised contracts have been issued. Over 50 international power firms from the U.S., Japan, Mexico, and Europe have prequalified for the bid and no new bidders are now being accepted. The schedule for completion is as follows:

1. Reception of proposals and opening of technical proposals: December, 1996
2. Opening of financial proposals: February, 1997
3. Project awarded: March, 1997
4. Contracts signed: March, 1997
5. (Power purchase/fuel supply)
6. Financial closing: January, 1998
7. Commercial operation: April, 2000



Source: CFE

Equipment & Services Demand

Equipment and services for the facility will include:

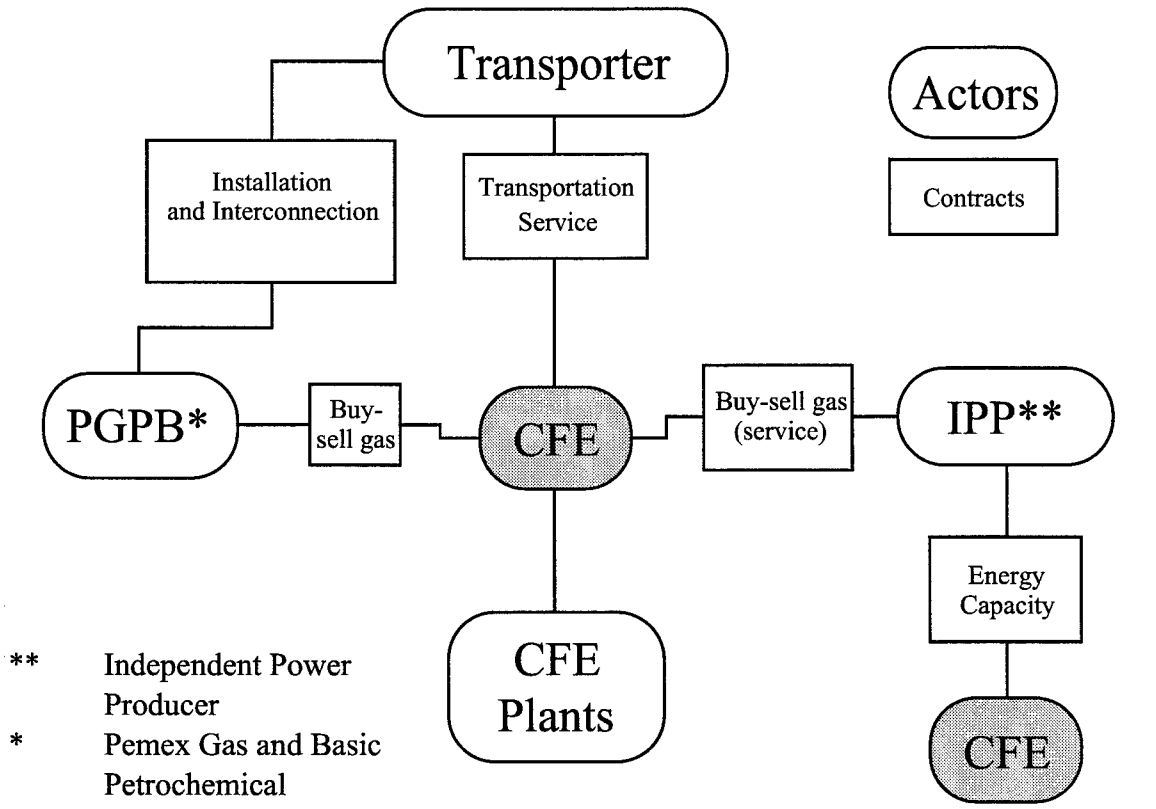
- Gas and steam turbines
- Compressors
- Feedwater and circulating pumps
- Conceptual, design and basic engineering
- Construction management
- Water systems
- Air pollution control systems
- Heat-recovery steam generators
- Electric switchgear
- Distributed control systems

Nature of Demand

With demand forecast to rise by 7.2 percent over the next eight years, the Yucatán Peninsula is expected to have the second highest electricity demand growth in Mexico. Over the past 10 years, electric power demand on the Peninsula has grown by 8.2 percent. This growth in demand is driven by the region's strong tourist industry, which is expected to continue to grow.

With delays in the original project, it is critical to move construction forward quickly. Without new power capacity on the Peninsula, Mexico will face a threat to its vital tourist industry and the jobs and foreign exchange it generates.

Organizational Diagram for IPP Projects



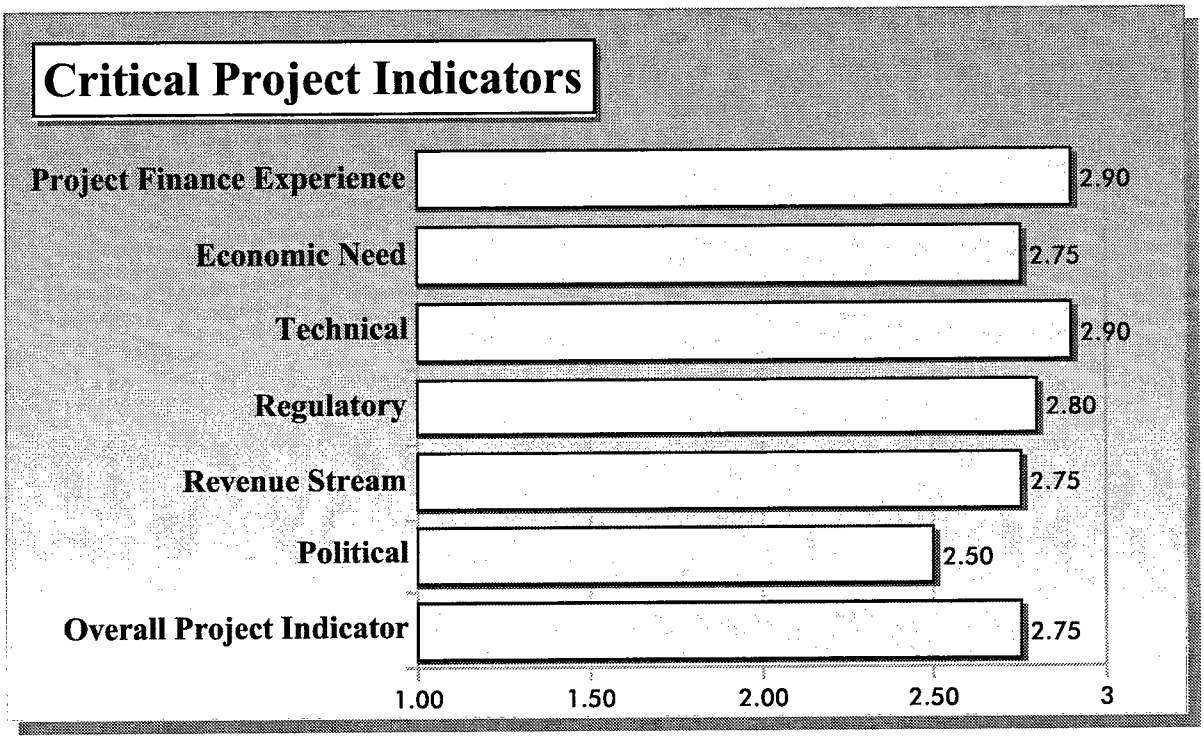
Project Assessment

The feasibility of the project is based on the strength of two contracts outlined below.

The first is the 25-year power purchase agreement signed between the independent power producer and CFE guaranteeing both a capacity and energy payment. The second is a 26-year contract whereby CFE will provide either natural gas or diesel to the plant at the same price as paid by CFE. Note that gas supply is dependent on successful bidding and construction of the natural gas pipeline.

The final contracts have been released and most financial experts consider them an adequate basis for project financing. With the closure of the Samalayuca project which also relied on payments from CFE, the markets have determined CFE to be a credible and credit worthy entity in these transactions. On this basis, the project seems viable.

Critical Project Indicators



Key Decision Makers

Company	**Federal Electricity Commission (CFE)**
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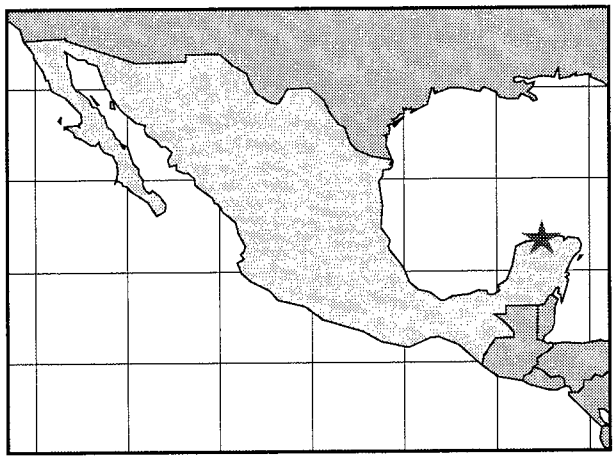
Energy/ Natural Gas

Mérida Gas Pipeline



Project Summary

Project No:	**ENE-11**
Subsector:	**Natural Gas**
State/Region:	**Yucatán**
Project Cost:	**$250 million**
Export Potential:	**$150 million**
Owner:	**CFE**

The Federal Electricity Commission (CFE) has issued a request for bids for a major natural gas pipeline to supply gas to the Yucatán Peninsula. The bid is being conducted in tandem with bidding for the Mérida III thermoelectric project, although the bids are separate. Companies may bid on either or both of these projects. The bid is being defined on the basis of a price for gas transportation services. The concessionaire will be responsible for the financing, construction, and operation of the pipeline and will sign a long term contract with CFE for gas transportation services.

Technical Description

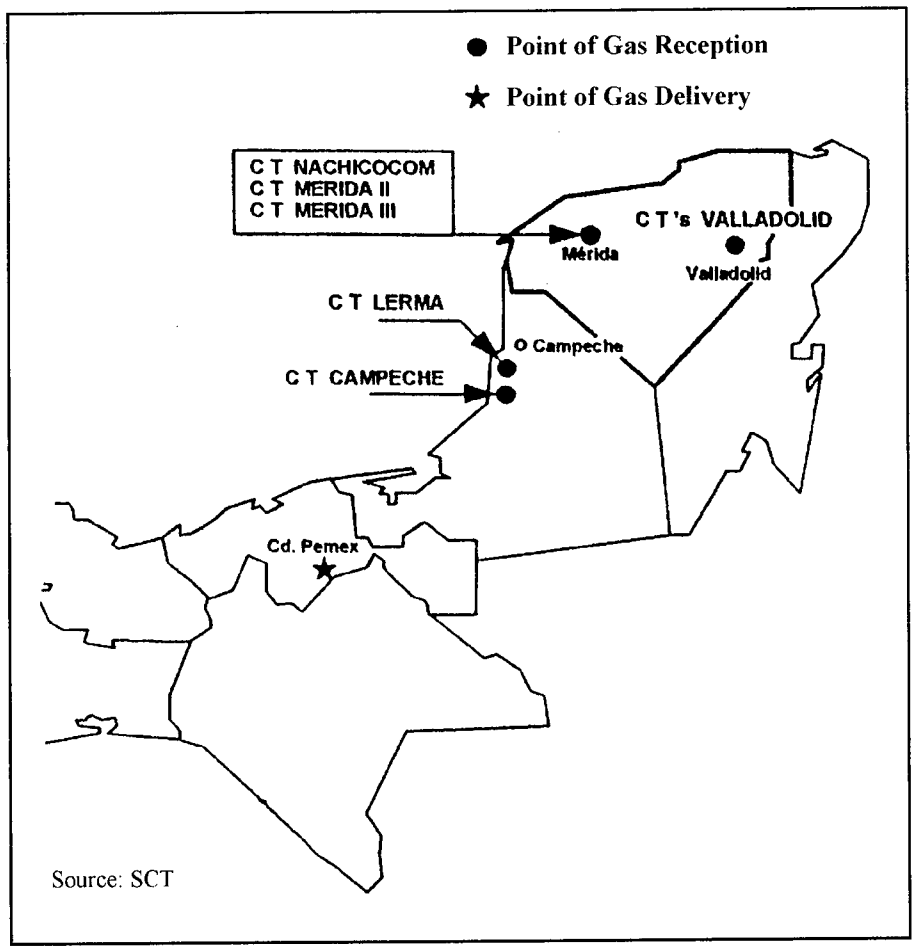
The project plans the construction of a natural gas pipeline 580 kilometers from Ciudad Pemex, and serving power stations in Campeche and Mérida along its route to Valladolid. The gas pipeline will serve units that will be converted from diesel or fuel oil, as indicated in the following table:

Existing Units	Volume of Gas	Pressure at Measurement Station	Alternative Fuel
	(millions of cubic meters per day)	(kilograms per squared centimeter)	
Lerma	1.243	7	Fuel Oil
Nachicocom	1.316	7	Fuel Oil
Valladolid Vapor	0.466		Fuel Oil
Valladolid Combined Cycle	0.602	20	Fuel Oil
Planned Units			
Mérida III	2.386	25	Diesel
Campeche	1.22	25	Diesel
Future (Valladolid)	1.221	25	Diesel

Source: CFE

Site

The pipeline will connect with Pemex, supply at Ciudad Pemex, passing through Campeche and Mérida, and terminating in Valladolid. This total distance is approximately 580 kilometers.



Source: SCT

Project Status

This project went to bid in May of 1996 and clarification meetings were held by CFE in July and August. Final revised contracts are expected by the end of September of 1996. The remainder of the schedule is as follows:

Activity	Date
Submission of Proposals and Opening of Technical Proposals	January, 1997
Opening of Financial Proposals	February, 1997
Contract Award	February, 1997
Signing of Contracts	March, 1997
Financial Closing	November, 1997
Commercial Operation	September, 1999

Source: CFE

Equipment & Services Demand

The project will require financing, natural gas piping, compressor stations, SCADA systems, environmental services, engineering services and operations.

Nature of Demand

The government is committed to bringing gas to the Yucatán Pennisula both to convert existing fuel oil facilities as well to serve important new facilities such as Mérida III. The Yucatán area covers an important tourist zone because of its beach and archeological areas. Continued dependence on fuel oil has the potential to curtail tourism while causing physical damage to precious Mexican archeological sites.

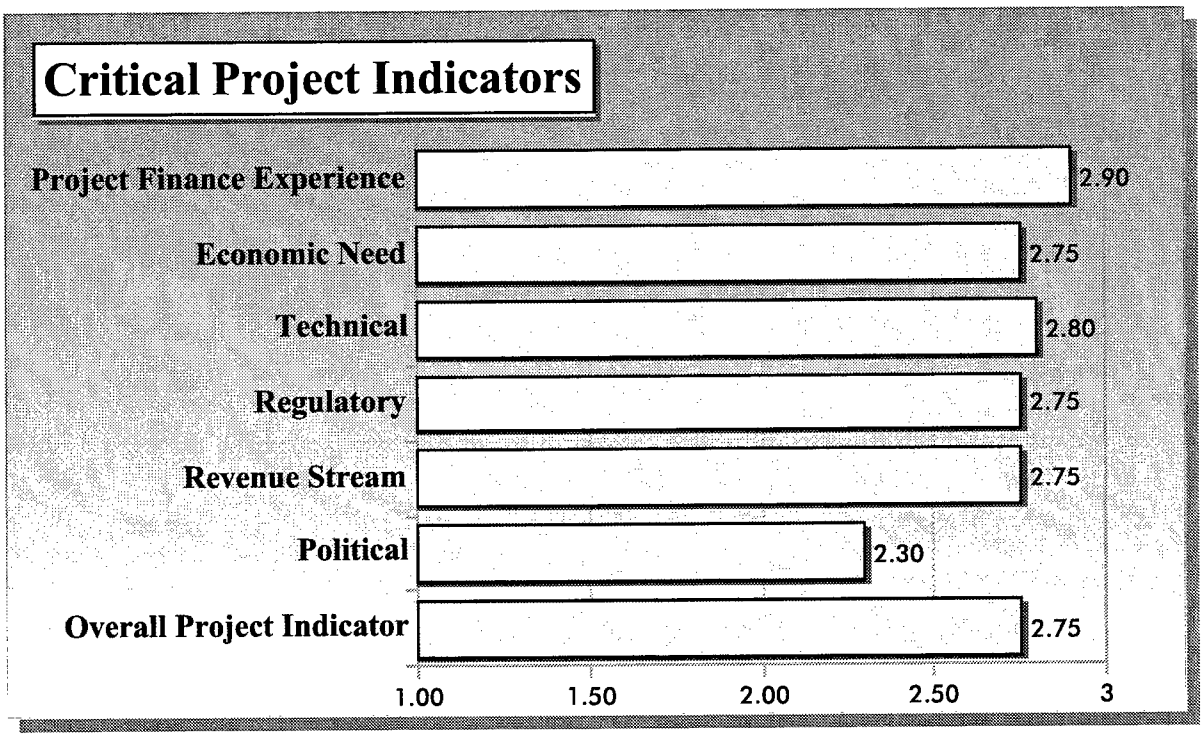
Project Assessment

The project is dependent on successful completion of parallel bidding for the Mérida III power plant. Although Mérida III project has been beset by delays, there is a new commitment on the part of the Mexican government to move this project forward.

The pipeline project will be structured so that the gas transporter will sign two contracts. The first, with CFE, will stipulate the price for transportation to points of consumption. The second, with Pemex Gas and Basic Petrochemicals, will govern the interconnection and related operational issues. CFE, however, will negotiate and sign a contract with Pemex Gas and Basic Petrochemicals for the actual supply of natural gas.

These contracts with Pemex and CFE are groundbreaking, and while there is a commitment to make them work, it will be important for both entities to demonstrate flexibility.

Critical Project Indicators



Key Decision Makers

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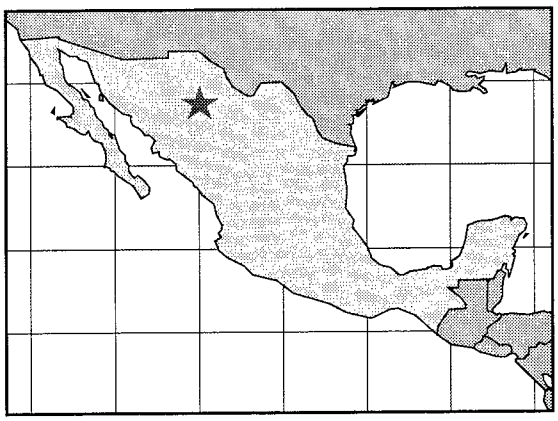
Energy/ Natural Gas

Chihuahua Gas-Fired Power Plant



Project Summary

Project No:	**ENE-12**
Subsector:	**Natural Gas**
State/Region:	**Chihuahua**
Project Cost:	**$450 million**
Export Potential:	**$337 million**
Owner:	**CFE**

In order to meet increasing demand in the northern border state of Chihuahua, the Secretariat of Energy will issue a request-for-proposal for two 225 megawatt units in late 1996.

Technical Description

Two 225 megawatt gas-fired combined cycle units will produce a total of 450 megawatts of electricity. The primary fuel will be natural gas, and consumption will be 80 million cubic feet per day. The alternative fuel will be 2640 cubic meters of diesel fuel.

The source of the natural gas has not yet been determined. The site does have access to natural gas from a major pipeline that brings gas from Mexico's south into the City of Chihuahua. There is also discussion about building a gas pipeline from the Samalayuca plant to Chihuahua.

The Federal Electricity Commision (CFE) will also be issuing bids for reconversion of the nearby 399 megawatt Francisco Villa Thermoelectric Plant located in Delicias.

Site

The plant will be located 30 kilometers to the southeast of the City of Chihuahua along Route 45 in El Encino.

Project Status

The project is one of six CFE priority electric generation projects to be bid in 1996. The schedule is as follows:

Release of Request for Bids:	Late October to Mid November, 1996
Award of Bid:	June 15, 1997
Initiation of Construction:	April 1, 1998
Commercial Operation:	July 1, 2000 (Unit I)
	January 1, 200 (Unit II)

The Secretariat of Energy has not made a final determination whether the plant will be bid under a build-lease-transfer (BLT) or an Independent Power Producer (IPP) scheme. The Secretariat has solicited comments on financial structures from national and international power companies and it is currently evaluating these comments.

Equipment & Services Demand

Equipment and services for the facility will include:

- Gas and Steam Turbines
- Compressors
- Feedwater and Circulating Pumps
- Conceptual, Design and Basic Engineering
- Construction Management
- Water Systems
- Air Pollution Control Systems
- Heat Recovery Steam Generators (HRSGs)
- Electric Switchgear
- Distributed Control Systems

Nature of Demand

The State of Chihuahua is driven by its industrial centers in Chihuahua and Ciudad Juárez. These centers are expected to continue to grow, with increased trade and investment generated by the NAFTA treaty.

Electricity demand in the Chihuahua region grew at an annual rate of 5.2 percent over the past decade. CFE forecasts that the region will continue to enjoy strong demand growth of approximately 4.5 percent per year over the next eight years.

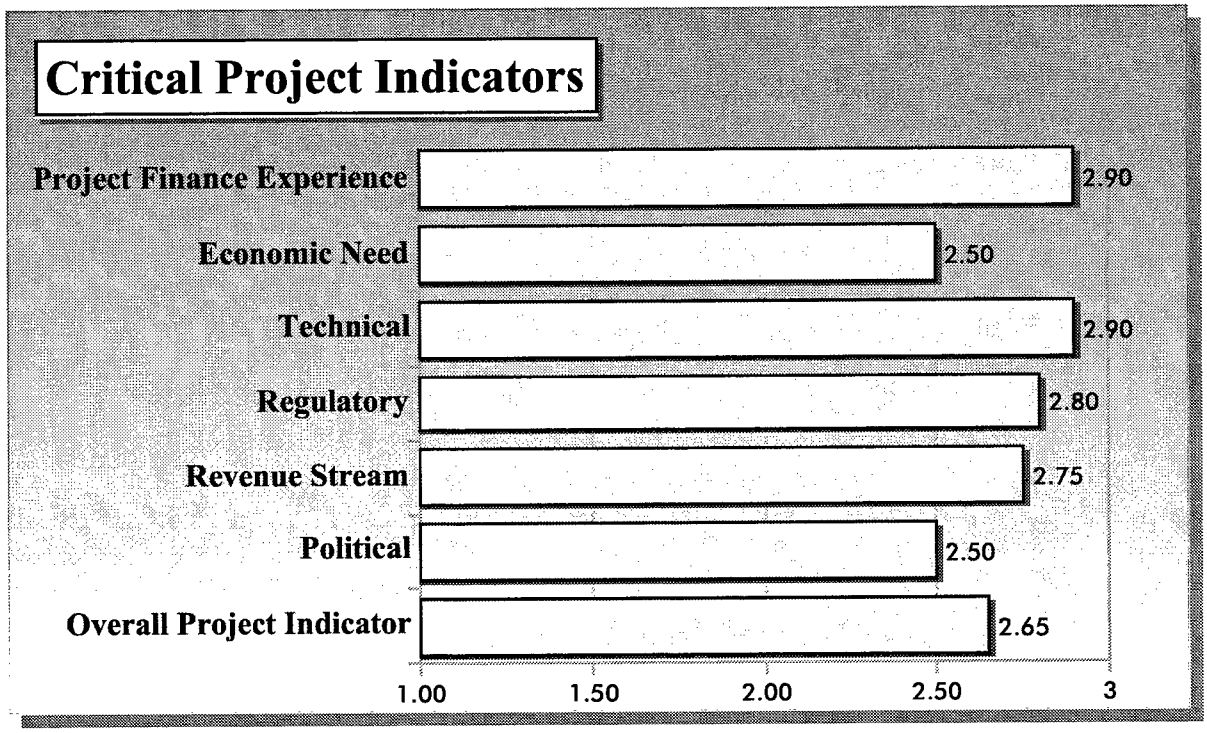
Project Assessment

The project is a priority for CFE, due to the expected continued industrial growth of Mexico's northern border. The project will involve either a long term lease or power purchase agreement with CFE. Successful financing of the Samalayuca plant indicates that developers are willing to accept long term CFE payment risk.

CFE has also demonstrated a willingness in the case of Mérida III to ensure against environmental risk. It is expected to issue similar guarantees for this facility. CFE will also likely agree to dollar payments for dollar denominated costs for capacity, operations and maintainance.

Gas supply should not be an issue, given its availability in the Chihuahua area. Also, Chihuahua has been designated a gas distribution zone and will soon have a privately operated gas distribution system.

Critical Project Indicators



Key Decision Makers

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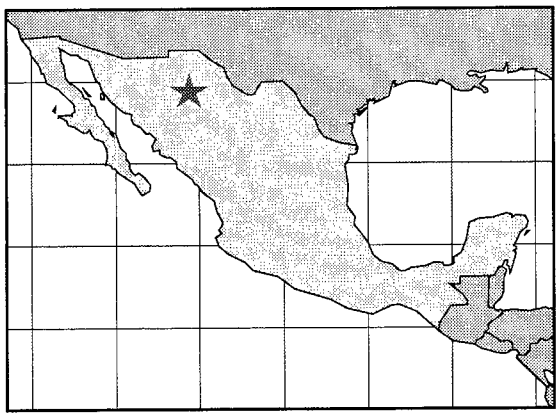
Energy/ Gas Pipeline

Samalayuca-U.S. Border Gas Pipeline



Project Summary

Project No:	**ENE-13**
Subsector:	**Natural Gas**
State/Region:	**Chihuahua**
Project Cost:	**$30 million**
Export Potential:	**$19 million**
Owner:	**CFE**

With the advent of construction work on a major new thermoelectric facility in Samalayuca, the Federal Electricity Commission (CFE) has issued a request for bids on a pipeline to carry gas from the U.S. border to the facility.

Technical Description

The project involves the construction of a 70-kilometer pipeline from the U.S. border crossing at San Agustín Valdivia to the Samalayuca I and II facilities. CFE will designate the exact route in Mexico and will obtain all the necessary rights of way. For the most part, the pipeline will traverse uninhabited desert terrain.

The pipeline must have the capacity to carry 171.98 x 10^9 British Thermal Units (BTUs) per day. Gas will be supplied from the South Texas natural gas distribution network. The terminal points of the pipeline will be the Samalayuca I facility (existing) and the Samalayuca II facility (under construction). Both are located in the municipality of Samalayuca, State of Chihuahua.

CFE is already planning an extension of this pipeline to Ciudad Chihuahua to supply a planned 450 megawatt facility in that city.

Site

The project will run 70 kilometers from the Mexican border town of San Agustín Valdivia to the Samalayuca facility.

Project Status

CFE announced the bid for the project on August 1, 1996. The project will be bid on the basis of the lowest transportation cost offered to CFE. CFE will then enter into a 10-year transportation services contract with the winning bidder.

Bids will be opened on October 31, 1996. Operation of the pipeline is expected to commence by December 20, 1997.

Equipment & Services Demand

The project will require financing, natural gas piping, compressor stations, measuring equipment, environmental services, engineering and construction services, and pipeline operations.

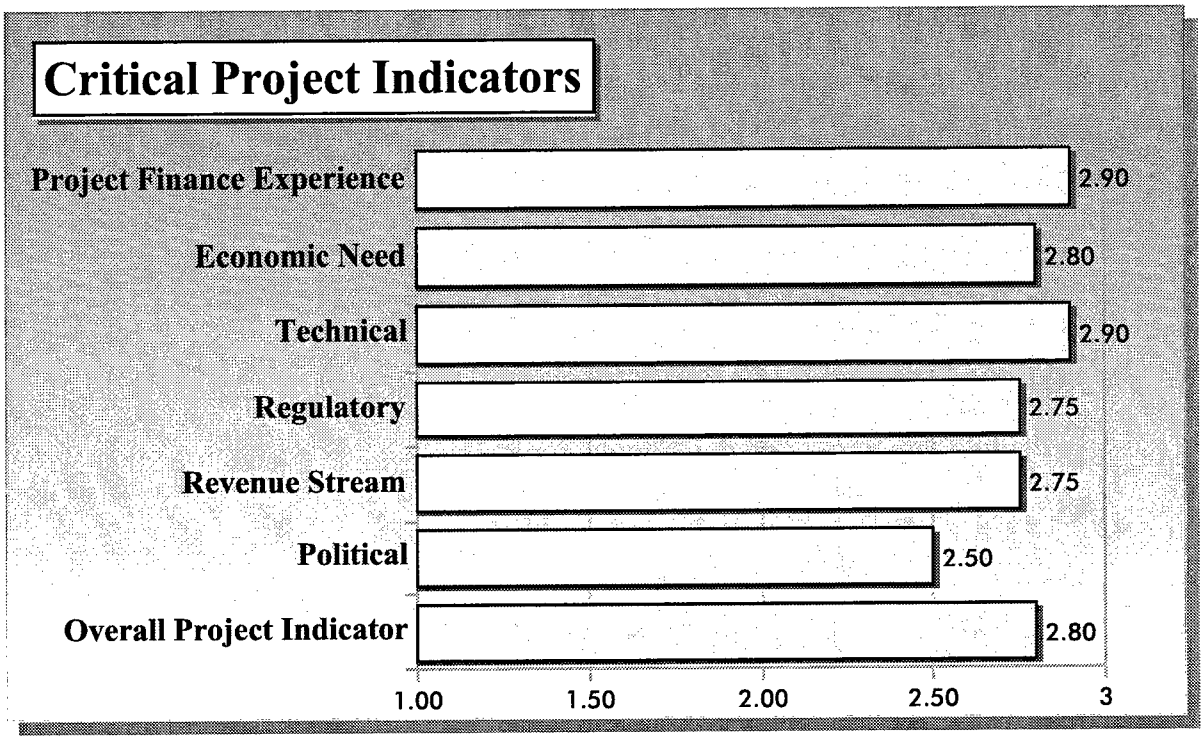
Nature of Demand

The project is required to support the Samalayuca II project which is now under construction and future expansion of gas sales into northern Mexico. The project is expected to be the first leg of a longer extension of the pipe line to Chihuahua, where the CFE will be issuing bids for the building of a 450 megawatt gas fired facility. Chihuahua has also been designated a gas distribution zone. Overall demand in the zone is expected to be high.

Project Assessment

This is a straightforward and viable project made necessary by the construction of Samalayuca II thermoelectric plant. The winning bidder will receive a 10-year transportation contract and will assume responsibility for the design, construction, and operation of the pipeline. The winning bidder is responsible for obtaining all required permits including the necessary permission to cross the U.S./ Mexican border. CFE is responsible for all issues related to rights of way. The project does carry long term CFE payment risk. Gas will be supplied from the U.S. and there will be no contracts involving Pemex.

Critical Project Indicators



Key Decision Makers

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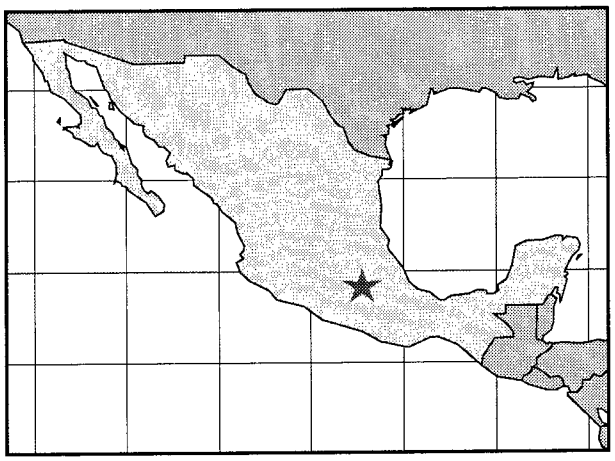
Energy/ Natural Gas

Mexico Gas Distribution Zone



Project Summary

Project No:	**ENE-14**
Subsector:	**Natural Gas**
State/Region:	**Federal District**
Project Cost:	**$1 billion**
Export Potential:	**$400 million**
Owner:	**CRE**

Technical Description

The Secretariat of Energy has invited proposals for the design, construction, and operation of a natural gas distribution system in the Mexico City Metropolitan Area, as a result of new legislation passed in 1995 which opened natural gas transportation and distribution to private sector participation. This project (estimated cost: US$1 billion) will require the construction of transmission and distribution lines for both residential and industrial use. Exact technical specifications are to be determined by the bidder, though the project must conform to international safety standards. Natural gas for the project will be supplied by Pemex, which retains exclusive control over the production of oil and gas.

The Secretariat of Energy is considering two models for the gas distribution project: offering one operating permit for the entire region, or dividing the region into several areas and holding multiple bids. The operating model shall be decided upon by the beginning of 1997 after a preliminary study of the project and the level of interest expressed by potential bidders.

Private Sector Gas Distribution Program

The Secretariat of Energy has officially invited both foreign and domestic investors to present plans to develop gas distribution systems in ten separate regions. The winning bidders of each will be granted a 12-year operating permit. Specific terms will be determined following an analysis of the level of interest expressed by potential bidders. The Secretariat has defined zones to encompass the following areas:

Zone	Area
Bajío	León, Samalayuca, Celaya, Irapuato
Mexico City	D.F. and surrounding municipalities
Cuernavaca	Cuernavaca
Hermosillo	Hermosillo
La Laguna	Torreón, Coah, Gómez Palacio, Lerdo
NW Baja California	Tijuana, Rosarito, Ensenada, Tecate
Pachuca	Pachuca
Querétaro	Querétaro, San Juan del Río
Tampico	Tampico, Madero, Altamira
Toluca	Toluca and surrounding municipalities

Source: Secretariat of Energy

The Mexico City gas distribution zone is the largest and may be broken down into two or more smaller zones.

Site

The Mexico City gas distribution zone also includes the following surrounding municipalities: Acolman, Atenco, Atizapán de Zaragoza, Coacalco, Cuautitlán, Chalco, Chicoloapan, Chimalhuacán, Ecatepec, Huixquilucan, Ixtapaluca, Jaltenco, Melchor Ocampo, Naucalpan, Nezahualcóyotl, Nextaplan, Nicolás Romero, La Paz, Tecámac, Teoloyucán, Texcoco, Tlalnepantla, Tultepec, Tultitlán, Zumpango, and Cuautitlán Izcalli.

Project Status

CRE has officially announced the Mexico City distribution project, but it has yet to define the exact geographic area which the project is to cover. The Secretariat of Energy is scheduled to define final project specifications by the end of the first quarter of 1997, after which the project should go to bid.

Equipment & Services Demand

The project will require the following equipment and services:

- Steel and Polyethylene Piping
- SCADA Systems
- Hardware and Software Billing Systems
- Gas Meters
- Compressors
- Pressure Regulating Stations
- Engineering and Construction Services
- Legal Services

Nature of Demand

The Mexico City zone has both a large residential population (approximately 20 million) and a high industrial density. Industrial consumers account for up to 55 percent of electric energy sales, and industrial growth is driving the current demand for energy. There is also pressure on manufacturers to use natural gas as a way to reduce particle emission and comply with air pollution standards.

Projected consumption for the region is 312.8 million cubic feet per day as follows:

Projected Gas Consumption Based on Current Fuel Use in Mexico City

Sector	Projected Volumes (cubic feet per day)
Industrial	138
CFE Power Plants	28.7
Residential	141.3
Fuel Oil Consumers	4.8
Total	312.8

Source: Secretariat of Energy

Legend

No.	City	No.	City	No.	City	No.	City
2	Acolman	31	Chimalhuacán	58	Nezahualcóyotl	99	Texcoco
11	Atenco	33	Ecatepec	59	Nextlalpan	104	Tlalnepantla
13	Atizapán de Zaragoza	37	Huixquilucan	60	Nicolás Romero	108	Tultepec
20	Coacalco	39	Ixtapaluca	70	La Paz	109	Tultitlán
24	Cuautitlán	44	Jaltenco	81	Tecámac	120	Zumpango
25	Chalco	53	Melchor Ocampo	91	Teoloyucán	121	Cuautitlán Izcalli
29	Chicoloapan	57	Naucalpan	95	Tepotzotlán		

During 1995, natural gas consumption accounted for 16 percent of total domestic fossil fuel consumption in Mexico. However, consumption is projected to grow to 45 percent by the year 2004 due to number of factors:

- The Federal Electricity Commission (CFE) and independent power producers are moving forward with the construction of gas-fired combined cycle plants, which will be brought on line soon.
- CFE is converting a number of existing thermoelectric plants to gas.

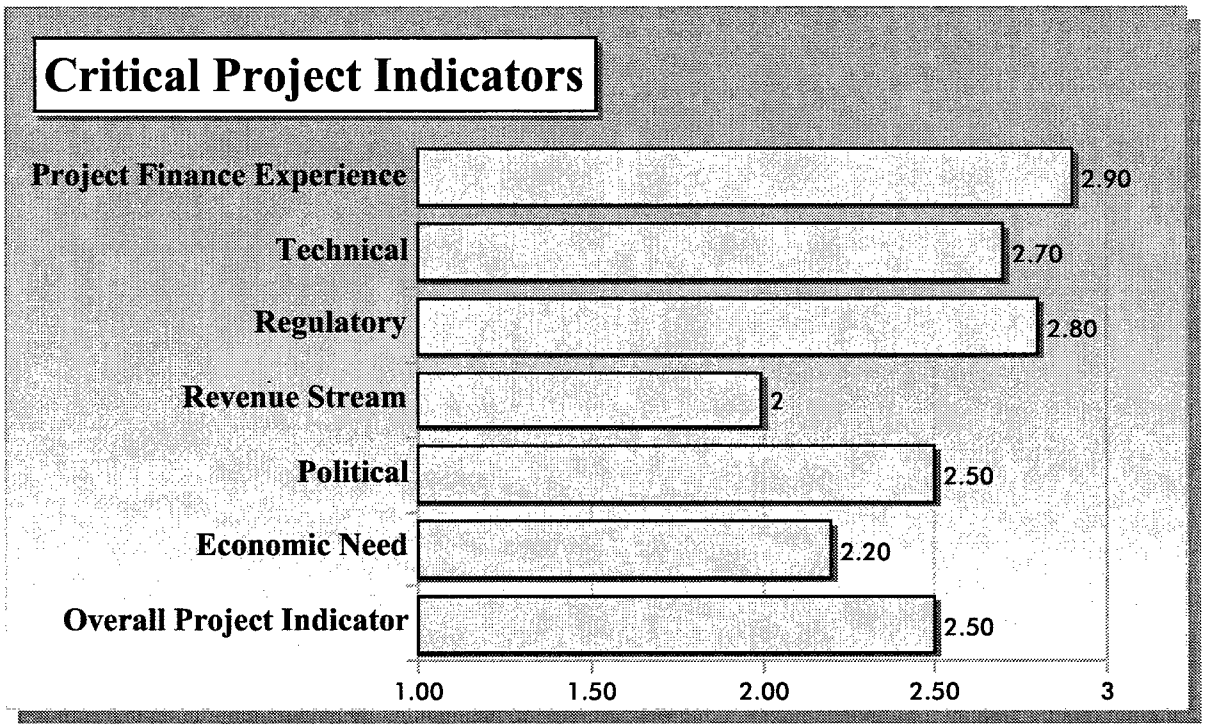
As a result, combined-cycle plants burning natural gas should account for 80 percent of the additional power capacity requirements for the next ten years. CFE is preparing for a major addition to its generation capacity. To prepare for the new generation capacity to come on line, CFE will launch an investment program worth US$4 billion in power transmission improvements between 1996 and 2004.

Project Assessment

Project sponsors will need to undertake an aggressive marketing effort to convince residential, commercial and industrial users to choose natural gas over existing fuels.

Given that this gas distribution system will be an urban area that will mostly use existing public rights of way, it is not anticipated that such issues will negatively impact the project. Under the natural gas regulations, the CRE can declare rights of way across private lands, but this authority has yet to be tested under the new program. Likewise, because of the urban environment, it is unlikely that these will be problematic. However, this project will involve peso revenue streams for a dollar denominated commodity, which could cause payment difficulties as a result of currency fluctuations.

Critical Project Indicators



Key Decision Makers

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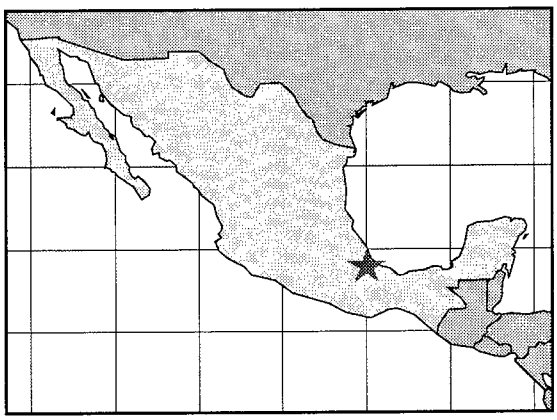
Energy/ Power Transmission

Southeast Power Transmission Project



Project Summary

Project No:	**ENE-15**
Subsector:	**Power Transmission**
State/Region:	**Southeast Mexico**
Project Cost:	**$33.2 million**
Export Potential:	**$9million**
Owner:	**CFE**

The Federal Electricity Commission (CFE) will be conducting bidding for electric power transmission projects in order to upgrade its transmission network. Each project package will consist of a number of individual projects within a given region. After years of insufficient investment, CFE is prioritizing the upgrade of its transmission network through a series of Build-Lease-Transfer (BLT) projects.

The Mexican power transmission system is interconnected by a transmission grid composed mainly of 400-, 230- and 115-kilovolt transmission lines, covering the entire country with the exception of the Baja California Peninsula. CFE's goal is to increase the length of transmission lines to 21,000 kilometers with substation capacity to be increased to 43,000 MVA. Total projected investment in transmission is US$2.37 billion between 1996 and 2000, and US$1.55 billion between 2000 and 2004.

Technical Description

CFE is upgrading its transmission network in the Yucatán Peninsula as part of the overall plan to better serve this region of Mexico. The project consists of the construction of 20 substations each with capacity ranging between 20 to 33 MVA. The total substation capacity to be built totals 733.32 MVA. The project also calls for building 80 kilometers of 230-kilovolt transmission lines from Nizuc to Playa del Carmen.

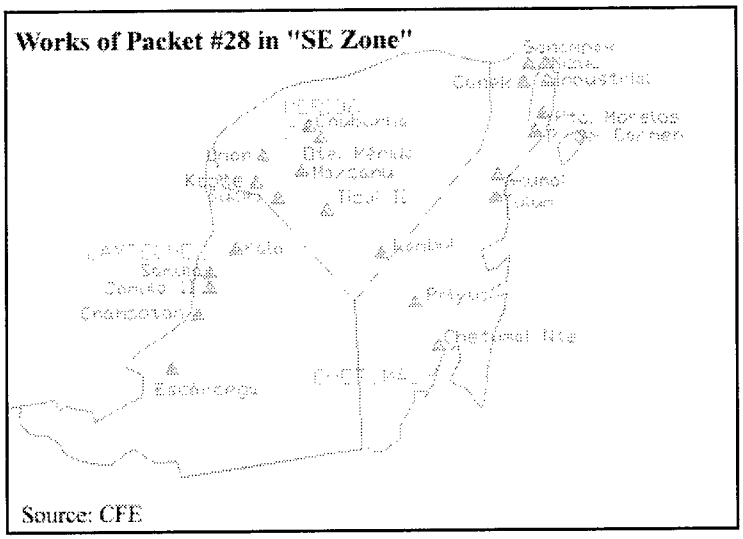
Substation Specifications

Name	MVA	Voltage	Kilovolts
Playa de Carmen	33.3	230	115
Escarcega Potencia Bco 4	33.3	230	115
Tulsum	20	115	34.5
Samula	20	115	34.5
Champoton	20	115	34.5
Bonampak	30	115	13.8
Escarcega Potencia Bco 3	20	115	13.8
Kopte	20	115	13.8
Chetumal Norte	30	115	13.8
Kala	20	115	13.8
Kambul	20	115	13.8
Canek	30	115	13.8
Polyuc	20	115	34.5
Oriente Mérida	30	115	13.8
Akumal	20	115	13.8
Industrial	30	115	13.8
Samula II	30	115	13.8
Chamburna	40	115	13.8
Uman	30	115	13.8
Maxcanu	20	115	34.5
Nizuc	n.a.	230	n.a.
Puerto Morelos	30	115	13.8
Sucila	20	115	13.8

Source: CFE

Site

The projects covers the entire Yucatán Peninsula, which includes the Mexican states of Quintana Roo, Yucatán, and Campeche.



Source: CFE

Project Status

This project was delayed due to the economic crisis in 1995, but CFE is seeking to move forward again with its BLT transmission program. The project is now scheduled to open bidding in September 1996, after which it will evaluate proposals for the transmission lines and substations.

Equipment & Services Demand

The project offers opportunities for U.S. companies in specialized services as well as equipment:

- Engineering Services
- Environmental Services
- Transformers
- Substations
- Cables
- Transmission Structures
- Switches
- Construction Management
- Financing

Nature of Demand

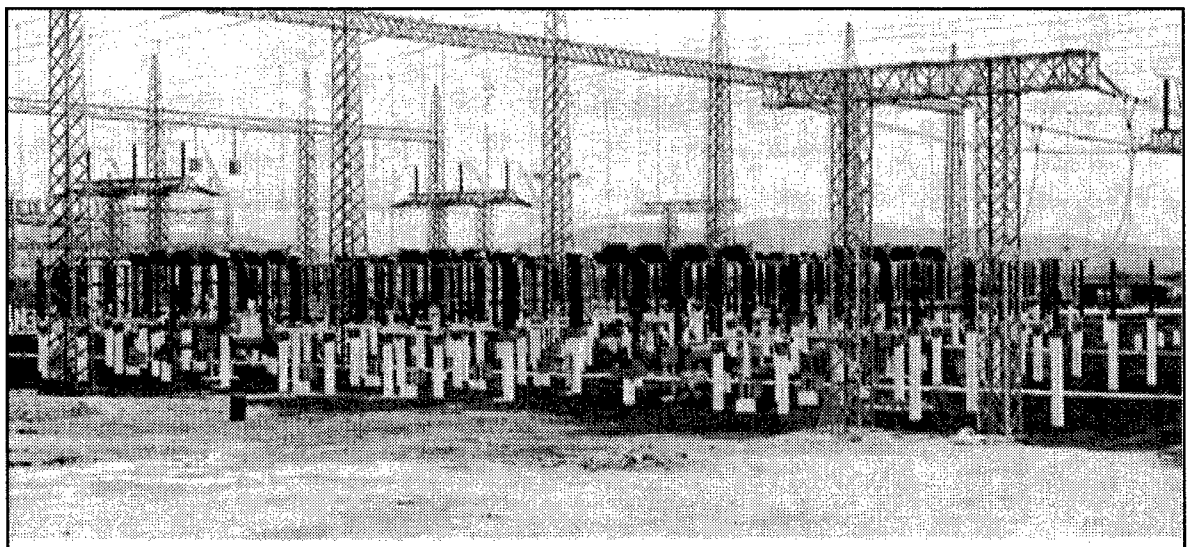
Because investment has lagged behind demand in recent years, bottlenecks in Mexico's transmission system have increased. In addition to overcoming bottlenecks, CFE aims to reduce transmission losses.

This transmission package is necessary to meet the growing need for power on the Yucatán Peninsula and to efficiently transmit the power from the Mérida III Gas-Fired Power Plant. With power demand forecasted to grow by 7.2 percent over the next eight years, the Yucatán Peninsula is expected to have the second highest electric power demand growth for anywhere in Mexico. Over the past 10 years, electric power demand on the Peninsula has grown by 8.2 percent. Growth in demand is driven by the region's strong tourist industry, which is expected to keep growing.

Project Assessment

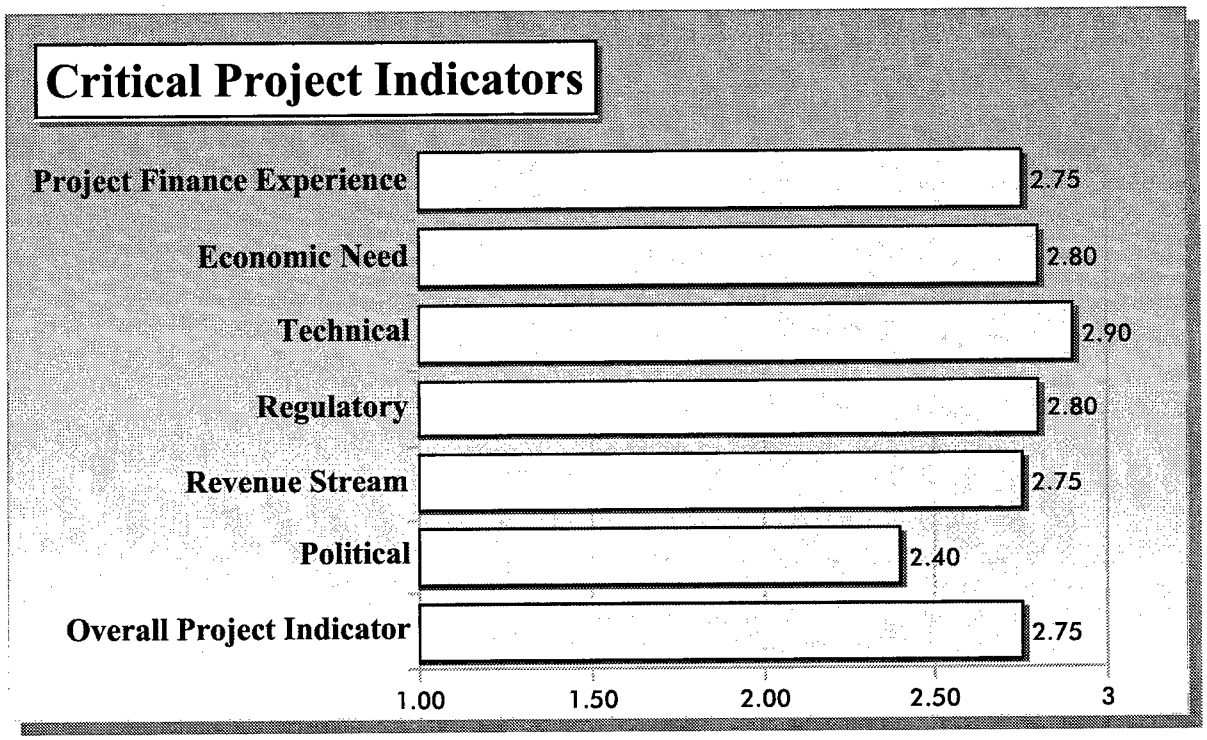
As a BLT project, the central question revolves around CFE's credit risk. Although CFE's balance sheet is suffering from low electric power tariffs, it has been given a financial stamp of approval by power developers. It is assumed, although not known, that the BLT contract will afford some protection from devaluation risk.

The project does involve substantial construction in the ecologically sensitive Yucatán Peninsula and environmental issues will need to be closely managed. At the same time, the project does not involve construction of a particularly risky nature from an environmental perspective.



Power Sub-Station

Critical Project Indicators



Key Decision Makers

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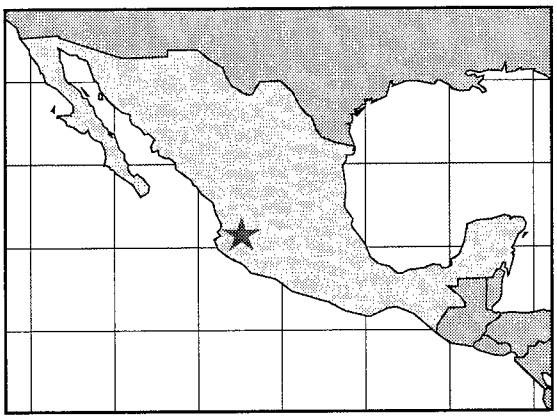
Energy/ Power Transmission

Western Power Transmission



Project Summary

Project No:	**ENE-16**
Subsector:	**Power Transmission**
State/Region:	**Western Mexico**
Project Cost:	**$38.9 million**
Export Potential:	**$10 million**
Owner:	**CFE**

After years of insufficient investment in transmission infrastructure, the Federal Electricity Commission (CFE) is prioritizing a series of private sector projects to improve its substations and transmission lines. The transmission investment program is valued at almost US$4 billion over the next eight years. Between 1996 and 2000, CFE plans to invest approximately US$2.37 billion in transmission infrastructure. Between 2000 and 2004, it will invest approximately US$1.55 billion. CFE will involve the private sector through a series of Build-Lease-Transfer (BLT) bids, each consisting of a package of individual substation and transmission line subprojects.

CFE's investment program will increase the transmission network to 21,000 kilometers and substation capacity to 43,000 MVA. Mexico's principal interconnected transmission grid — composed mainly of 400, 230 and 115 kilovolt transmission lines — covers virtually the entire country with the exception of the Baja California Peninsula, which has a separate grid.

Technical Description

CFE is upgrading its transmission network in Western Mexico. The US$38.9 million BLT project consists of the construction of substations which will increase the transmission capacity to 1,305 MVA. Two of the largest substations have capacities of 100 MVA and 125 MVA, respectively. CFE is looking for both Mexican and international firms to participate in the bidding.

Site

Substations will be located in Western Mexico in the states of Jalisco, Morelia, Aguascalientes, Colima and Guanajuato. This region has a high population density and its economy is driven by agriculture and by a growing industrial base. Its food processing and apparel industries are particularly strong.

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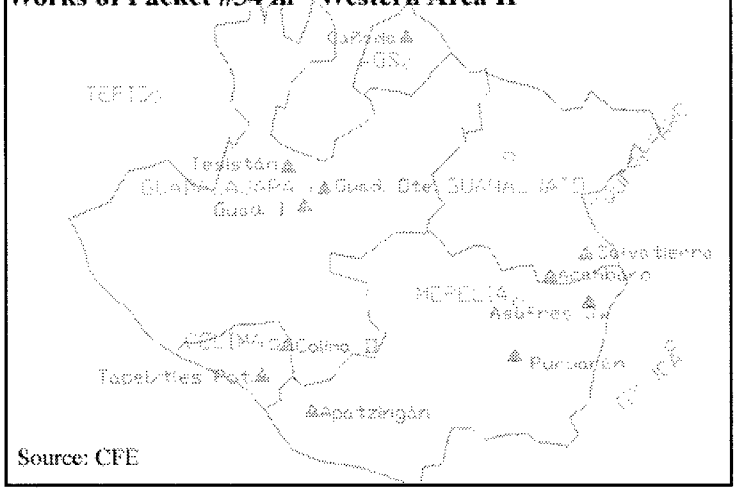


Source: CFE

Project Status

Because of the economic crisis in 1995, the execution of CFE's transmission investment program has been delayed. Now CFE wants to move forward with its first BLT transmission bids. The Western Power Transmission Project is now scheduled to open prequalification in September 1996, at which time CFE will begin prequalifying companies to submit full proposals.

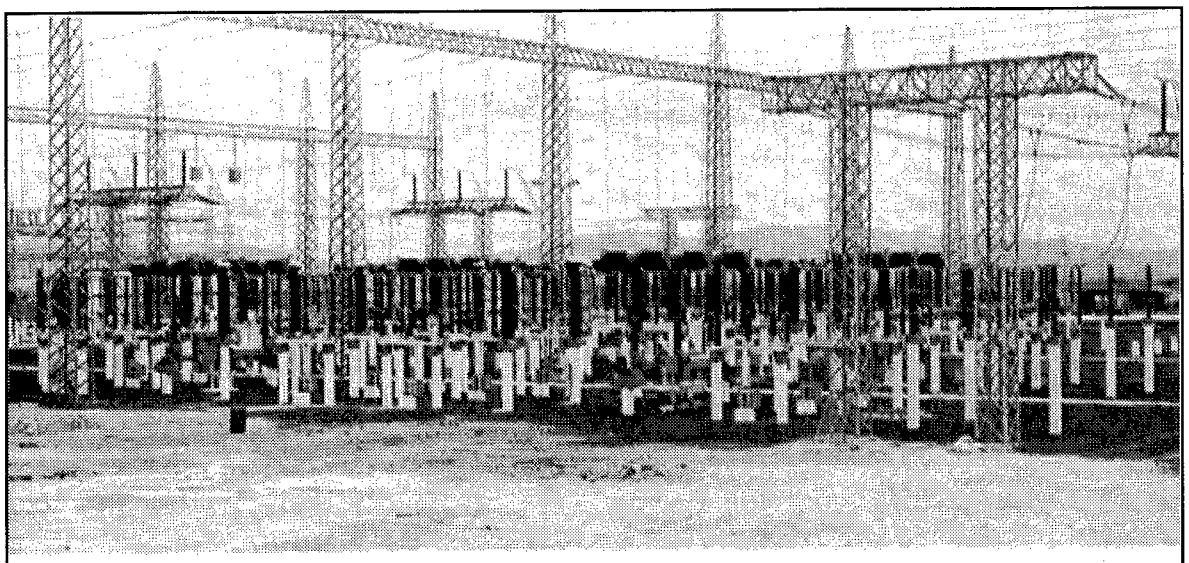
Construction is expected to begin in early 1997, with the first substations to be completed by October 1997. The entire project will be concluded by the last quarter of 1998.

Equipment & Services Demand

Principal opportunities for the export of goods and services include:

- Engineering Services
- Environment Services
- Transformers
- Substations

- Cables
- Transmission Structures
- Switches
- Construction Management
- Financing



Power Sub-Station

Nature of Demand

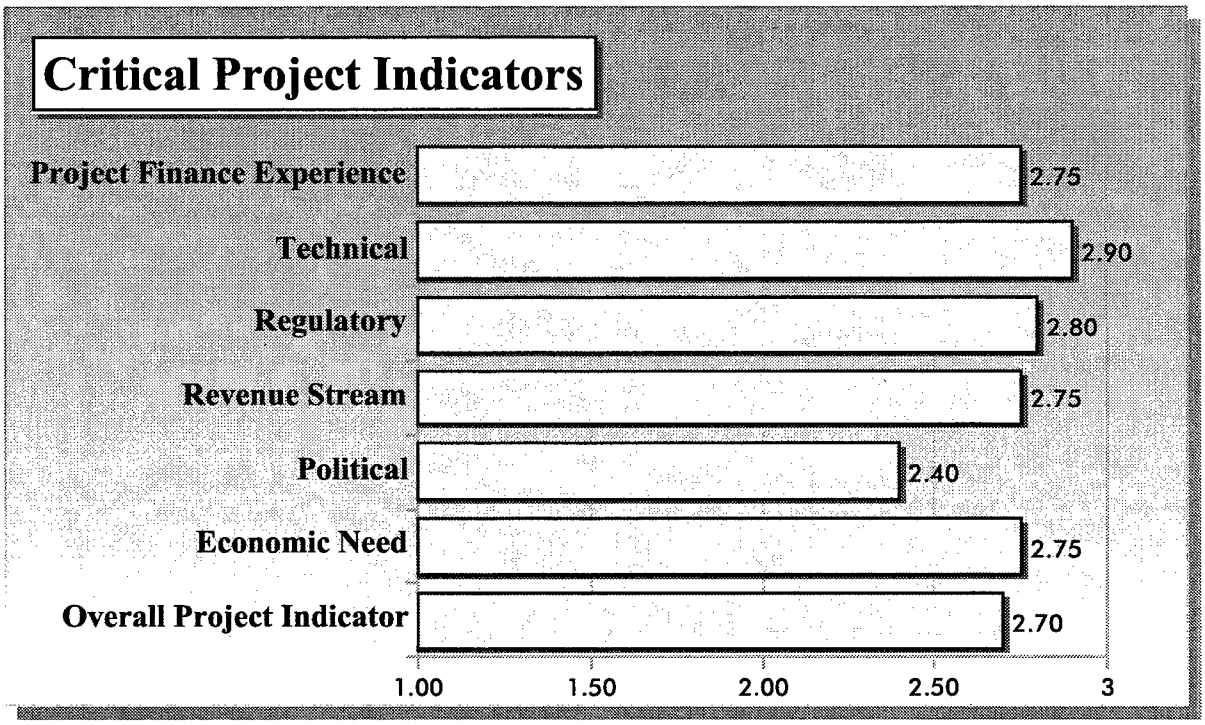
CFE's investment program results from its need to reduce transmission losses and bottlenecks which have become progressively worse in recent years. Underinvestment has taken its toll on the efficient functioning of the transmission grid.

The Western Power Transmission Project is necessary to improve and expand the capacity of the system in the Western Region, particularly the area around the City of Guadalajara. Guadalajara is Mexico's second largest city and is an important center for agriculture, food processing, and high technology. The region's electric demand grew by 5.5 percent over the past decade and CFE is forecasting an additional 5.3 percent growth over the next eight years.

Project Assessment

As a BLT project, the central question concerns CFE credit risk. Although CFE's balance sheet is suffering from current low electric power tariffs, it has been given a financial stamp of approval by power developers as a result of the closing of the Samalayuca II Thermoelectric Project. It is assumed, although not known, that the BLT contract will afford some protection from devaluation risk.

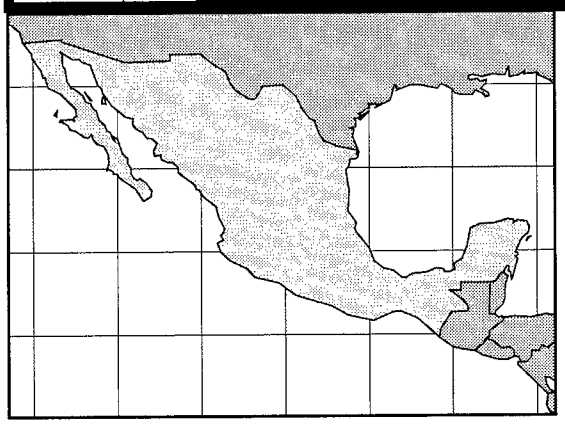
Critical Project Indicators



Key Decision Makers

Company	**Federal Electricity Commission (CFE)**
Name	Ing. Julio Ruíz Guerrero
Title	Coordinator, Transmission and Transformation Project Unit
Location	México, D.F.
Phone	(52-5) 525-0697
Fax	(52-5) 207-6288

Environmental Sector Overview

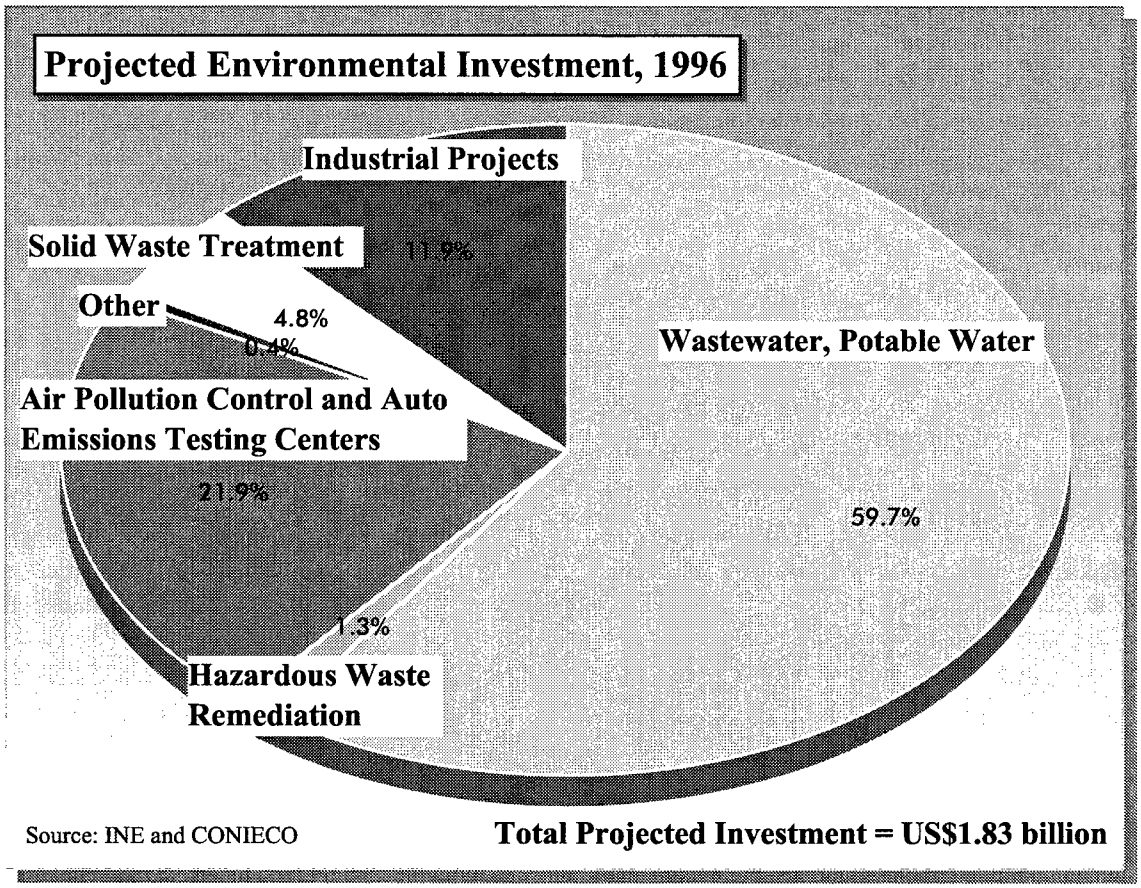


OVERVIEW

The Green Industry

Throughout the last decade, the Mexican market for environmental equipment and services was driven by rising environmental standards. This began with the comprehensive environmental legislation, the General Law for Environmental Protection and Ecological Equilibrium of 1988. In addition, as a result of the NAFTA treaty and environmental side agreements, companies and municipal governments were required to take even more decisive steps toward implementing programs of pollution prevention, control, and recycling. The result was a steady increase in environmental investment that reached US$1.5 billion in 1994 and US$2 billion in 1995, according to the National Ecology Institute (INE) and the National Council of Environmental Industries (CONIECO). Due to the economic crisis, INE is predicting a decline in environmental investment of nine percent for a total of US$1.83 billion in 1996. The breakdown of projected investments for 1996 is as follows:

- 59.7 percent Wastewater and Potable Water
- 21.9 percent Auto Pollution Control and Auto Emissions Testing Centers
- 11.9 percent Solid Waste Treatment
- 4.8 percent Industrial Projects
- 1.4 percent Hazardous Waste Remediation
- 0.3 percent Other



REGULATORY FRAMEWORK

Environmental Law

Mexico's environmental regulatory framework is based on the 1988 General Law for Environmental Protection and Environmental Equilibrium. To complement this law, most Mexican states have passed their own environmental legislation. Since 1988, Mexico's environmental framework has been further defined by the passage of four important regulations:

- Regulation to the Law for the Prevention and Control of Atmospheric Contamination
- Regulation to the Law of Hazardous Waste
- Regulation to the Law for Environmental Impact
- Regulation to the Law for Pollution Prevention and Control of Pollution Generated by Motor Vehicles that Travel in the Federal District and Surrounding Municipalities

The following are important dates in the development of key environmental legislation, practices, and institutions:

1940	President Lázaro Cárdenas issues decrees regulating hazardous practices by industrial and commercial establishments.
1960	First atmospheric particulate testing undertaken.
1970	Central Coordinating Committee for Environmental Improvements is formed.
1971	Federal Environmental Pollution Prevention and Control Law is approved.
1987	Two amendments to the Constitution authorized the federal Congress and the Representative Assembly of the Federal District to issue laws distinguishing the roles of federal, state, and local authorities to protect the environment.
1988	General Law for Environmental Protection and Ecological Equilibrium is enacted.
1992	The Secretariat of Social Development (SEDESOL) replaces the Secretariat of Urban Development and Ecology (SEDUE) as the primary environmental coordinating agency. SEDESOL opens offices throughout the country to facilitate federal/local cooperation in the enforcement of environmental standards.
1994	The Secretariat of Environment, Natural Resources, and Fisheries (SEMARNAP) assumes the environmental policy and enforcement authority held by SEDESOL and other secretariats.

Environmental Institutions

The principal institution that regulates the environment is the Secretariat of Environment, Natural Resources, and Fisheries (SEMARNAP) and its agencies: the National Water Commission (CNA), the Attorney General for Environmental Protection (PROFEPA), and the National Ecology Institute (INE). These entities are responsible for environmental policy and enforcement. The operation of environmental services such as solid waste collection and potable water supply are municipal functions that must receive approval from federal agencies.

Counter to the trend elsewhere in Latin America, these institutions are still relatively centralized, although they have offices in most states, and the states have been granted some authority in this area. Certainly the states and municipalities are asserting themselves to a greater degree today than ever before. In a rather controversial case, INE gave all necessary permits for the construction of a hazardous waste facility in the state of San Luis Potosí. The municipality however, successfully blocked the project by finding a reason to deny the company the building permits. INE, conscious of its experience in San Luis Potosí, is taking the extra step of giving the state final approval over sites chosen under its new hazardous waste disposal framework, CIMARIS.

- **SEMARNAP** The Secretariat of the Environment, Natural Resources, and Fisheries is the cabinet level department created in 1994 by President Ernesto Zedillo to centralize these environmental duties previously assigned to other secretariats and agencies, including the Secretariat

for Social Development (SEDESOL), the Secretariat for Agriculture and Water Resources (SARH), and the Secretariat of Fisheries (SEPESCA). SEMARNAP controls a number of autonomous policy and enforcement bodies including CNA, INE, and PROFEPA.

- **CNA** A decentralized agency under SEMARNAP, the National Water Commission (CNA) sets water standards and plays an important role in coordinating Mexico's water policy. CNA has jurisdiction over federal waters and issues its regulations and permits regarding discharges into these waters. It is responsible for issuing concessions to private companies for the use of federal waters. It also oversees investment in water infrastructure.

- **INE** The National Ecology Institute formulates and evaluates environmental standards. It is SEMARNAP's autonomous agency responsible for reviewing environmental impact assessments and regulating environmentally hazardous activities.

- **PROFEPA** The Office of the Attorney General for Environmental Protection (PROFEPA), a decentralized agency under the control of SEMARNAP, is charged with enforcement of environmental policy. PROFEPA is the most important agency with regard to environmental audits and the verification of standards. PROFEPA has offices in the states to coordinate enforcement with state and local authorities.

Enforcement

Since 1991, enforcement of environmental regulations has become increasingly strict. Enforcement was strengthened further with the creation of PROFEPA in 1992. Both the amount of fines and the frequency of inspections of industrial facilities increased. Inspections rose from approximately 7,000 in 1992 to more than 20,000 in 1993. However, because of the 1995 recession, pressure from cash-strapped companies and municipalities resulted in a relaxation of Mexico's enforcement efforts. In 1995, PROFEPA did not meet its goals set out at the beginning of the year, and carried out almost 14,000 inspections. As a consequence it succeeded in 206 partial plant closings and 67 total closings.

Environmental Inspections of Industrial Plants, 1995

Findings	Valley of Mexico	Rest of Mexico	Total
Partial Closings	63	149	212
Total Closings	2	66	68
Slight Irregularities	1,980	7,075	9,055
No Irregularities	2,261	2,397	4,658
Total			13,993

Source: PROFEPA

Financial Institutions

Other institutions that will have an impact on the environmental sector will be Mexico's financial institutions. BANOBRAS, Mexico's state development bank, plays a key role in financing municipal and other projects in the environmental sector. BANOBRAS is implementing a new program to assist state governments in implementing municipal water projects. This program will guarantee the payment of operating and maintenance fees and investment recovery up to an equivalent of six months of operation. States that want to participate must pass a law authorizing the use of the states' shares as collateral.

The Mexican Government recently set up a new fund within BANOBRAS, the Development and Infrastructure Trust Fund (FINFRA), that could serve as a source of financing for water projects. FINFRA contributes equity and/or loans for the construction of projects in regions of the country that do not possess sufficient resources.

A potentially important role may also be played by two bilateral institutions established by environmental side agreements to NAFTA: the North American Development Bank (NADBank) and the Border Environmental Cooperation Commission (BECC). Established by NAFTA to finance environmental projects in the U.S.-Mexico border region, the BECC provides technical certification of all project proposals that are then sent to NADBank to be evaluated for eventual financing.

In 1996, the BECC certified eight projects, four of which are located in Mexico: the US$8 million water reuse plant in Ensenada, Baja California; a US$39 million water supply and distribution project in Nogales, Sonora; a US$700,000 water supply and wastewater treatment project in Naco, Sonora; and a US$1 million secondary treatment plant for non-process wastewater at the FINSA Industrial Park in Monterrey. In August 1996, NADBank gave preliminary approval to provide financing for its first two projects: FINSA and Naco.

TRENDS AND OPPORTUNITIES

Municipal Wastewater

Unable to provide adequate funds for sanitation infrastructure, many Mexican municipalities turned to the private sector under a program begun in 1992 to promote municipal wastewater concessions. Between 1992 and 1994, over 11 cities awarded BOT wastewater concessions. The economic crisis, however, put this ambitious program on hold, as it placed a severe strain on municipal governments and on concessionaires. As a result, a number of the concessioned plants were never built.

Wastewater Plants Awarded in Concessions, 1992-1994

			Capacity	Cost	Tariff	Awardee
City	State	Unit	cu. meters per sec.	US$ millions	US$/cubic meter	
Chihuahua	Chihuahua	North	27.4	13.37	0.106	Atlatec
		South	2.5	21.89	N/A	Atlatec
Ciudad Júarez	Chihuahua	North	2.5	20.65	0.106	Degremont
		South	1	11.04	0.115	Degremont
Ciudad Obregón	Sonora	North	0.8	7.88	0.087	Tafer
		South	0.7	7.58	N/A	Tafer
Coatzocoalcos	Veracruz		0.5	8.96	0.086	Obras Portuarias
Cuernavaca	Morelos		0.6	17.44	0.086	U.S. Filter
Hermosillo	Chihuahua		2.5	30.3	N/A	N/A
Matamoros	Tamaulipas	Tlacaelel I	0.5	N/A	N/A	Tribasa
		Tlacaelel II	0.35	N/A	N/A	Tribasa
Minatitlán	Veracruz		0.35	4.48	0.091	Obras Portuarias
Nuevo Laredo	Tamaulipas		1.36	N/A	N/A	Atlatec
Puebla	Puebla	B. del Conde	0.578	N/A	N/A	GMD
		San Francisco	1.393	N/A	N/A	GMD
		Atoyac Sur	0.377	N/A	N/A	GMD
		Parque Ecológico	0.565	N/A	0.086	GMD
		Alseseca Sur	0.587	N/A	0.091	GMD
Puerta Vallarta	Jalisco		1	18.41	0.236	Biwater
Toluca	Mexico	East	1	17.98	0.151	Ecosys
		North	1.25	19.74	0.132	Ecosys

Sources: CNA, CG/LA, and Sierra International

In spite of the economic difficulties facing private as well as public water and wastewater operators, a number of municipalities continued to award concessions in 1995 and 1996. In order to meet new water standards, many of these concessions required secondary treatment levels. A number of these

projects required an imported equipment component of around 30 percent of the project cost; these projects were seriously affected by the peso devaluation. The minimal increase in water tariffs did not match the rising costs of imported equipment. Some cities awarded concessions only to find that the concessionaires were in financial straits, lacked the proper technology, or faced difficulty in closing financing. The recession severely hurt the construction industry, the principal business of a number of concessionaires. Some concessions have been revoked and rebid.

On an informal level, enforcement of water standards, with BOD standards of 30 milligrams per liter for many municipalities, was relaxed in 1995. In August 1996, CNA distributed for comment a series of revisions that will officially lower water quality standards. This new approach will promote advanced primary treatment — most commonly implemented through a combination of aerated lagoons and chlorination — as a more affordable alternative which still achieves the goal of raising wastewater treatment above present levels.

With the support of federal, multilateral, and international assistance, several major new municipal projects are coming on line in Central Mexico:

- Valley of Mexico Wastewater Treatment Plants: The National Water Commission, the government of the State of Mexico and the Water Commission for Mexico City are planning to build three wastewater treatment plants with bids opening in January 1997. One plant will have a capacity of 44 cubic meters per second. The other two will have capacities of 15 cubic meters per second each. At this stage only primary treatment, including the application of chemicals, will be required as the effluent is intended to be used for irrigation. Secondary treatment is to be added in 15 years. The Japanese OECF is lending US$500 million in untied aid for this project and the remaining US$80 million will be provided by the Mexican government. This US$580 project represents the largest wastewater opportunity in Mexico today.

- Moctezuma Water Pipeline Project: The State Government of Puebla has given Construmex a permit to develop a 60-kilometer water pipeline with a capacity of 4 cubic meters per second in order to relieve Puebla's municipal water shortage. The project is expected to require an investment of US$100 million over the next 10 to 15 years.

Percentage of Population With Water and Sewage Service

Year	Water Supply	Sewage Service
1970	49	37
1980	70	49
1990	73	58
1995 (est.)	89	73

Source: World Bank/ INE

A rather innovative project is being undertaken by Monclova, Coahuila, a city with a population of over 200,000 people, which is working to provide wastewater treatment in partnership with local industry. Monclova — taking advantage of the financial position and expertise of private steel maker AHMSA — has arranged to pay the company to treat the city's wastewater. As Monclova currently provides little wastewater treatment, the US$8.5 million project will improve the quality of life for its residents, many of which work at the AHMSA plant. AHMSA, which was already in the process of contracting the construction of its own industrial wastewater plant, will operate the two plants simultaneously. In 1996 AHMSA opened bids on the design and installation of the plant. AHMSA will award the plant and have construction begun in early 1997. AHMSA has received bids from ten major consortia from Mexico, France, Canada, and the United States.

Industrial Wastewater

Industrial wastewater treatment is a smaller but important environmental market in Mexico. Companies are arguably in a better position, through their finance experience, to take on wastewater projects. However, companies which focused solely on domestic production have been squeezed in the economic crisis.

Pemex is moving forward with its plan to provide wastewater treatment at all of its refineries. In June 1996, construction began on the first integrated project for water supply, reuse, and treatment at its Cadereyta plant near Monterrey. Pemex awarded a long-term contract to CYDSA which will build and operate the plant at its adjacent facility. By 1999, all Pemex's facilities will have the use of similar treatment plants.

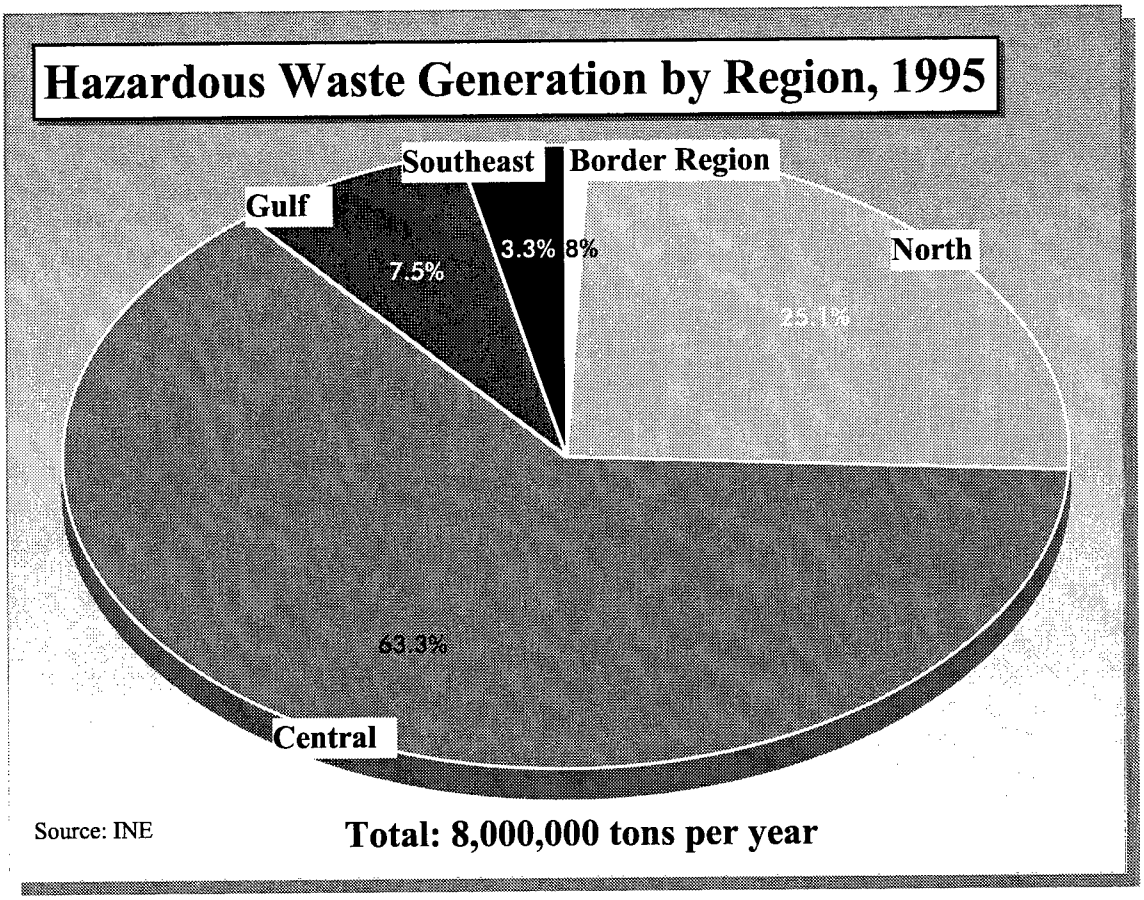
AHMSA is getting ready to close bids on an US$8 million wastewater treatment plant, in addition to the one serving the city of Monclova. The plant will treat industrial wastewater produced by sulfuric acid pickling lines and other production facilities.

Potable Water

As an arid country Mexico relies heavily on groundwater for its potable water sources. Mexico City, Monterrey and Guadalajara get most of their water from ground water. Although obtaining water from underground sources is cheaper than from rivers or lakes — US$0.09 versus US$0.21 by one estimate — groundwater pumping in Mexico is running into a number of risks. Groundwater faces exhaustion of supply, the threat of contamination from hazardous waste, and also the sinking of the ground level in some urban areas, most notably Mexico City. For these reasons Mexico is trying to increase its water use from aqueducts. Mexico City now obtains only 34 percent of its water from rivers using the Cutzamala Aqueduct, which will soon to be expanded, and the Valle de Lerma Aquifer.

Hazardous Waste Disposal

The National Ecology Institute estimates that industry in Mexico generates around eight million tons of hazardous waste annually. 40 percent of all waste is produced by the chemical sector. INE also estimates that only 12 percent of this amount is properly disposed of in licensed storage facilities. Central Mexico produces 63 percent of Mexico's hazardous waste. The North and the Gulf Regions are the next largest waste producers, with 25 percent and seven percent, respectively.



INE is implementing a bold plan to set up a regulatory framework to license firms to treat industrial hazardous waste. INE will allow companies to design, build, and operate Integrated Centers for the Industrial Waste Management (CIMARIS). In INE's conceptual design, each center will include waste-water treatment plants, solvent and recovery/recycling units, hazardous waste storage facilities, and hazardous waste incinerators.

INE has identified 87 sites throughout the country to be used for CIMARIS. To insure the support of local authorities, INE has submitted its sites to each of the respective state governments for approval. These state governments was expected to give INE their decisions by late September 1996.

Central Mexico has over 100 industrial parks which generate five million tons of waste per year. At the moment the entire country has only two licensed hazardous waste storage facilities. As a result INE is making Central Mexico the priority of its program. In the next two years, INE expects that Central Mexico will need eight CIMARIS centers.

Hazardous Waste Remediation

There has been minimal pressure on Mexican companies to undertake environmental clean up projects. PROFEPA's activities have largely been dedicated to forcing companies to reduce emissions rather than clean up waste.

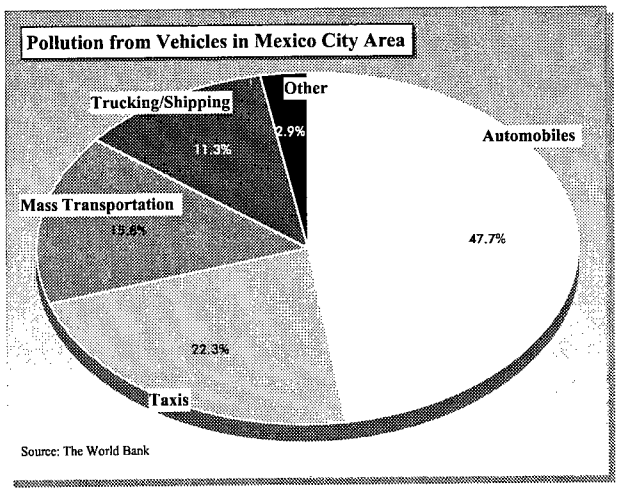
Pemex, due to its sheer size and the nature of its business, probably has the largest task at hand. In 1995 the company made headway, with environmental audits at all of it petrochemical facilities and many of its refineries. Pemex will assume legal responsibility for all existing environmental contamination at its facilities, including those to be privatized. To prepare its secondary petrochemical plants for privatization, Pemex may open tenders for remediation in early 1997.

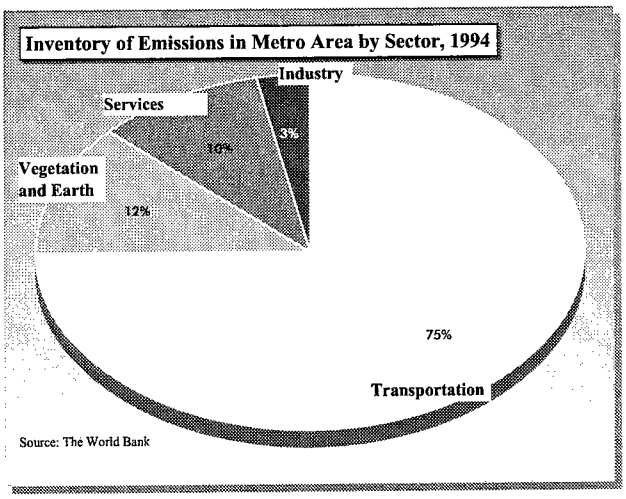
Mexican National Railways (FNM) is implementing a bold soil and groundwater remediation plan which aims to clean up 54 contaminated sites throughout the country. Although FNM will soon be privatized, it will still be liable for underground contamination, consisting primarily of fuel and lubricant spills. This initiative will be executed over the next 10 to 15 years at a cost of US$100 million. Given the inaction of industry in Mexico to date, this program is probably the country's most comprehensive industrial remediation project. Although the peso crisis brought severe budget cuts, FNM has presented a plan in which the timetable for this investment is delayed rather than forgotten. Five sites will be bid in 1997—including one in Mexico City.

Air Pollution

Air pollution is a severe problem in three major urban areas: Mexico City, Guadalajara, and Monterrey, which together account for the vast majority of the country's air emissions. Air pollution is becoming a larger problem for medium-sized cities like Aguascalientes, where geography aggravates these conditions. It is estimated that 75 percent of Mexican air emissions are from mobile sources. 70 percent of the air pollution produced by these vehicles comes from vehicles which are over 10 years old.

The severity of the problem in the Mexico City Metropolitan Area has spurred a comprehensive effort to reduce both mobile and fixed source pollution. The Air Quality Improvement Program 1995-2000, with an estimated cost of US$12 billion, will reduce by 50 percent the amount of airborne contami-





nants in four major areas: a) reduction of industrial emissions, b) reduction of vehicle emissions per kilometer traveled, c) regulation of the total distances traveled by each vehicle, and d) abatement of erosion.

Breakdown of Air Emissions by Sector, 1994

Sector					
	PST	SO2	CO	NOx	HC
Industry	1.4	57.3	0.4	24.5	3.2
Service	0.2	15.9	0.1	4.2	38.9
Transportation	4.2	26.8	99.5	71.3	54.1
Vegetation & Soils	94.2	0	0	0	3.8

Sources: INE, DDF, UNAM

The plan calls for the following actions:

1. New regulations on nitric oxides and volatile organic compound emissions for industry and services (including the distribution and uses of Liquefied Petroleum Gas (LPG) and the recovery of gasoline pump vapors.
2. Re-engineering for nitric oxide control in the Valley of Mexico Thermoelectric Plant and gradual substitution of the Jorge Luque Thermoelectric Plant with more efficient generation systems.
3. Stricter regulations for industrial and service sector fuel use, including LPG, fuel oil, and other fuels.
4. New fuel price structures to encourage the use of fuels of higher environmental quality such as natural gas.

5. Utilization of fiscal incentives, international credits, and tariff exemptions to finance the technological reconversion.
6. Programs which limit the number of days vehicles can circulate as a tool to encourage new technologies. Exemptions will be given to vehicles which comply with stricter regulations.
7. Increasingly strict regulations for new vehicles.
8. Extension and operation of an efficient vehicle inspection system.
9. Progressive revision of gasoline regulations.
10. The incorporation of environmental costs in automobile fuel prices in the medium and long term.
11. Expansion and restructuring of the public surface transportation system.
12. Expansion of non-contaminating forms of public transportation: trolley buses, metro, and elevated trains.
13. Reorganization of the public transportation system.
14. New urban development policies which promote diversification of soil use, urban recycling, ecological conservation zones, and revitalization of downtown areas.
15. Reforestation and ecological restoration in suburban zones.

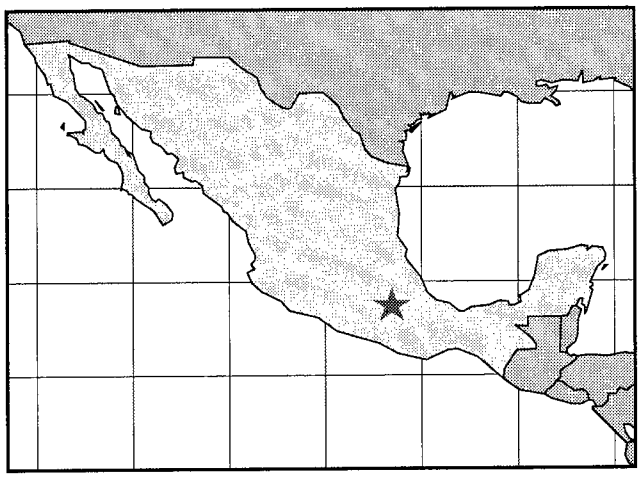
Estimated Industrial Emissions, 1994

City	State	Sources Monitored	Total (tons/year)
Tula-Vito-Apaxco	Mexico State-Hidalgo	13	442,863
Manzanillo	Colima	11	280,928
Toluca-Lerma	Mexico State	67	262,928
Salamanca	Guanajuato	49	158,634
Tijuana	Baja California	114	138,617
Coatzacoalcos	Veracruz	78	134,419
Tampico-Altamira	Tamaulipas	14	112,559
Mexico City Metro	D.F.	4623	105,721
Torreón	Coahuila	94	72,546
Monterrey	Nuevo León	85	42,738
La Paz	Baja California del Sur	25	40,485
Mérida	Yucatán	42	40,371
Ciudad Juárez	Chihuahua	135	38,273
Guadalajara	Jalisco	423	30,536
Other cities		573	64,342
Total		6345	1,965,965

Source: INE

Environmental/ Hazardous Waste

ECONSA Industrial Waste Facility



Project Summary

Project No:	**ENV-01**
Subsector:	**Hazardous Waste**
State/Region:	**Central Mexico**
Project Cost:	**$22.8 million**
Export Potential:	**$11 million**
Owner:	**ECONSA**

ECONSA is planning to build an industrial and municipal nonhazardous and hazardous waste facility. The facility will consist of seven units to treat, recycle and store a variety of wastes produced in Central Mexico. The project is being implemented by a three company alliance that make up ECONSA:

- The Mexico representative of Metalclad, a major U.S. environmental services firm.
- Browning Ferris International, also of the United States, one of the world's largest municipal and hazardous waste management companies.
- Química Omega, a Mexican chemical company.

Technical Description

ECONSA will construct an integrated facility of seven units with a total cost of US$22.8 million. A breakdown of the units with their respective costs is outlined below:

1. Solvent Recovery and Recycling Unit
   Cost: US$0.75 million
   Capacity: 1 million liters of solvents per month
   Process: Distillation and evaporation

2. Cement Kiln Fuel Blending Unit
   Cost : US$2.3 million
   Capacity: 7 million liters of fuel per month
   Process: Mixture and dispersion of waste oils. Blended fuel is burned in cement kilns for energy generation.

3. Liquid and Semi-Solid Waste Treatment Unit
   Cost: US$6.5 million
   Capacity: 36,000 tons per year
   Process: Physical and chemical treatment unit to reduce waste disposal needs.

4. Non-Hazardous Industrial Waste Recycling Center
   Cost: US$0.75 million
   Process: Separation, compacting, and commercializing reusable waste cardboard, wood, paper, aluminum, and plastic.

5. Non-Hazardous Industrial Waste Storage Unit
   Cost: US $4.5 million
   Process: Storage of nonhazardous industrial wastes.

6. Hazardous Industrial Waste Storage Unit
   Cost: US$ 6.5 million
   Process: The unit will use the most modern technology available based on the BFI installed facility in Houston, Texas.

7. Sanitary Landfill for Municipal Waste.
   Cost: US$1.5 million
   Process: Construction of a modern sanitary landfill for domestic waste from nearby towns.

As an independent industrial waste treatment facility, the ECONSA facility will be financed, built, owned and operated by the private owners. The municipality in which the project is to be located (decision pending by the National Ecology Institute) will grant a long-term lease on the property to be paid by BFI-Omega.

Site

The plant will be located in a municipality in Central Mexico, the largest industrial waste producing region in the country. Site selection is dependent on the INE decision.

Project Status

The project is waiting for INE approval for a site in Central Mexico. INE is working to license more facilities; this should expedite the approval process for this project. Participating companies are ready to begin construction.

Equipment & Services Demand

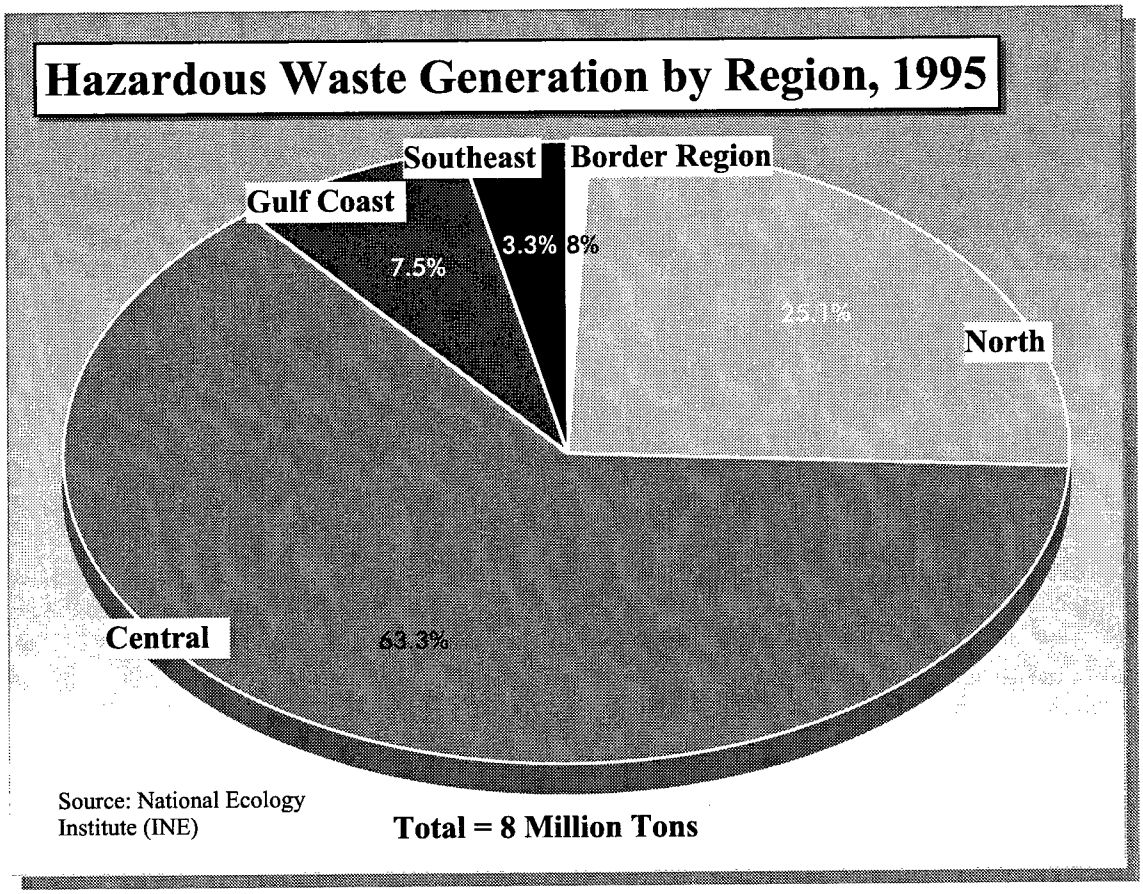
ECONSA will need to purchase new equipment for all new units, including distillation and evaporator equipment, sludge processing equipment, compactors, collection pipes, geomembranes, impermeable

underliners, methane gas probes, storage tanks, and pumps.

U.S. firms should be well-positioned to supply equipment to the new plant, since two of the companies involved are U.S.-based and the process entails many hazardous waste treatment and recycling processes.

Nature of Demand

The National Ecology Institute estimates that industry in Mexico generates around eight million tons of hazardous waste annually. INE also estimates that only 12 percent of this amount is properly disposed of in licensed storage facilities.



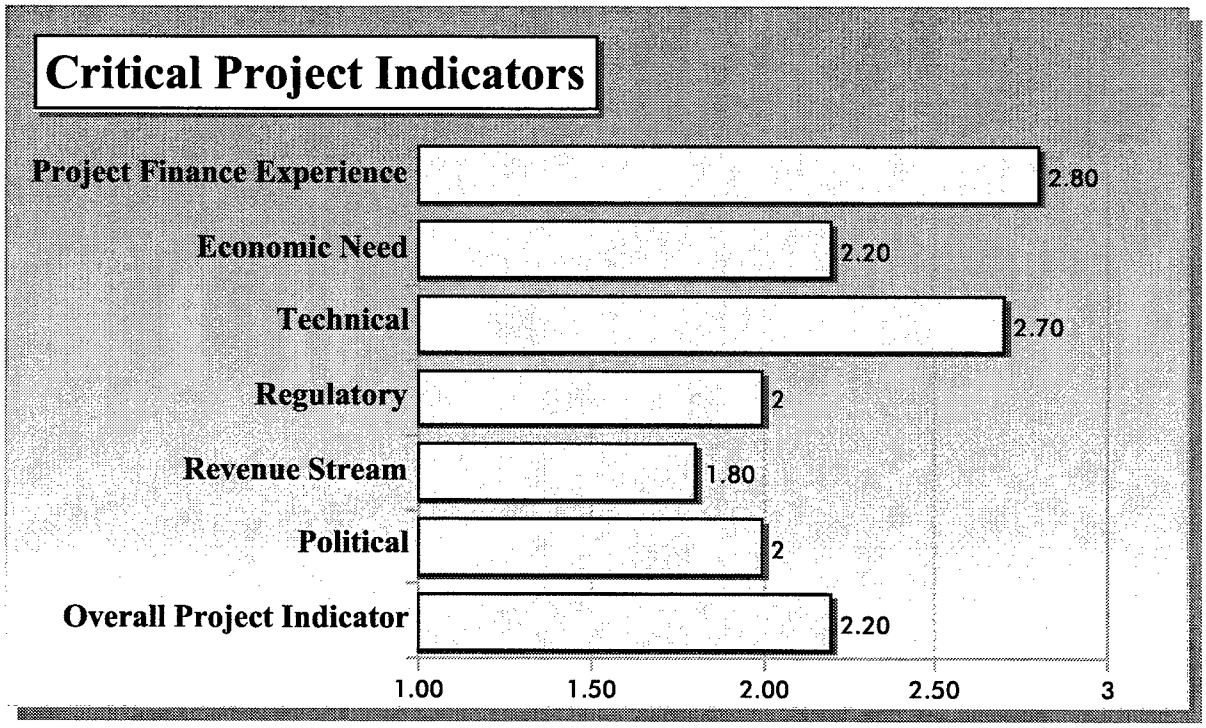
Project Assessment

Most of ECONSA's revenues will come from waste disposal fees to be paid by private sector industrial companies without long-term contracts. Feasibility is therefore based on the strength of the three-company partnership and on the economic need for a facility of this kind in Central Mexico. Mexico's hazardous waste regulations are strict; however, not all standards are in place.

It is not clear that the manufacturing sector, which is recovering from a major recession last year, will grow enough to meet market expectations. Hence, the projected revenue stream from the industrial waste may not prove sufficient to implement the project until the manufacturing sector fully recovers.

It should be noted that the National Ecology Institute recently introduced a new program (July 1996) to license hazardous waste recycling facilities. It is far from clear what effect this initiative will have in spurring private sector interest in the hazardous waste processing business. No new enforcement initiatives have been undertaken. It is too early to tell if the program will bring new entrants into the market.

Critical Project Indicators



Key Decision Makers

Company	**Ecosistemas Nacionales S.A. de C.V. (ECONSA)**
Name	Lic. Javier Guerra Cisneros
Title	Associate Director
Location	Naucalpan, State of Mexico
Phone	(52-5) 300-7363
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Company	**Metalclad**
Name	Mr. Grant Kessler
Title	Chairman of the Board
Location	Newport Beach, California
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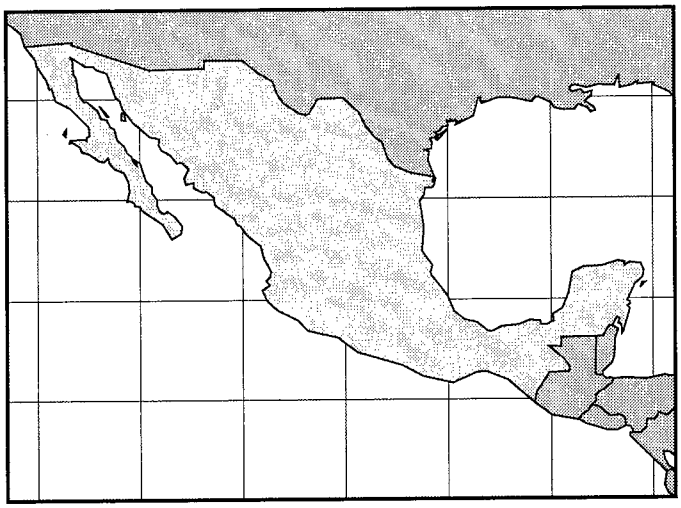
Environmental/ Hazardous Waste

FNM Soil and Groundwater Remediation



Project Summary

Project No:	**ENV-02**
Subsector:	**Hazardous Waste**
State/Region:	**Nationwide**
Project Cost:	**$100-$150 million**
Export Potential:	**$85-$120 million**
Owner:	**Mexican National Railways (FNM)**

The Mexican National Railways (FNM) is preparing to undertake an extensive environmental remediation program as part of an important effort to prepare its operations for privatization. After privatization, operations on FNM's major rail lines will be transferred to the new private concessionaires. FNM is undertaking what is probably the most comprehensive industrial remediation program in Mexico today.

Technical & Site Description

FNM is initiating a massive program to clean up soil and groundwater contamination at 54 of its facilities located throughout Mexico. The company is in the second year of a 10- to 15-year program to clean up sites that have hazardous waste contamination above and below ground. On the basis of open competitive bidding, FNM is contracting environmental firms to carry out the remediation work at individual sites. No restrictions exist on contracting foreign firms for environmental remediation projects.

FNM estimates a total cost of US$50 million for the above ground remediation portion of the program. Depending on the extent of contamination, underground remediation could cost between US$50 to US$100 million. FNM's estimates cover all 54 sites and each of the 117 units which make up those sites. FNM calculates a rough estimate of US$1 million per unit depending on the complexity of contamination at each site. The project will be financed from FNM's own funds.

Hazardous waste at FNM facilities derives primarily from fuel and lubricant spills. FNM has identified

only minor amounts of solvents or heavy metals. Since most of its transformers are new — only five percent contain PCBs — PCB contamination is minimal.

Project Status

Plans to clean up hazardous waste sites at FNM maintenance facilities began to take shape in 1993, when the company undertook an environmental audit of all facilities. In 1994, FNM announced the formulation of a comprehensive remediation program for the next five years. At the end of 1995 the company began remediation on the first five sites. In late 1996, FNM will call bids for two sites in Guadalajara and one in Aguascalientes.

A U.S. TDA-funded feasibility study is being carried out by Brown and Root of the United States to determine the extent of the remediation work needed to be done on an additional five sites. Although the study will not be completed until November 1996, FNM's preliminary list of high-priority sites for 1997 includes: Valley of Mexico, Jalapa, and Torreón. Before FNM can move ahead with its plans for 1996 and 1997, it must get site permits from the National Ecology Institute (INE).

The devaluation of the peso and the ensuing economic recession have slowed the implementation of this program. Originally planned as a five year effort, it will now take 10 to 15 years.

Equipment & Services Demand

For above-ground remediation, FNM envisions that the following equipment will be necessary:

- Chemicals for Bioremediation
- Sandblasting Equipment
- Air and Water Separators
- Fuel Tanks
- Pumping Stations
- Pipes
- Retaining Walls
- Hazardous Waste Storage Areas

For underground remediation, the following are the principal tasks and equipment that FNM envisions as necessary:

- Drilling Equipment
- Monitoring Wells
- Measuring Instrumentation

- Pumping Equipment
- PVC Pipes
- Valves
- Gas Extraction Equipment
- Cleaning Agents

FNM's Environmental Protection Committee has been using models from the United States and the Netherlands in its analysis of the company's soil and ground water contamination.

Remediation work will require laboratory testing, much of which could be done in the United States, given U.S. expertise in environmental analysis.

Nature of Demand

Although other state-owned enterprises have not made comprehensive efforts to address hazardous waste pollution, FNM has undertaken its clean-up effort in part because of liability issues that will come into play after privatization. After the sites have been cleaned up, surface hazardous waste contamination will become the responsibilitity of the new concessionaires. Underground hazardous waste contamination, on the other hand, will continue to be the legal responsibility of FNM.

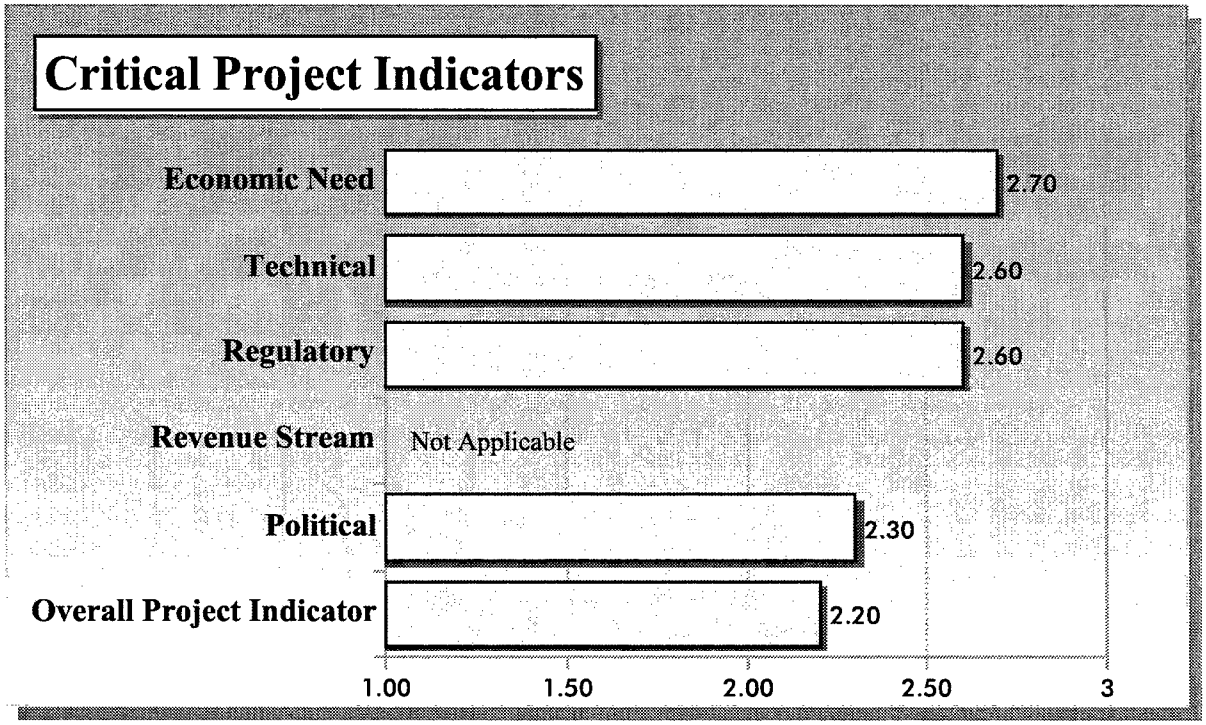
Project Assessment

The project, already underway, stands a very good chance of continuing due to the need to prepare FNM for privatization. Recent economic difficulties created budgetary constraints that have slowed down implementation of the cleanup. However, FNM appears to be committed to its ultimate completion.

Because of the relatively small scale of remediation work carried out to date in Mexico, Mexican environmental firms are unlikely to have the experience in remediation that U.S. and other international firms may have. For this reason, FNM expects to see bids from consortiums composed of foreign and local firms.

Mexico's regulatory framework for hazardous waste is not yet final; however, FNM is working closely with the National Ecology Institute (INE) to work out any regulatory problems that may arise.

Critical Project Indicators

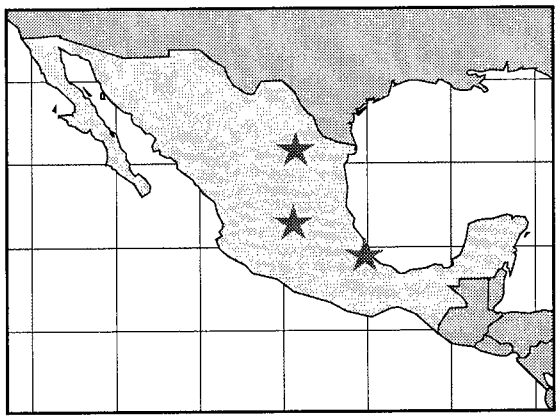


Key Decision Makers

Company	**Mexican National Railways (FNM)**
Name	Gustavo Schiele
Title	Executive Director of the Environmental Protection Com.
Location	México, D.F.
Phone	(52-5) 547-6371
Fax	(52-5) 547-5974

Environmental/ Hazardous Waste

Ecocalpin Hazardous Waste Facilities



Project Summary

Project No:	**ENV-03**
Subsector:	**Hazardous Waste**
State/Region:	**Central, North, Gulf**
Project Cost:	**$72-120 million**
Export Potential:	**$33-$55 million**
Owner:	**Ecología Calpin**

Ecología Calpin was formed in 1992 by a group of U.S. and Mexican investors whose principal objective was to provide services for the treatment of hazardous waste. In 1995, Ecocalpin formed a partnership with a U.S. steel producer which has over 100 years of experience and will provide environmental technology. Ecocalpin is looking for equipment and financing from the United States.

Technical Description

Ecocalpin's project involves the development of three hazardous waste incineration facilities, to be completed in successive phases. Each plant will be equipped for the stabilization of the waste and each will have a facility for compacting and storing the resulting incinerator ash. Phase I consists of the construction of a plant in the Gulf Region. Phases II and III will be conducted in the Northern Region and Central Region of Mexico, respectively. In addition to an incinerator, the Central plant will have a landfill as well. The Gulf and North plants, with a total cost of US$72 million, will be identical. The construction of the Central Region plant and landfill will raise the total cost to US$120 million.

Ecocalpin needs to identify a new partner to meet the project requirements. Ecocalpin is planning to use European Community hazardous waste handling and air emissions norms, which it judges to be 30 percent stricter than those of the United States. The stabilization technology that will be used originates in the United States.

Ecocalpin was in negotiation with private Mexican banks when the peso crisis put a severe squeeze on capital available for investment. In 1995, Ecocalpin began discussions with a major private Mexican

bank. Ecocalpin is also holding discussions with Banobras, a Mexican development bank, although nothing has been concluded yet.

With the devaluation of the peso, Ecocalpin had to reorganize the financial structure of its project. It is talking to a number Canadian and U.S. investors, and is looking for international lenders or investors which can provide capital or credits.

Although it has not closed with any financial institution, Ecocalpin expects that the project will be financed as follows:

- 60 percent debt: Financed by U.S. or international financial institutions.
- 40 percent equity: By the shareholders and two investment funds with which Ecocalpin has letters of intent.

Ecocalpin estimates that waste processing fees will allow it to recover its costs in a period of five years. This period will not be affected by any future exchange rate fluctuation since Ecocalpin has calculated both its costs and its fees in U.S. dollars.

Site

Ecocalpin will build three facilities at sites in the Central, Northern, and Gulf Regions of Mexico. Sites for each of the plants have been chosen but will only be disclosed once the project is ready to go forward.

Project Status

Ecocalpin has obtained the support of all relevant federal environmental institutions, including the National Ecology Institute, as well as those at the state level. The company has completed its market studies for all three plants.

The plant in the Gulf Region is designed to serve the oil and petrochemical industries. Memoranda of understanding for waste treatment have been signed with certain companies in the region.

Working jointly with Pemex, Ecocalpin started work on the engineering studies for its Gulf Region plant in 1992, and completed these in 1994. Ecocalpin has completed geological, financial, engineering, environmental impact, and feasibility studies for the plant in the Gulf Region. It also has construction permits for the plant site. For the Northern plant, the feasibility study is complete but an environmental impact assessment remains to completed.

For the Central plant, the studies are not as complete. Nonetheless, the geological studies are underway. A feasibility study and environmental impact assessment, however, still need to be carried out.

Ecocalpin is considering licensing its Central plant under INE's new Integrated Industrial Waste Management Center (CIMARIS) framework. The Central plant will be built under a new company founded by Ecocalpin called Transecología S.A. de C.V.

Ecocalpin hopes to close financing and finish issuing permits so that it can begin construction on Phase I in the Gulf Region by the end of 1996.

Equipment & Services Demand

For the new plant, Ecocalpin expects that the following equipment systems and services will be needed:

- Incineration Equipment
- Air Pollution Control Equipment
- Civil Construction
- Technical Assistance
- Instrumentation

Nature of Demand

Ecocalpin is targeting waste generating industries in the top three waste producing regions of the country. Central Mexico produces 63 percent of Mexico's hazardous waste. The North and the Gulf Regions are the next largest waste producers with 25 percent and seven percent, respectively.

Fees for incineration are high and the demand is strong, due to the fact that Mexico has only two licensed hazardous waste landfill facilities. Most hazardous waste now is sent to storage facilities or to informal dumps, where the risk of ecological hazards is higher.

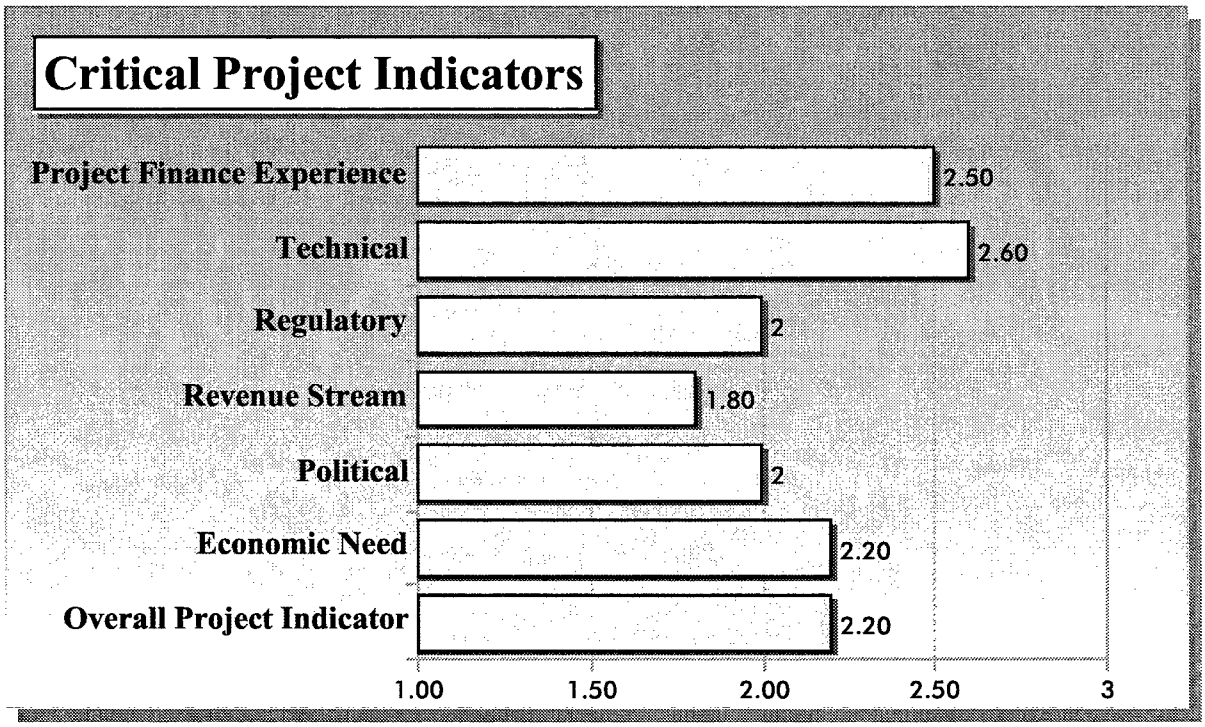
Project Assessment

Ecocalpin is trying to position itself to serve the country's three largest markets for waste generation. However, it is not clear that the manufacturing and industrial sector that generate waste — which are recovering from a major recession last year — will grow enough to meet Ecocalpin's expectations for this market.

It should be noted that the National Ecology Institute introduced its new CIMARIS program in July 1996 to license hazardous waste recycling facilities. This initiative could encourage the development of competing projects in the hazardous waste processing field. It is not known whether new enforcement initiatives will be undertaken in the near future by PROFEPA — Mexico's environmental enforcement agency — to push for greater compliance with norms, an action that would drive demand for

incineration services.

Critical Project Indicators

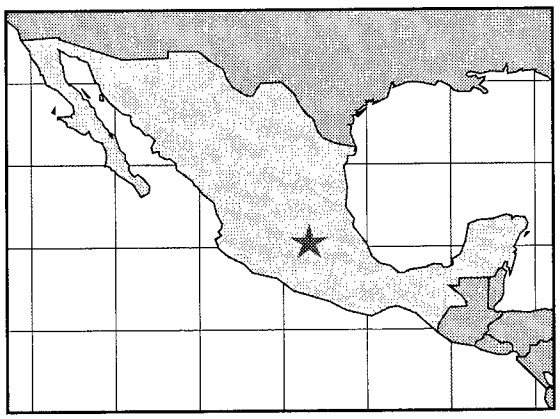


Key Decision Makers

Company	**Ecología Calpin**
Name	Ing. Antonio Zanetti
Title	General Director
Location	México, D.F.
Phone	(52-5) 280-4302
Fax	(52-5) 280-4302

Environmental/ Hazardous Waste

IUSA Environmental Management Project



Project Summary

Project No:	**ENV-04**
Subsector:	**Hazardous Waste**
State/Region:	**State of Mexico**
Project Cost:	**$50 million**
Export Potential:	**$10-15 million**
Owner:	**IUSA**

Complex industrial activities undertaken by Industrias Unidas S.A. (IUSA), one of Mexico's largest industrial companies, have resulted in a large variety of solid and liquid wastes which can potentially threaten the environment. U.S. TDA is providing partial funding for a feasibility study, so that IUSA can implement a new environmental management project at its largest industrial facility. The study is cofunded by Advanced Sciences Inc. (ASI) who is also conducting the study.

Technical Description

IUSA is planning a comprehensive environmental management project designed primarily to reduce, manage, and treat both solid waste and wastewater from its largest manufacturing plant. Proposed alternatives for the environmental management plan — to be determined in a feasibility study — will be evaluated by IUSA. The company will study the alternatives using cost/benefit analysis which will take into account legal implications, implementation time, and environmental impact.

IUSA is a major industrial company with 120 plants across Mexico. Founded in 1939 by the Peralta family, the company today produces a number of manufactured products: copper tubing, electrical fixtures and conductors, control systems, meters, and clothing. IUSA, together with Bell Atlantic of the United States, also owns Iusacell, a provider of cellular and other telecommunications services.

Regulatory Framework

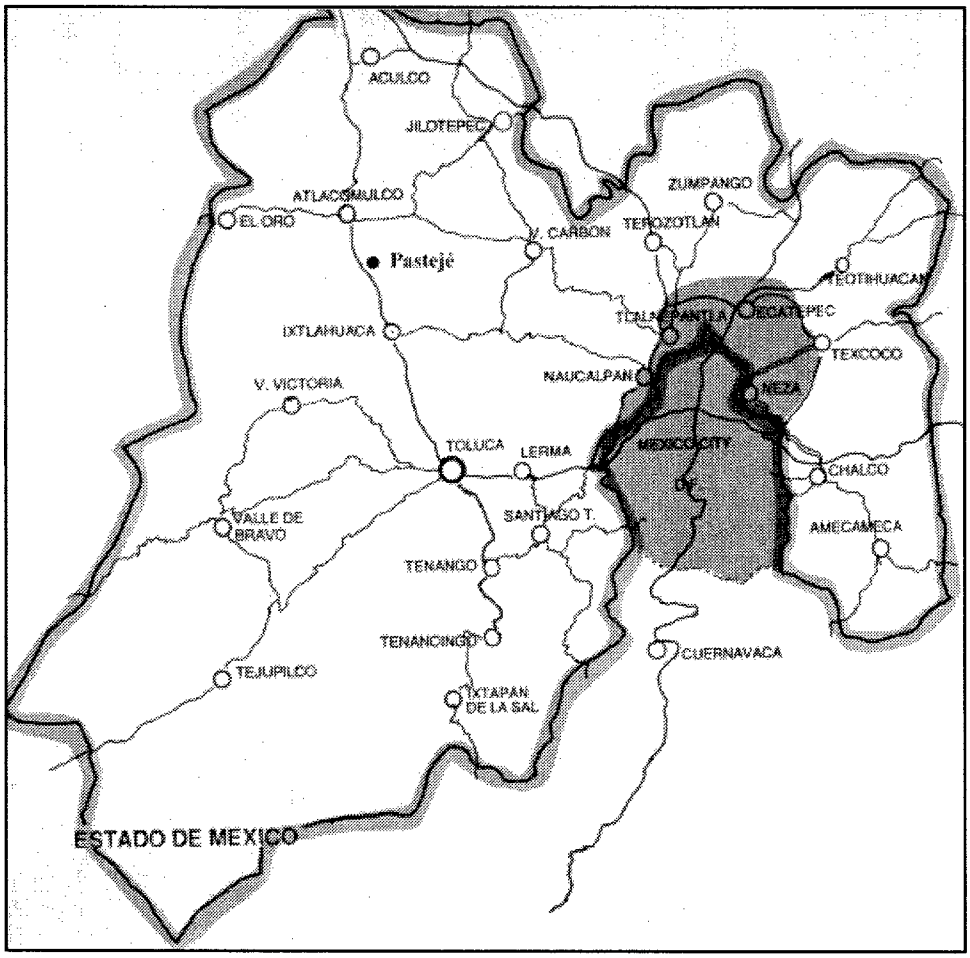
The project seeks to keep IUSA in compliance with Mexico's General Law of Environmental Protection and Ecological Equilibrium and all of the relevant federal regulations (NOMs). Because of the

broad scope of the project, several types of regulations come into play including those NOMs which address:

- Prevention and Control of Air, Water, and Soil Contamination
- Classification and Management of Wastes
- Environmental Impact
- Transportation of Hazardous Waste
- Labor Safety and Hygiene

Site

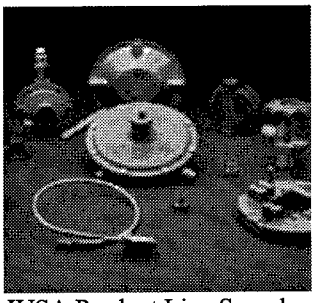
IUSA will implement the program at its plant located at kilometer 109 of the Mexico-Quéretaro highway in Pastejé, which is located in the Municipality of Jocotitlán in the State of Mexico. The plant is IUSA's largest and has 42 separate production facilities. Pastejé is approximately 120 kilometers from Mexico City and approximately 55 kilometers northwest of Toluca.



Source: Government of the State of Mexico

Project Status

The project is in the feasibility study stage. The U.S. Trade and Development Agency gave a partial grant to fund the US$930,000 feasibility study. Advanced Sciences Inc. (ASI) of the United states was selected by IUSA to carry out the study. Begun in October 1995, a draft of the study should be complete in September 1996. After IUSA's review, the final study will be ready at the end of October or early November, after which IUSA will be able to define a schedule for equipment procurement and contracting services.



IUSA Product Line Samples

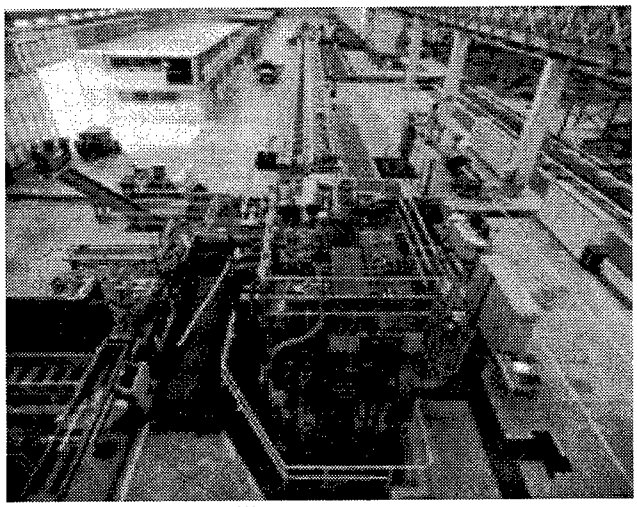
Although permitting cannot begin until the study is finished and an implementation alternative has been chosen, IUSA has kept the municipal government informed of the studies it is conducting and the general scope of the project it intends to implement.

Equipment & Services Demand

The project will require significant investment in both equipment and services. A broad range of specialized engineering services will be needed: electrical, civil, environmental, sanitation, chemical, and process. The feasibility study will define future equipment needs. It is expected that IUSA will need air, soil, and water abatement equipment for:

- Remediation of Soils and Sediments
- Clean Up of Mogote Lagoon (863,000 cubic meters)
- Zinc and Copper Recovery
- Industrial Wastewater Treatment (including clarifiers, sedimentation tanks, chemical dispenser , pumps and filters)
- Incineration
- Treatment of Solid Waste Streams

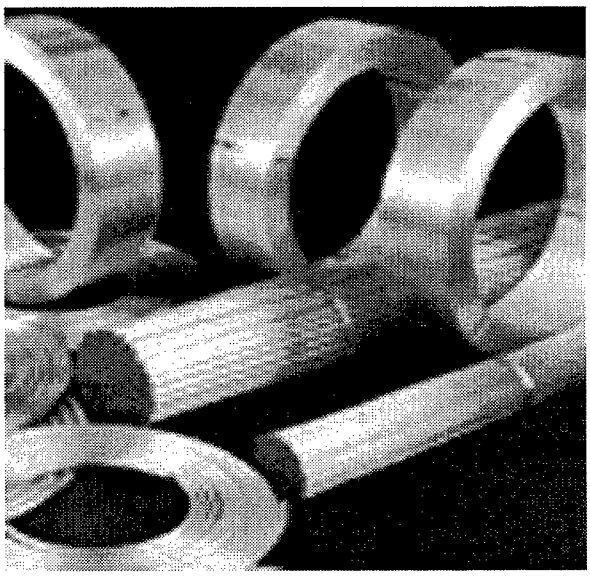
The execution of the feasibility studies necessitated the purchase of soil sample analysis equipment, drilling machinery for monitoring wells, and water testing instruments.



IUSA Production Facility

Nature of Demand

Mexico's industrial sector today bears the dual responsibility to protect the environment at the same time that its factories increase production. It is up to industry to face and resolve inevitable solid and liquid waste management and generation issues. Environmental considerations in manufacturing represent an important production cost for which IUSA, through its feasibility study, is searching for the most effective solutions.



IUSA Product Line Samples

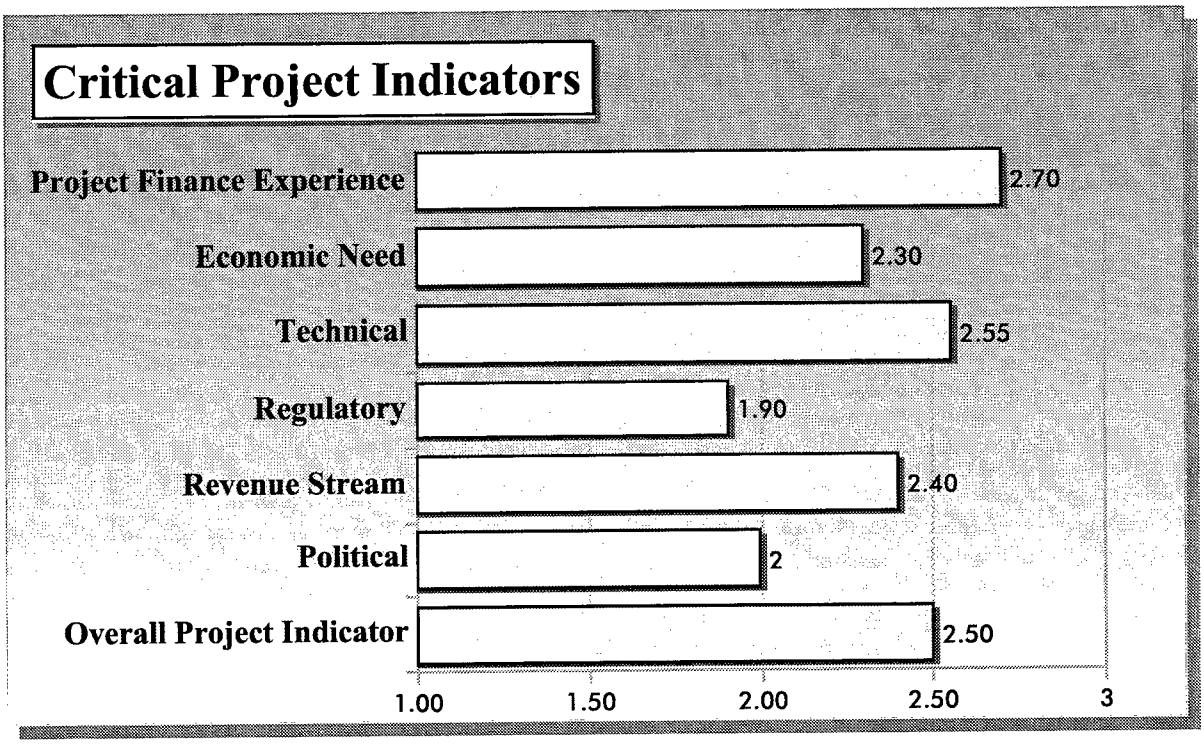
The project will generate a wide range of benefits — social, economic, and environmental — for IUSA as well as the surrounding communities. The environmental management project is designed to help IUSA reduce costs, use resources efficiently, and generate revenue through the recycling of wastes and sub-products. Surrounding communities will benefit from pollution control and remediation of contaminated sites.

Project Assessment

The project is strictly a private investment program. The strength of the project lies in the stable resources of this well-established industrial conglomerate.

It is not clear what the regulatory pressures will be on IUSA, so it is difficult to know which of the alternatives proposed by ASI in its feasibility study will be implemented. In addition, the time line for implementation has not yet been defined.

Critical Project Indicators



Key Decision Makers

Company	**Industrias Unidas S.A. (IUSA)**
Name	Ing. Eduardo Márquez Váldez
Title	Administrative Director
Location	Pastejé, State of Mexico
Phone	(52-7) 220-5072
Fax	(52-7) 283-0358

Company	**Advanced Sciences Inc.**
Name	Ing. Alberto Acevedo
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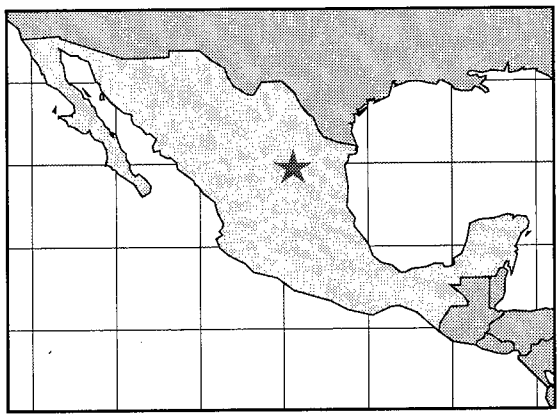
Fax	(52-5) 208-2882

Environmental/ Solid Waste

Monterrey Landfill Privatization



Project Summary

Project No:	**ENV-05**
Subsector:	**Solid Waste**
State/Region:	**Nuevo León**
Project Cost:	**$14 million**
Export Potential:	**$5 million**
Owner:	**SIMEPRODE**

With funds from Nuevo León, various municipal governments and the World Bank, the Metropolitan Solid Waste Processing System (SIMEPRODE) was launched in 1987 to improve solid waste disposal for municipalities in the Monterrey Metropolitan Area. In 1991 each of the municipalities closed their open air dumps and began to send municipal waste to SIMEPRODE's newly completed landfill. As a component of the state's privatization program, Nuevo León intends to turn the Monterrey Metropolitan Area's primary sanitary landfill over to the private sector.

Technical Description

SIMEPRODE operates the landfill and three transfer stations, all of which will be privatized. The landfill is located on 212 hectares of land and is expected to have sufficient capacity to meet the metropolitan area's needs for 20 years. Solid waste intake is 2,500 tons per day (850,000 tons per year). Each of the three transfer stations has a capacity of approximately 700 tons of waste per day. The transfer stations primarily serve two outlying municipalities.

The landfill receives nonhazardous municipal solid waste only; no industrial waste is accepted. The Nuevo León metropolitan area has one fully licensed industrial storage and incineration facility, operated by RIMSA. Neither SIMEPRODE nor any of the municipalities have a major solid waste recycling program. Collection and transportation of municipal waste is the responsibility of each municipality. SIMEPRODE collects 32.5 pesos per ton (US$4.33) of waste dumped directly in the landfill and 52 pesos per ton (US$7) of waste dumped in the transfer stations. SIMEPRODE receives no government subsidies.

The precise form of participation by private sector firms is currently under discussion. One alternative is a long term concession for the operation and administration of the landfill. Another is the privatization of SIMEPRODE's assets and the contracting of a private firm for its operation and administration. Although Nuevo León has not estimated a value for SIMEPRODE's assets, a private sector study calculates that US$14 million in debt and equity — including financing from BANOBRAS as well as private sources — could be needed if it is privatized.

Site

SIMEPRODE is the primary sanitary landfill for ten municipalities in the metropolitan areas: Monterrey, San Pedro, Santa Catarina, San Nicolás, Escobedo, Apodaca, Guadalupe, Flores, Juárez, and Salinas.

Project Status

The State of Nuevo León has been a strong supporter of privatizing municipal services. Both the past governor and the current governor put SIMEPRODE on the list of municipal services to be privatized. Although the current administration's plans to privatize SIMEPRODE in the medium term, the replacement of the company's CEO in August 1996 is likely to speed up the process. The new director is working to tighten up the management of the company and to evaluate a number of alternatives for long-term concession or privatization.

Equipment & Services Demand

Although specific requirements for the new concessionaire or owner of SIMEPRODE have not been detailed, the company will need investment in new technology as well as in the upkeep and repair of its equipment. The majority of its equipment — compactors, front loaders, bulldozers, and trucks — was purchased in 1988. Most of the equipment was manufactured by Caterpillar of the United States. In addition, modernization of the transfer stations may be needed.

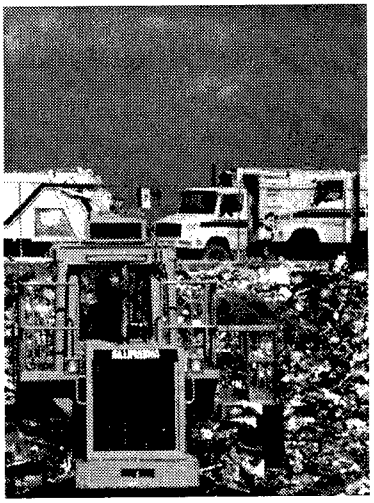
The Monterrey Technological Institute and SIMEPRODE are jointly carrying out a study that will recommend alternatives for the collection of methane gas at the landfill. New equipment such as methane gas probes and collection pipes may be needed.

Nature of Demand

With 3.5 million inhabitants in the metropolitan area, Monterrey's market for municipal waste is the third largest in Mexico. Monterrey is a fast-growing area of relative affluence. Private sector studies calculated an average annual growth of two percent in the metropolitan area's market for solid waste.

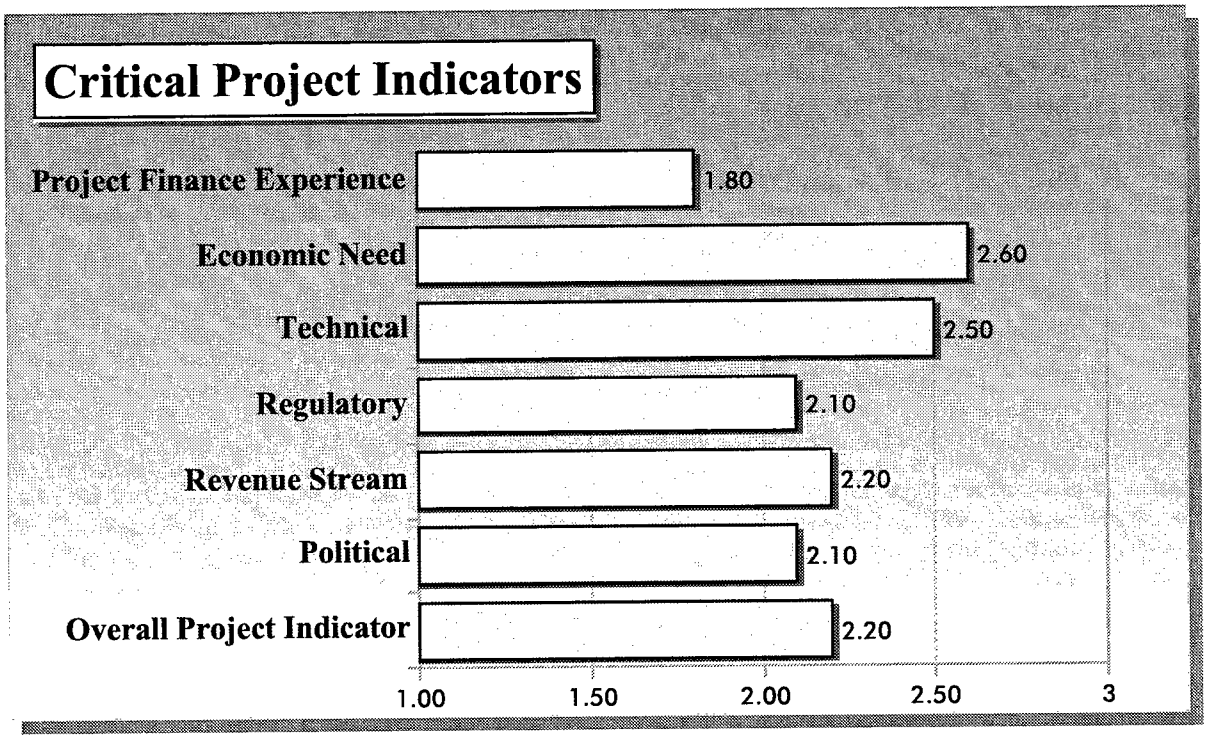
Project Assessment

Tariffs are certainly low by U.S. standards. However, a number of major Mexican construction companies have expressed interest in bidding, as they expect SIMEPRODE to be a profitable operation. Monterrey is a fast-growing market with Mexico's third largest population concentration.



One question that remains is the extent of the modernization — including equipment maintenance and upgrade —that will be required of the future concessionaire. The system's equipment is relatively new, but the peso crisis hurt the company's ability to repair and replace equipment, as needed. Nuevo León has not set a timetable for privatization, but there is support throughout the state; particularly from the new director of SIMEPRODE. Although statewide elections are scheduled for 1997, there should be no major delay as both major parties favor privatization of public services.

Critical Project Indicators



Key Decision Makers

SIMEPRODE is company owned by the State of Nuevo León and administered by the Secretariat of Urban Development and Public Works. As Nuevo León has no central authority organizing its privatization program, the Secretariat of Urban Development and Public Works will make the key decisions.

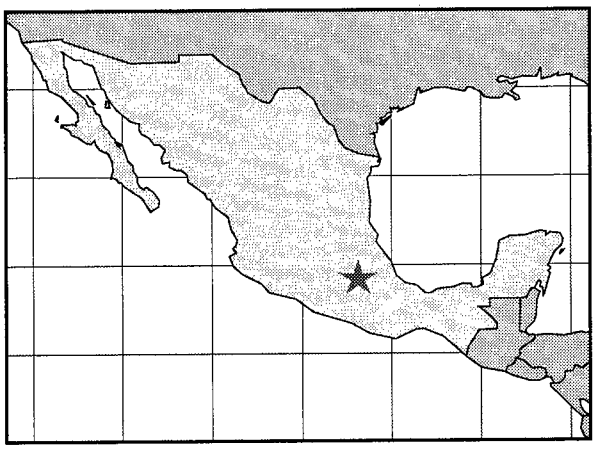
Company	**Secretariat of Urban Development & Public Works**
Name	Ing. César Lazo
Title	Secretary
Location	Monterrey, Nuevo León
Phone	(52-8) 354-3456/ 354-3466
Fax	(52-8) 354-3456/ 354-3466

Company	**Metropolitan Solid Waste Processing System**
Name	Lic. Mentor Pijerina
Title	Director
Location	Monterrey, Nuevo León
Phone	(52-8) 345-4218/ 344-5430
Fax	(52-8) 345-4158

Company	**Metropolitan Solid Waste Processing System**
Name	Arq. José Manuel Vázquez
Title	Director of Operations
Location	Monterrey, Nuevo León
Phone	(52-8) 345-4218/ 344-5430
Fax	(52-8) 345-4158

Environmental/ Hazardous Waste

Química Wimer Waste Recycling Plant



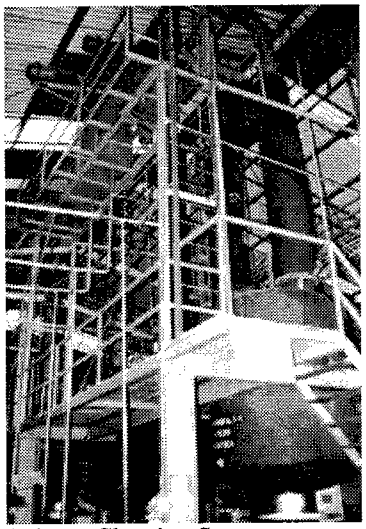
Project Summary

Project No:	**ENV-06**
Subsector:	**Hazardous Waste**
State/Region:	**Hidalgo**
Project Cost:	**$20-25 million**
Export Potential:	**$8-$11 million**
Owner:	**Química Wimer**

Química Wimer is a small Mexican firm which specializes in recycling industrial wastes. The company operates a chemical and solvent recycling plant in Valle del Chalco in the State of Mexico. Because of growing demand for recycling services, QW will build a larger facility that will serve industries in the Valley of Mexico, the company's primary market.

Technical Description

Química Wimer is planning a new US$20-$25 million hazardous waste recycling facility in the state of Hidalgo. The project involves the distillation of waste chemical and resale of recycled products. Eight distillation units will have the capacity to recycle 1,000 drums per week, or 1 million liters per year.

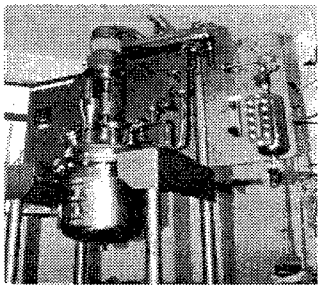


Solvent Cleaning Systems

The new plant will be designed to do the following:

- Manufacturing of paint from waste sludges and solvents.
- Treatment and recycling of emulsified cutting oil sludges.
- Detoxification of filter clay wastes from oil processing.
- Waste oil and solvent purification, blending (for cement kilns), and reprocessing.
- Recycling of residues from the distillation process.
- Processing of used metal containers.
- Heavy metal recycling.

- Processing of plastics.
- Treatment of contaminated waste water.
- Recycling of activated carbon.
- Sterilization of hospital waste.


Universal Pilot Plant

The project's revenue stream will derive both from recycling fees and from the resale of recycled wastes. Recycled chemicals retain between 30 percent and 75 percent of their value prior to first use.

Projected Plant Capacity

	Vol. of Waste in Valley of Mexico	QW Projected Market Share	Recyclable Portion of Waste	Vol. of Waste Recycled
	metric tons	percent	percent	net tons
Waste Collection	464,500	10	100	46,450
Paint Manufacturing	13,854	25	20	693
Emulsified Cutting Oils	60	60	80	29
Clays	6,000	50	70	2,100
Waste Oils and Solvents	230,986	20	70	32,338
Non-Chlorin. Waste Oils	4,005	10	90	361
Metal Containers	520	100	100	520
Heavy Metals	74,865	20	100	14,973
Cyanide	330	100	100	330
Industrial Wastewater	34,713	15	80	4,166
Activated Carbon	10,066	70	90	6,341
TOTAL	839,899			108,301

Source: Química Wimer

Site

The plant will be built in Ciudad Sagahún, in the state of Hidalgo, approximately 60 kilometers from the capital. Química Wimer recently acquired a 6,000 square kilometer parcel of land, properly zoned for this new facility.

Project Status

QW has obtained all necessary permits and licenses to begin construction from the National Ecology Institute (INE) and the Secretariat of the Environment and Natural Resources (SEMARNAP). Once Química Wimer obtains financing, it will begin equipment procurement. Initial purchases will include US$1.8 million for distillation equipment and US$200,000 for laboratory equipment.

Equipment & Services Demand

For the new plant, Química Wimer will need to purchase new equipment including: distillation plants, boilers, dryers, evaporators, storage tanks, and pumps.

U.S. firms should be well-positioned to supply equipment to the new plant, as Química Wimer already uses hazardous waste treatment and recycling equipment from the United States.

Nature of Demand

Química Wimer is targeting waste generating industries primarily in the Valley of Mexico. The Valley of Mexico contains 50 percent of the country's industry. Besides QW, there are only five other companies in the Valley of Mexico licensed to recycle solvents and only 11 licensed to handle hazardous waste. The company's strategy is to target companies from the following industries, among others: paint manufacturers, dry cleaning operations, resin makers, the automotive industry, drum manufacturers, plastic automotive parts makers, the metal mechanical industry, and refrigerator manufacturers.

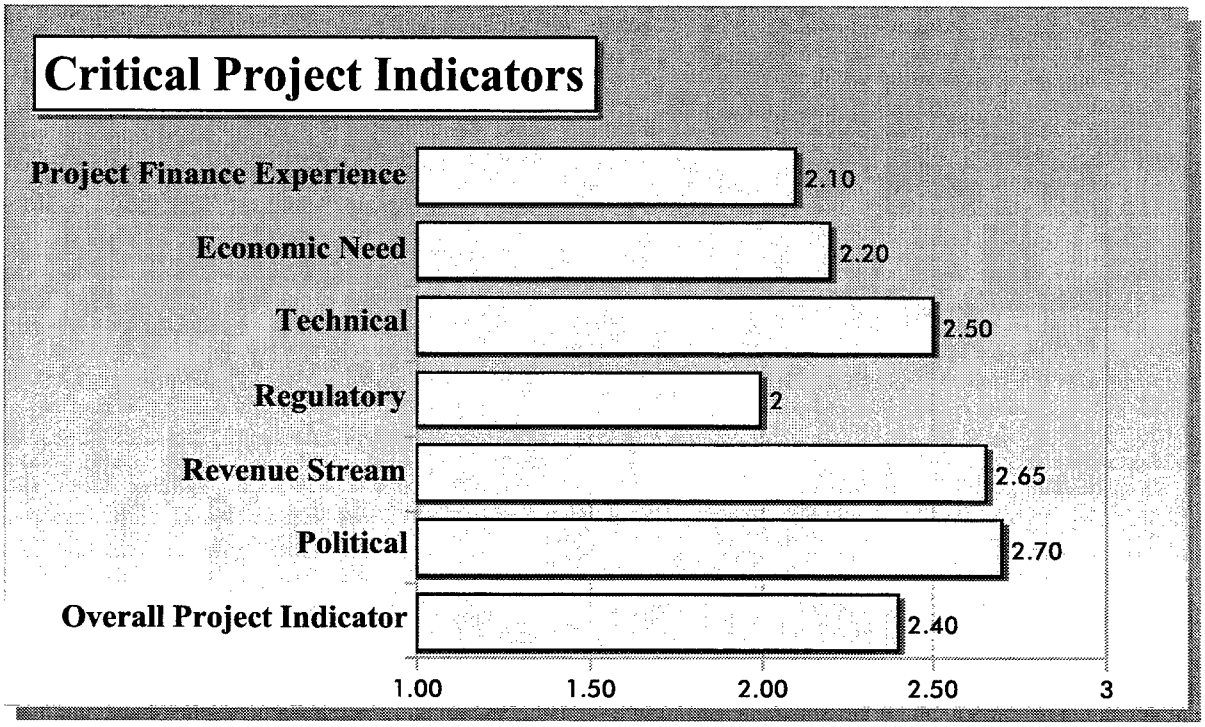
Project Assessment

Química Wimer will operate on a merchant basis, without long-term contracts from industrial companies supplying waste for disposal and recycling.

Química Wimer is currently one of only a few companies in the recycling industry in the Valley of Mexico. It is aggressively trying to capture a key share of the country's largest market for waste management and disposal. However, it is not clear that the manufacturing sector — which is recovering from a major recession last year — will grow enough to meet QW's expectations for the market.

The National Ecology Institute introduced a new program in July 1996 to license hazardous waste recycling facilities. It is far from clear what effect this initiative will have in spurring private sector interest in the hazardous waste processing business. No new enforcement initiatives have been undertaken. It is still unclear if the program will attract new entrants into this market.

Critical Project Indicators



Key Decision Makers

Company	**Química Wimer**
Name	Ing. Alejandro Merín Winnitzky
Title	General Director
Location	Mexico City, D.F.
Phone	(52-5) 860-0203
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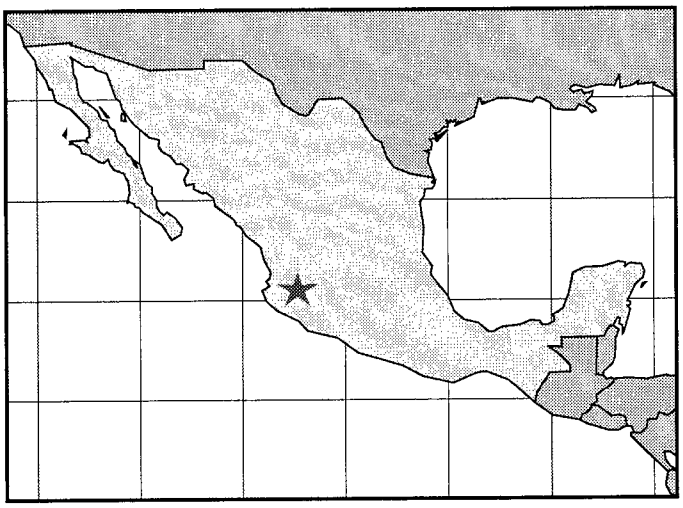
Environmental/ Solid Waste

Tonalá Waste Management Project



Project Summary

Project No:	**ENV-07**
Subsector:	**Solid Waste**
State/Region:	**Jalisco**
Project Cost:	**$70 million**
Export Potential:	**$40 million**
Owner:	**City of Tonalá**

The City of Tonalá, a suburb of Guadalajara, receives the majority of solid waste generated by 3.5 million residents in the metropolitan area. Tonalá is dissatisfied with previous attempts to develop a sanitary landfill and a composting plant. For these reasons and the fact that the existing landfill is quickly running out of capacity, Tonalá is planning an integrated waste management system that includes a solid waste recycling system and a waste-to-energy plant.

Technical Description

Tonalá's waste management system consists of a 30-megawatt waste-to-energy plant and the development of a system to separate solid wastes into recyclable materials and those to be used as fuel for the plant. Tonalá is interested in using a facility in North Carolina designed by J.A. Jones of the United States as a model. Total cost of the project is estimated at US$70 million.

The largest component of the project will be the waste-to-energy plant. Tonalá considers fluidized-bed technology the most appropriate to generate power with materials such as waste wood, agricultural waste, and materials of relatively low heating value. Tonalá is interested in a 30-megawatt fluidized-bed waste-to-energy unit based on the J.A. Jones design. A plant of this type would process 600 tons of municipal solid waste per day, approximately one-fourth of current capacity.

Currently, 2,500 tons of municipal solid waste per day are deposited in the landfill at Tonalá. However, the landfill at the nearby town of Zapopán is nearing capacity, so it is expected that the new plant will need to increase its daily intake by an additional 1,750 tons of waste.

The second project component involves the classification and separation of solid waste. Solid waste will be separated into materials that can be recycled — metals, glass etc. — and others that are suitable as fuel for the power plant. Given existing costs, the separation system is likely to be manual rather than mechanical.

The project's revenue will derive from solid waste dumping fees and electric power sales to the Federal Electricity commission (CFE). Tonalá estimates an annual net income of US$6.98 million for solid waste fees, based on a current cost of US$15 per ton, and an annual net income of US$238,000 for power sales, based on a price of 3.7 U.S. cents per kilowatt hour. Tonalá is interested in having one firm design, build, and operate the power plant. It is not yet clear whether that company would have a concession or work under contract to the city.

Site

The plant will be located at the solid waste landfill in Tonalá, a suburb of Guadalajara. Tonalá has selected a five-hectare site for the plant.

Project Status

As this is a priority project, Tonalá wants to move quickly to identify companies suitable to carry out the project. By early 1997, the city would like to begin the process of inviting companies to submit bids. However, before this can happen the city plans to conduct a plant feasibility study.

Equipment & Services Demand

The project will require significant equipment for construction of the power generation plant. To use fluidized bed technology, the plant will require specialized boilers and bubbling bed or circulating bed burners. In addition, the power plant will require instrumentation, steam turbines, air pollution control equipment, and switch gear. In addition to general civil construction services for the foundation, the project will require specialized electromechanical engineering and boiler installation services.

As this is a technology that has been used successfully in the United States, its export potential is quite high. In addition to the plant in North Carolina, Tonalá notes that other successful plants exist in Duluth, Minnesota; La Crosse, Wisconsin; and Tacoma, Washington.

Nature of Demand

Tonalá considers the project of utmost importance for ecological, social, and political reasons. Without

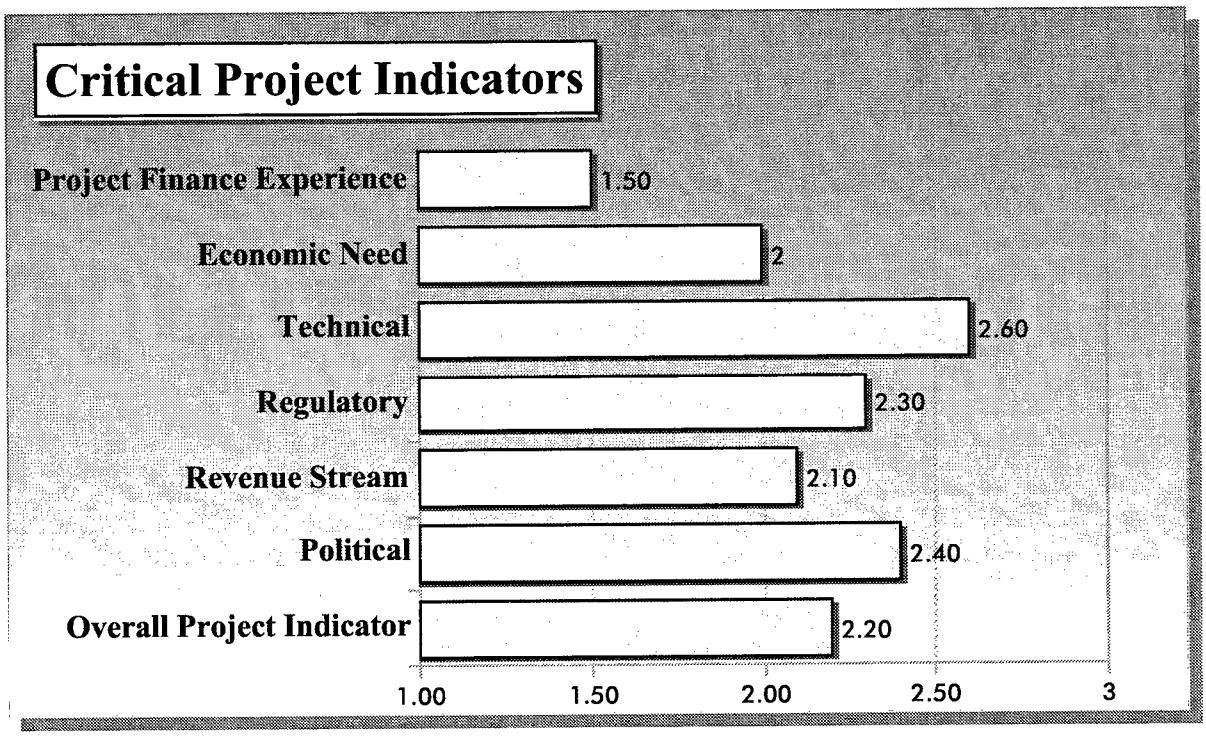
proper management, the landfill will continue to pose health and environmental hazards for the citizens of Tonalá. Pollution from the landfill has started to seep into the groundwater, a potentially dangerous problem given that much of Guadalajara gets its water from wells. In addition, the landfill is located near several densely populated areas which are threatened by contaminated runoff. Further, without proper management practices, the landfill has experienced a number of explosions from trapped methane gas. Finally, the landfill at Tonalá will be filled to capacity at the end of 1996.

Project Assessment

The project has strong support from officials both in the city and state governments. Clearly, for environmental reasons there is a sense of urgency to find a solution. The model identified by the city's advisors uses a proven technology.

Since the roles and working relationship of the private operator and the government is unclear, it is difficult to make a judgment on the financial viability of the plant. The project's future revenue stream appears to be strong, though, only if power can be sold under contract or at competitive rates to CFE and if the landfill is a monopoly and/or low-cost provider of disposal services.

Critical Project Indicators



Key Decision Makers

Due to its impact on public health and the environment, a number of key groups are supporting this project. The project has strong support from the City of Tonalá, and is championed by City Councilman Pascual de Anda. Tonalá has hired a local construction firm, Orendain, as a technical advisor to assist in defining project requirements. The local office of the Secretariat of Social Development also is backing the project, as the landfill is a threat to nearby residents. The State Ecological Commission of Jalisco has strong concerns about the impact that the existing landfill is having on the environment, and is considering putting up funds for the project.

Company	**City of Tonalá**
Name	Dr. Felipe Jarero Escobedo
Title	Municipal President
Location	Tonalá, Jalisco
Phone	(52-3) 863-0047
Fax	(52-3) 863-0401

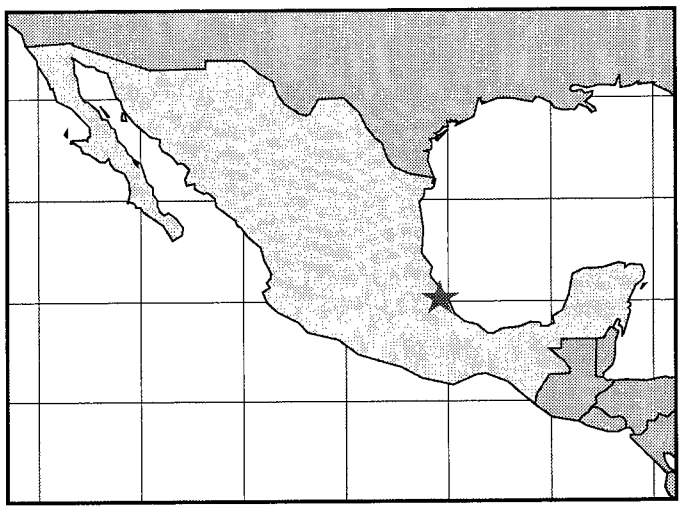
Company	**City of Tonalá**
Name	Ing. Pascual de Anda Cárdenas
Title	City Councilman
Location	Tonalá, Jalisco
Phone	(52-3) 863-0047
Fax	(52-3) 863-0401

Company	**State Ecological Commission**
Name	Ing. Ramón Humberto González
Title	Director General
Location	Guadalajara, Jalisco
Phone	(52-3) 817-1475
Fax	(52-3) 817-1475

Company	**Constructora Orendáin**
Name	Ing. Alberto Rodríguez
Title	Vice President
Location	Guadalajara, Jalisco
Phone	(52-3) 826-0555
Fax	(52-3) 825-4774

Environmental/ Hazardous Waste

Veracruz Recycling Facility



Project Summary

Project No:	**ENV-08**
Subsector:	**Hazardous Waste**
State/Region:	**Veracruz**
Project Cost:	**$55-$100 million**
Export Potential:	**$35-$55 million**
Owner:	**Molten Metal Technology**

Technical Description

Molten Metal Technology (MMT) of Waltham, MA proposes to build a hazardous waste recycling facility capable of recycling 60,000 tons of hazardous waste per year generated in Mexico. The project is still in the feasibility stage but a combination of private and public sector funding is being envisioned. The project's revenues will be derived from recycling wastes and reselling them as useful industrial products.

The plant will use Catalytic Extraction Processing (CEP), a patented technology that allows organic, organometallic, and inorganic waste streams, both hazardous and nonhazardous, to be transformed into high quality commercial products. These products include synthesis gas, hydrogen chloride, metal alloys, and specialty ceramics. The process uses a molten metal bath, both as a catalyst for elemental dissociation and as a solution for reaction engineering. The technology is capable of total destruction and removal efficiencies of greater than 99 percent on a wide variety of feedstocks, without generating harmful emissions.

MMT has signed a letter of intent with Celanese Mexicana, one of Mexico's largest chemical companies. Celanese will provide the site for the plant. In return, MMT will process and recycle selected waste for Celanese and provide its plant with synthesis gas. The letter of intent does not provide for Celanese taking an equity stake in the project. MMT is seeking additional partners to be involved in development of the project.

Regulatory Framework

The project is being regulated by Mexico's General Ecology Law and the new norm for thermal treatment, which has been submitted for public comment. The permitting process has yet to begin. To gain local support for the project, MMT has met with representatives of national, state, and local governments.

Site

The Veracruz Recycling Facility is to be sited at the Cangrejera Plant of Celanese Mexicana, near Coatzacoalcos, Veracruz.

Project Status

MMT is presently conducting a feasibility study partially funded by the U.S. Trade and Development Agency which should be completed by the end of September 1996. This study focuses on market, regulatory, technical, and community conditions on which the project will be evaluated. The project is subject to confirmation, following completion of the feasibility study.

Bidding dates for subcontracts and additional equipment have not yet been decided. However, bidding will most likely take place in the first quarter of 1997. Construction is expected to take 12 months once equipment has been purchased and subcontracts let.

Equipment & Services Demand

Although the results of the feasibility study are not yet known, MMT expects that the facility will need the following types of equipment:

- Feed Preparation and Injection Systems
- Gas Injection Systems Compressors
- HCL Product Absorption and Product Storage
- Equipment Control Devices
- Area Monitoring Systems
- Quenching Systems
- Gas Handling and Purification Equipment
- Venturi Scrubbers
- Scrubbing Towers
- Feed Tanks

The project is estimated to generate between US$35 million and US$55 million in U.S. exports.

Nature of Demand

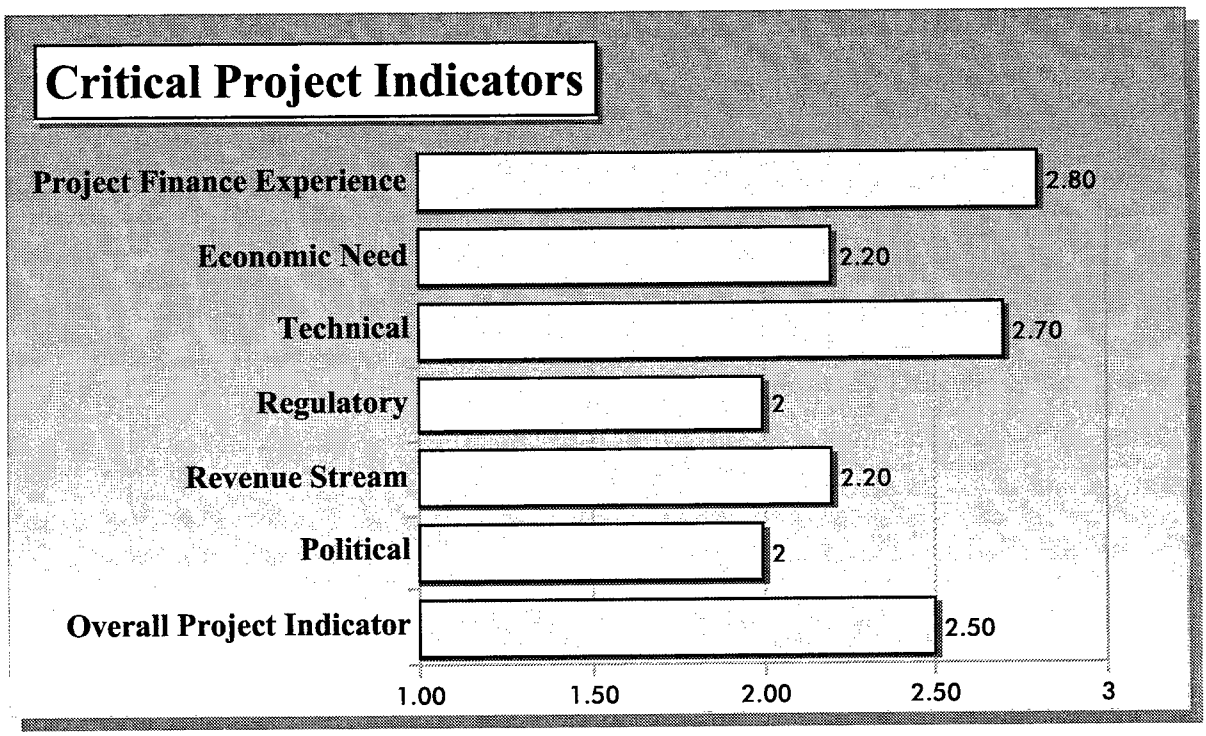
The Veracruz Recycling Facility will primarily serve the region of Coatzacoalcos-Minatitlán in the state of Veracruz. Selected waste streams will be accepted from other regions of the country. The Mexican market for hazardous waste is estimated by the National Ecology Institute (INE) to be eight million tons per year.

Project Assessment

MMT is investigating traditional infrastructure development financing options to increase the project's viability. The Veracruz Recycling Facility will be well positioned to serve the petrochemical industry on Mexico's Gulf Coast. Chemical waste makes up almost 45 percent of all hazardous waste produced in Mexico.

INE introduced a new program in July 1996 to license hazardous waste recycling facilities. It is not clear what effect this initiative will have in spurring private sector interest in the hazardous waste processing business, as no new enforcement initiatives have been undertaken.

Critical Project Indicators



Key Decision Makers

MMT is based in Waltham, Massachusetts. The company's representative in Mexico is as follows:

Company	**Molten Metal Technology**
Name	Lic. Sergio Bringas Viguri
Title	Mexico Representative
Location	México, D.F.
Phone	(52-5) 596-9271
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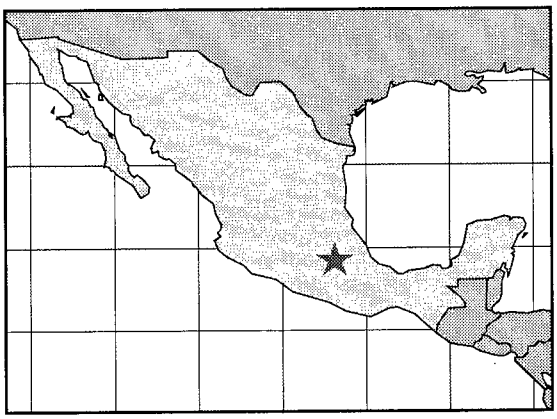
Environmental/ Water Supply

Valley of Mexico Water Project: Cutzamala



Project Summary

Project No:	**ENV-09**
Subsector:	**Water Supply**
State/Region:	**State of Mexico**
Project Cost:	**$878 million**
Export Potential:	**$165 million**
Owner:	**CNA**

The Valley of Mexico, which contains Mexico City, has experienced a long period of intense population growth. The Mexico City Metropolitan Area is expanding rapidly and, with a population of almost 20 million, is already one of the largest cities in the world. Current water supply and wastewater treatment facilities are inadequate to handle current and future demand. Consequently, the Government of Mexico, through the National Water Commission (CNA), has launched an effort to meet the existing and future demands for water and wastewater treatment services. This effort will be financed by bilateral and multilateral agencies, as well as out of the national budget. Apart from the US$878 million water supply component of the project, US$593 million is budgeted to expand wastewater treatment capacity by 74.5 cubic meters per second.

Technical Description

The water supply component of the Valley of Mexico Water Project aims to meet the increasing demand for clean water. The new system will expand the Valley of Mexico's potable water supply from the current 19 cubic meters per second to a total capacity of 24 cubic meters per second. The project includes the construction of a water reservoir, an aqueduct, a potable water treatment plant and expansion of the water distribution network. Please see the following table for the cost-breakdown:

Name	Type	Cost
Temascaltepec	Water Reservoir	US$507 million
Cutzamala IV	Potable Water Treatment Plant	US$98 million
Perimeter	Aqueduct Distribution Network Expansion	US$65 million
Macrocircuito	Distribution Network Expansion	US$208 million

Temascaltepec Water Reservoir

Located on the Temascaltepec River, this reservoir will be approximately 80 meters high. It will require a pumping station with a capacity of 15 cubic meters per second which will raise the water 250 meters. The project will also require 5,000 meters of force mains with a diameter of 1.5 meters. In addition, a 14-kilometer tunnel with a diameter of four meters will have to be drilled through rock.

Cutzamala IV Potable Water Treatment Plant

The existing Cutzamala water supply system will be modernized and expanded. This endeavor will consist of aqueducts, distribution canals, and a regulating reservoir. At the core of the expansion are six pumping stations raising the water 1,000 meters and a water treatment plant with a capacity of five cubic meters per second, which will expand current capacity from 19 to 24 cubic meters per second.

Perimeter Aqueduct

This part of the project aims to expand potable water distribution capabilities in the southern part of the Mexico City Metropolitan Area through the installation of piping, which will also require the digging of tunnels. The total length of the required piping is 11,000 meters.

Macrocircuito Water Distribution Network

Macrocircuito refers to a system of water distribution in the northern and eastern parts of the Mexico City Metropolitan Area. At present, the system requires 160 kilometers of piping with a diameter ranging from 1.2 to 1.5 meters.

The government of Mexico is in the process of arranging financing for the whole Valley of Mexico Project with international development and lending agencies, such as the Inter-American Development

Bank (IDB) and the World Bank. Remaining funds will be drawn from the public budget. The IDB and the Japanese OECF are expected to provide funding for the wastewater treatment plants.

Construction will be undertaken under public management and funding by the federal government through the CNA. The bidding process will be governed by the laws on public bidding and public works. Nevertheless, once completed, the plan is to let concessions for operation and maintenance to the private sector.

The concessions will include: responsibility for water measurement, invoicing and collection of payment for both water and wastewater services, plant management, and distribution network maintenance. These concessions will not be let by the federal government but by the individual municipalities, alone or in groups.

Site

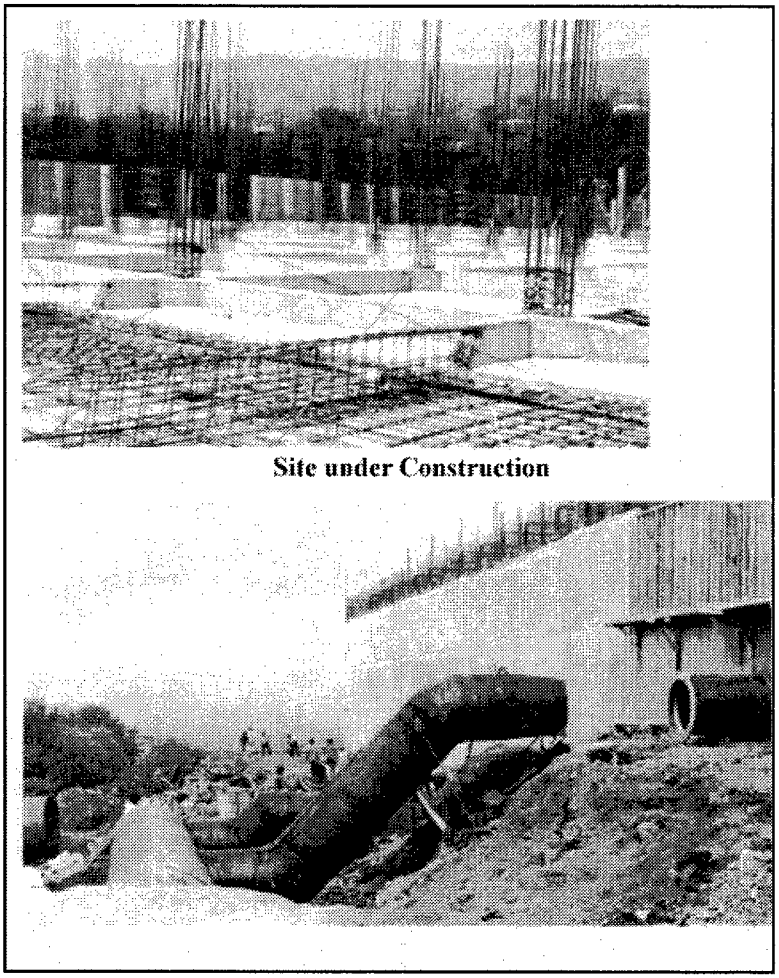
All parts of the project are located in the State of Mexico. The Temascaltepec project is located in the municipalities of Temascaltepec and Valle de Bravo. The Cutzamala IV water treatment system will encompass various municipalities to the east and north of the Valle de Bravo reservoir. The Perimeter Aqueduct will be located in the south of Mexico City within the Federal District, while the Macrocircuito Water Distribution Network will be located in urban municipalities to the north and east of the Federal District.

Project Status

Funds for the Water Supply Project are being negotiated with international development and lending agencies. Negotiations are expected to yield positive results in the last quarter of 1996 at the latest.

The bidding process for the whole Valley of Mexico Project, including the wastewater treatment plant, is expected to start in September 1996. The publication of bids is expected to continue until July 1997. Bids for the Water Supply Project are expected to open in the last quarter of 1996.

Construction is expected to start in the first quarter of 1997 and last until the first half of the year 2000.



Site under Construction

Equipment & Services Demand

The principal equipment required will be used for the pumping stations and water treatment plant at Temascaltepec and Cutzamala. Equipment for tunnel drilling will also be required. The technology to be used for the water treatment plant and pumping stations has not been determined. Equipment to be purchased includes:

- Pumping Stations and Pumps
- Clarifiers
- Drills and Other Tunneling Equipment
- Heavy Earth Moving Equipment
- Chlorination Systems

- Flowmeters
- Power Transmission Substations
- Reinforced Concrete Mains

Specialized service requirements are focused on detailed engineering for the rehabilitation of the Cutzamala water supply system, design of the water reservoir, the pumping stations and the water treatment plant.

The estimated export potential is approximately US$165 million.

Nature of Demand

Although Mexico's population growth rate declined in the 1980s, the inflow of people to the Mexico City Metropolitan Area continues virtually unabated. Current water and wastewater treatment facilities are already insufficient to handle the demands put on them by Mexico City's 20 million inhabitants.

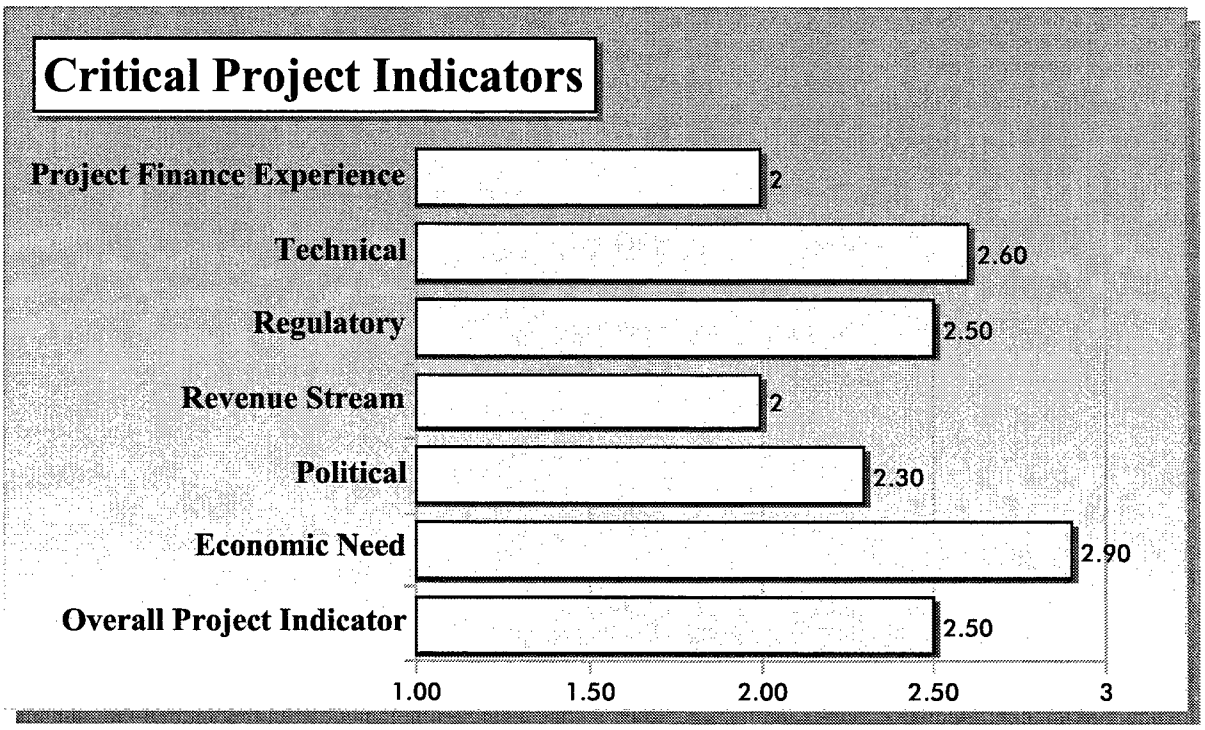
This project is a priority of the federal government due to the positive impact on public health.

Project Assessment

There is no doubt that expanding water and wastewater treatment capacity in the Mexico City Metropolitan Area is an urgent necessity. However, this is an immense undertaking requiring large amounts of funding as well as highly qualified management teams.

It appears that the project's financing efforts have met with success with international and multilateral institutions. Adequate funding will need to be allocated in the government's budget, one of the key factors that will affect the viability of the project.

Critical Project Indicators

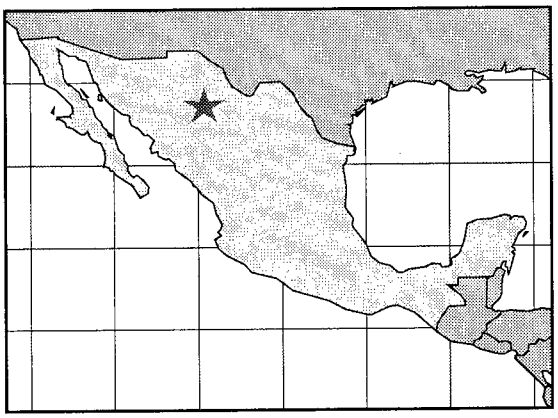


Key Decision Makers

Company	**National Water Commission**
Name	Ing. Luis de la Mora
Title	Project Manager
Location	Metepec, State of Mexico
Phone	(52-72) 32-40-65
Fax	(52-72) 32-40-67

Environmental/ Wastewater

Delicias Wastewater Treatment Plant



Project Summary

Project No:	**ENV-10**
Subsector:	**Wastewater**
State/Region:	**Chihuahua**
Project Cost:	**$21 million**
Export Potential:	**$5 million**
Owner:	**City of Delicias**

The State of Chihuahua received funding for a feasibility study from the U.S. Trade and Development Agency to evaluate wastewater treatment alternatives for nine small- and medium-sized cities in the state. In mid-1996, the U.S. consulting engineering firm Freese & Nichols completed the nine-part feasibility study and conceptual design.

The individual municipal governments are responsible for moving forward to implement the projects. Delicias is the first to do so, and it plans to let a concession for the construction and operation of the city's wastewater treatment facilities.

The National Water Commission (CNA) has set particular discharge conditions for Delicias, limiting discharge to 30 milligrams per liter for both for Biological Oxygen Demand (BOD_5)and Total Suspended Solids (TSS). Freese & Nichols concluded that a plant using extended aeration would most adequately serve the city's needs. Due to financing issues and the devaluation of the peso in December 1994, however, this alternative has become increasingly less viable.

Technical Description

The City of Delicias has 21,214 domestic service connections to the sewage system, 663 commercial connections and 40 industrial service connections, for a total of 21,917 connections. This represents 82.7 percent of the city's potable water connections. The city has a population of approximately 110,000.

Freese & Nichols found that the most economical alternative to treat Delicias's wastewater and achieve the required levels of 30 milligrams per liter for both BOD_5 and TSS was a process using extended

aeration and conventional clarification.

The plant is estimated to have an initial capacity of 1,097 liters per second. In the year 2005, it would be expanded to 1,634 liters per second. In addition to sewage from the City of Delicias, this plant will also treat sewage from the much smaller town of Meoqui. For this purpose, a force main and a pumping station will have to be constructed to transport the raw sewage from the nearby town.

The city has not made a final decision on plant specifications. It is not clear whether the extended aeration alternative will be financially viable after recent economic difficulties. In order to finance such a plant, Freese & Nichols estimates that the user fee for wastewater treatment would have to be approximately 1.20 pesos (US$0.16) per cubic meter, which would more than double the current fee charged for potable water. Such an increase could make this alternative difficult politically for the municipal government.

CNA is considering new regulations which will relax the wastewater discharge standards from 50 milligrams per liter for both BOD_5 and TSS to somewhere between 75 to 200 milligrams per liter. These new regulations offer most operators the possibility of satisfying legal discharge requirements using only an advanced primary treatment plant with disinfection and sludge treatment. However, in the case of Delicias, CNA previously set specific discharge requirements at 30 milligrams per liter for BOD_5 and TSS. These discharge requirements would not be affected by the new regulations. Consequently, since compliance promises to be above the financial capacity of the city and its water users, Delicias -- with the assistance of Freese & Nichols --is in the process of requesting a special relaxation of the discharge requirements imposed on the city.

The construction cost for an initial plant with an average capacity of 1,097 liters per second is estimated at US$16.2 million. The pumping station for Meoqui is estimated at US$1.9 million. Expansion to full capacity in the year 2005 to 1,634 liters per second is estimated to cost US$4.8 million. The total project cost for an extended aeration plant with conventional clarifiers is estimated at US$22.9 million including the expansion in the year 2005. An advanced primary treatment plant with disinfection and sludge treatment is expected to cost approximately 35 to 40 percent less, or US$14.5 to US$15.6 million.

Site

Delicias is located approximately 80 kilometers southeast of the state capital of Chihuahua. Meoqui is located about 10 kilometers north of Delicias.

Project Status

Since the feasibility and conceptual study was completed in July 1996, the municipality of Delicias has

begun to prepare a public bid for a concession. The city is currently in the process of submitting a request to the CNA to lower the particular discharge requirements so that it can install an advanced primary treatment plant.

Grants and heavily subsidized loans are also being sought to finance the extended aeration plant in case the discharge requirements are not lowered.

Equipment & Services Demand

The project will be designed and implemented by the company winning the bid. Equipment needs include:

- Bar Screens
- Grit Removal System
- Influent Pump Station and Pumps
- Splitter Boxes
- Automated and Manual Screens
- Primary Clarifiers
- Sludge Pump Stations and Pumps
- Parshall Flumes
- Aeration Basins*
- Secondary Clarifiers*
- Chlorine Contact Basins
- Scum Pump Stations
- Gravity Thickeners
- Anaerobic Digestor
- Sludge Handling Units

* Not required for advanced primary treatment plant.

The estimated export potential is approximately US$6 million. If an advanced primary treatment plant is selected the estimated export potential will be US$2 million.

Nature of Demand

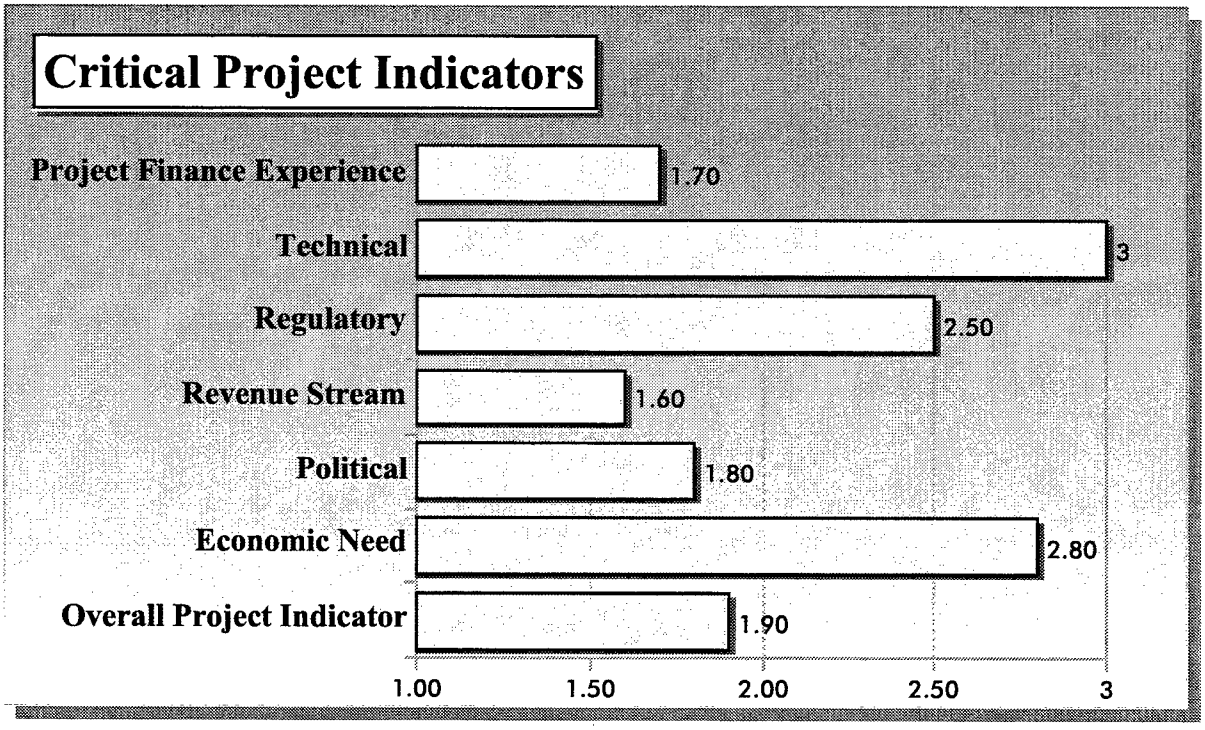
The State of Chihuahua and its small- and medium-sized cities, such as Delicias and Meoqui, are experiencing rapid population growth. Moreover, the concerns about the waterborne diseases and the need to preserve its limited water resources have prompted Delicias to actively pursue this project as one of its more important priorities. The municipal government is currently petitioning the CNA to lower the discharge requirements for Delicias in order to open up the option of building an advanced primary treatment plant.

Project Assessment

The State of Chihuahua is a relatively prosperous state. However, water charges have been depressed and subsidized. Currently potable water tariffs are approximately one peso per cubic meter (approximately US$0.13). Consequently, there is not only a problem of payment capacity but also a problem of willingness to pay. A water bill increase of over 100 percent is clearly politically sensitive.

A complicating factor is that there is no significant local industry to which one could sell the effluent as industrial process water. Hence, the only revenue sources for a concessionaire remain the municipality and the domestic and commercial users. As a result of these poor credit conditions, the project may have difficulty in attracting financial support.

Critical Project Indicators



Key Decision Makers

Company	**Delicias Municipal Water and Sanitation Company**
Name	Ing. Armando Carrasco
Title	Chairman
Location	Delicias, Chihuahua
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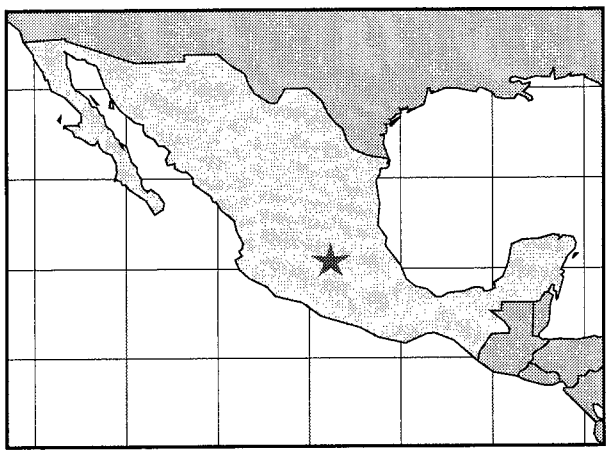
Environmental/ Wastewater

Querétaro Wastewater Treatment Plant



Project Summary

Project No:	**ENV-11**
Subsector:	**Wastewater**
State/Region:	**Querétaro**
Project Cost:	**$21 million**
Export Potential:	**$7 million**
Owner:	**ARQSA**

In 1994, the Compañía Aguas Recicladas de Querétaro, S.A. de C.V. (ARQSA), a private Mexican consortium, won a 15-year wastewater treatment concession for the city of Querétaro. When the peso was devalued in December 1994, the project was put on hold. ARQSA is currently in the process of restarting the project and searching for cost-efficient technological solutions.

Technical Description

The wastewater treatment plant will serve the city of Querétaro and operate at a total capacity of 700 liters per second. The influent has a Biological Oxygen Demand (BOD) of 454 milligrams per liter. The effluent is required to have the characteristics of 20 milligrams per liter for both BOD and Total Suspended Solids (TSS), a removal efficiency of approximately 96 percent.

The process being contemplated uses biological filters, preceded by primary clarification as well as a bar screen and grit removal. The biological filter is followed by secondary clarification, chlorination and measurement of the treated wastewater volume. The plan is to move the sludge through aerobic digesters, followed by belt presses.

ARQSA has conducted discussions with technology providers in an effort to restart the project. However, no agreements have been signed and the company is actively searching for new technological solutions. It is also considering adding a tertiary treatment process to be able to sell industrial process water to industries in the northern part of Querétaro. Such sales would generate a significant source of revenue. Without tertiary treatment, the effluent can still be used for irrigation purposes as long as it is

disinfected properly.

The company is in the process of developing a new financial package and welcomes participation by additional parties, as the key issue for restarting the project is financing.

ARQSA will be paid for its service under a long-term contract by the State Water Commission (CEA), which in turn charges the user. Banobras is also providing a revolving credit-line worth six months of expected revenues in order to guarantee against irregular payments. Any federal support will be channeled through Banobras.

Banobras has also offered financing for 70 percent of the project. However, ARQSA has declined this offer as it finds it somewhat expensive.

Site

The plant will be located at the confluence of the Querétaro River and the Arenal Creek in the City of Querétaro, in the State of Querétaro.

Project Status

When the economic crisis erupted in December 1994, civil works construction had just begun. As the economic climate worsened, construction was suspended and the contract with CEA was restructured. The issue of guarantees in the contract was not clear. The guarantee solicited by the State Water Commission (CEA) from Banobras on behalf of the project had been withheld.

In light of improving economic circumstances and the restructured contract, ARQSA expects to receive the guarantee before the end of 1996. Hence, it expects to restart construction in November 1996 and begin actual plant operations in the first quarter of 1998.

If financing cannot be arranged at this time, the project will be delayed further.

Equipment & Services Demand

The project requires all relevant equipment for the treatment plant. This includes:

- Bar Screens
- Vortex Grit Removal Units

- Centrifuges
- Submersible Pumps
- Primary Clarifiers
- Biological Filtration Units
- Blowers
- Secondary Clarifiers
- Chlorine Contact Chamber
- Chlorine Diffusers and Dosage Meters
- Sludge Thickeners
- Sludge Digesters
- Belt Filter Presses
- Ultrasound Flowmeters

The estimated export potential is US$7 million.

Nature of Demand

The city of Querétaro is located in a very arid area which draws on underground aquifers for its potable water. These are becoming depleted and the water supply situation is becoming increasingly difficult. Hence, the city is searching for alternative sources of water for industrial processing and agricultural irrigation. The strict effluent standards quoted above are intended to ensure sufficient water quality in order to sell it to industry and irrigation.

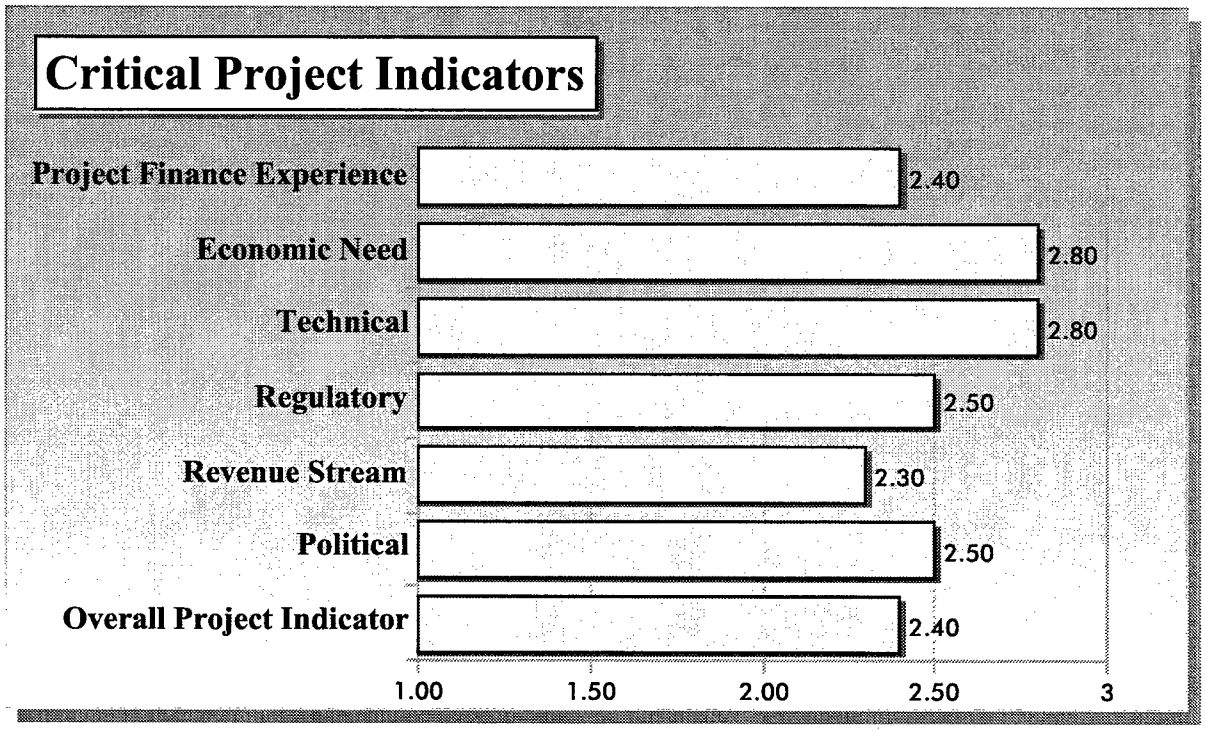
Project Assessment

This project was thrown off track by the peso devaluation of December 1994. Although wastewater plants are difficult to finance, the presence of potential industrial and agricultural customers holds out the prospect of a relatively solid revenue flow.

The main difficulty seems to lie with structuring the financial package, but there appears to be a good opportunity for equipment manufacturers entering with full or partial financing.

The relationship with Banobras will need to be maintained as Banobras deals with virtually all private water and wastewater projects in Mexico in one capacity or another.

Critical Project Indicators



Key Decision Makers

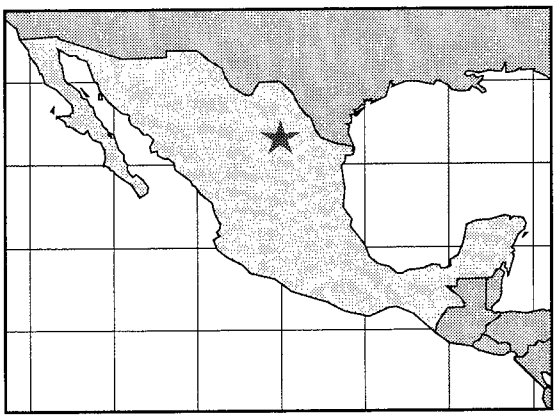
Contact information for Aguas Recicladas de Querétaro and Obras Portuarias de Coatzacoalcos -- one of the members of the consortium that holds the Querétaro concession -- is as follows:

Company	**Aguas Recicladas de Querétaro S.A. de C.V.**
Name	Ing. Luis Ortizibarra Ybarra
Title	General Director
Location	Querétaro, Querétaro
Phone	(52-42) 15-37-04
Fax	(52-42) 15-37-05

Company	**Obras Portuarias de Coatzacoalcos S.A. de C.V.**
Name	Ing. Sergio Anguiano Lugo
Title	Manager of the Environmental Division
Location	Coatzacoalcos, Veracruz
Phone	(52-921) 466-86
Fax	(52-921) 401-11

Environmental/ Wastewater

Saltillo Wastewater Treatment Plant



Project Summary

Project No:	**ENV-12**
Subsector:	**Wastewater**
State/Region:	**Coahuila**
Project Cost:	**$26.8 million**
Export Potential:	**$8 million**
Owner:	**FIDAGUA**

In 1994, the State Government of Coahuila created FIDAGUA, a trust responsible for planning improvements for the city of Saltillo's water and wastewater collection and treatment systems. A year later, FIDAGUA obtained funding from the U.S. Trade and Development Agency to prepare a feasibility study on a wastewater treatment plant. This study was completed in July 1996 by the U.S. firm, Freese & Nichols.

The Water Utility of Saltillo (SIMAS) is the agency in charge of water and wastewater systems in Saltillo. The State Water Commission (CEAS) plans and supervises water and wastewater systems throughout the State of Coahuila.

FIDAGUA is planning to open bids for a concession to build and operate the wastewater treatment plant. It is still to be decided whether it will be a plant with secondary treatment or solely advanced primary treatment.

Technical Description

The average design flow for the plant is estimated at 2,350 liters per second to be reached in the year 2015. Initial capacity is estimated at 1,410 liters per second which will be adequate until the year 2004. After plant expansions in 2004 and 2010, total average capacity will reach 2,350 liters per second. The parameters used for designing the plant are the following:

Plant Parameters

	Influent	Effluent	Removal Efficiency
	(milligrams per liter)	(milligrams per liter)	(milligrams per liter)
BOD5	290	30	90.0%
TSS	370	30	92.0%

Source: Freese & Nichols

Maximum wastewater discharge limits are established by the National Water Commission (CNA). The current limit on contaminants from municipal wastewater treatment plants for BOD_5 and suspended solids is 50 milligrams per liter. However, a proposal is now being reviewed which would relax these standards to a range between 75 and 200 milligrams per liter for BOD_5 , except for public urban use where the limit would be 30 milligrams per liter.

This general relaxation of standards is a response to the dramatically increased costs of installing secondary treatment facilities. The peso devaluation of December 1994 raised the costs of imported capital equipment dramatically, while water tariffs remained virtually the same at around one peso per cubic meter of potable water.

The result is that many communities are planning to pare down their wastewater treatment plants to comply only with the new regulations. For this purpose it is usually only necessary to install advanced primary treatment, which includes disinfection and sludge treatment in addition to the primary clarification process. Such a move may cut investment costs by as much as 45 to 50 percent. Even larger savings may be obtained in operations and management.

In the case of Saltillo the local authorities and FIDAGUA are still vying for an activated sludge plant to be financed by selling the effluent to local industry. However, the final process selected may still be advanced primary treatment.

In addition to sewage from the city of Saltillo, the plant will treat sewage from the community of Ramos Arizpe. For this purpose, a force main and a pumping station will have to be constructed to transport raw sewage.

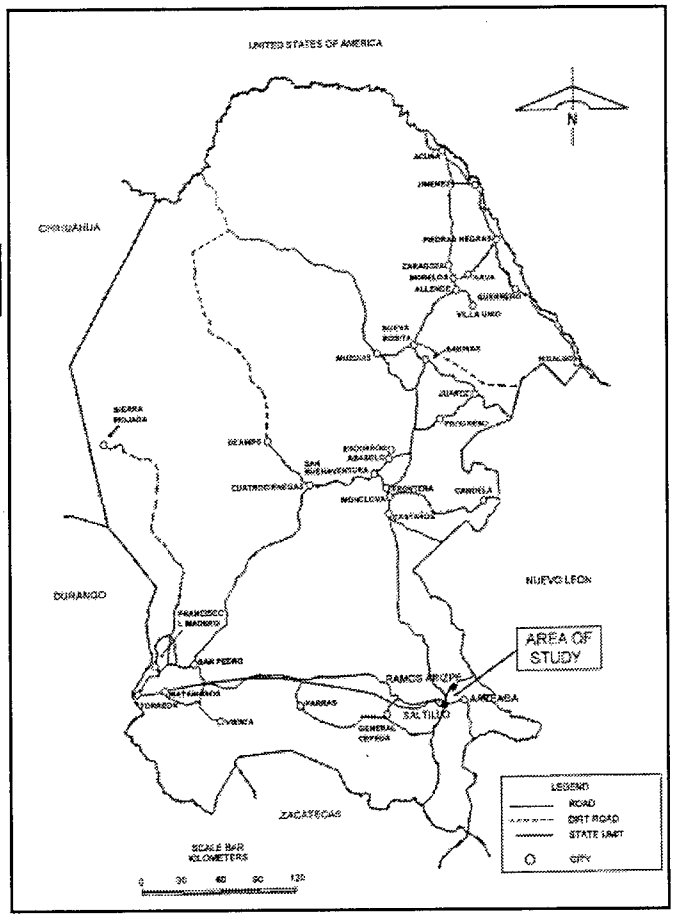
Initial construction cost for the activated sludge plant (average capacity of 1,410 liters per second) is estimated at US$16.7 million. The pumping station for Ramos Arizpe is expected to cost US$379,000. In order to expand in 2004 to 1,880 liters per second, an additional US$5.2 million will have to be spent. Final expansion in the year 2010 to full capacity is estimated to cost US$4.5 million.

Freese & Nichols also evaluated the financial viability of the plant in cooperation with an experienced Mexican consulting firm. The key issue they identified was the payment capacity of users. Hence, they focused on evaluating the impact of various scenarios on the final user fee to be charged per cubic

meter of treated wastewater. Included in this calculation was the amount the municipality would pay to the concessionaire for investment recuperation and for monthly fixed costs, i.e. fixed payments due regardless of the volume treated.

Using an internal rate of return and real interest rates of approximately eight to ten percent, the fee per cubic meter of treated wastewater was approximately one peso. Passing all of this cost on to the user would mean a cost increase of approximately 100 percent; an increase which is clearly politically unacceptable. Hence, Freese & Nichols recommended that grant financing and subsidized financing be solicited from national sources such as Banobras and Nafinsa as well as from international development banks.

Another alternative suggested by Freese & Nichols was to set up a trust fund to finance expansions. The municipality would charge the users a flat fee in real terms over the life of the concession. As the payments due to the concessionaire would decrease over time, the difference would be put into a trust fund to be used to finance future expansion.



Site

The city of Saltillo is located in the southeast region of the State of Coahuila, which borders the United States. The state is one of the most arid regions in Mexico. The city of Saltillo has an average elevation of 1,560 meters above sea level, with a very steep difference in elevation between the southern, highest parts of the city and the northern, lowest parts.

Project Status

The feasibility study for the Saltillo plant was completed by Freese & Nichols in July 1996. FIDAGUA is currently negotiating with local industries to determine if they will want to buy effluent water from

the municipal wastewater treatment plant. A decision on whether to open bids for an advanced primary treatment plant or a secondary treatment plant is expected to be made by the middle of 1997.

Equipment & Services Demand

The activated sludge plant as designed would require the following equipment:

- Bar Screens
- Grit Removal Units
- Grit Pumps
- Cyclone/Grit Wash Unit
- Pump Station and Pumps
- Primary Clarifiers
- Primary Sludge Pump Station and Pumps
- Aeration Tanks*
- Blowers*
- Secondary Clarifiers*
- Sludge Pump Station and Pumps*
- Parshal Flume
- Chlorine Contact Chamber
- Chlorine Diffuser
- Chlorinators
- Sludge Mixing Tank
- Mixed Sludge Pumps
- Belt Thickeners
- Anaerobic Digestors
- Digested Sludge Tank
- Digested Sludge Pumps
- Belt Filter Presses

* Not required in an advanced primary treatment plant.

The estimated export potential is approximately US$8 million in the case of an activated sludge treatment plant and US$3 million in the case of an advanced primary treatment plant.

Nature of Demand

The State of Coahuila is experiencing significant growth and its population is steadily increasing. Increased economic activity and population inflows to regional urban centers such as Saltillo have put enormous stress on existing sanitation facilities. Currently, Saltillo does not treat its wastewater, which is posing a serious health hazard. Over the next 19 years, the city is expected to virtually double in size from approximately 575,000 inhabitants in 1998 to 1.1 million in the year 2015. Sewage is expected to

more than double over the same period. Please see table below for estimates for 1998-2015:

Population and Wastewater Volume Projections

	Saltillo		Ramos Arizpe	
Year	Population	Annual Volume Cubic Meters per Year	Population	Annual Volume Cubic Meters per Year
1998	575,209	31,139,975	26,770	1,449,242
1999	598,103	32,693,745	28,377	1,551,155
2000	621,907	34,321,804	30,079	1,660,000
2001	646,659	36,027,701	31,884	1,776,372
2002	672,396	37,815,013	33,797	1,900,716
2003	699,157	39,687,507	35,825	2,033,599
2004	726,984	41,649,204	37,974	2,175,546
2005	755,918	43,704,155	40,253	2,327,267
2006	786,003	45,856,673	42,668	2,489,319
2007	817,286	48,111,338	45,228	2,662,446
2008	849,814	50,472,833	47,942	2,847,410
2009	883,637	52,946,115	50,818	3,044,933
2010	918,806	55,536,310	53,867	3,255,937
2011	953,261	58,119,942	56,830	3,464,902
2012	989,008	60,819,245	59,956	3,687,006
2013	1,026,096	63,639,295	63,253	3,923,002
2014	1,064,575	66,585,334	66,732	4,173,846
2015	1,104,496	69,662,772	70,403	4,440,458

Source: Freese & Nichols

Project Assessment

Saltillo has a serious economic need to treat its wastewater. Health hazards and a grave need for fresh water dictate a necessity not to pollute the city's waterways.

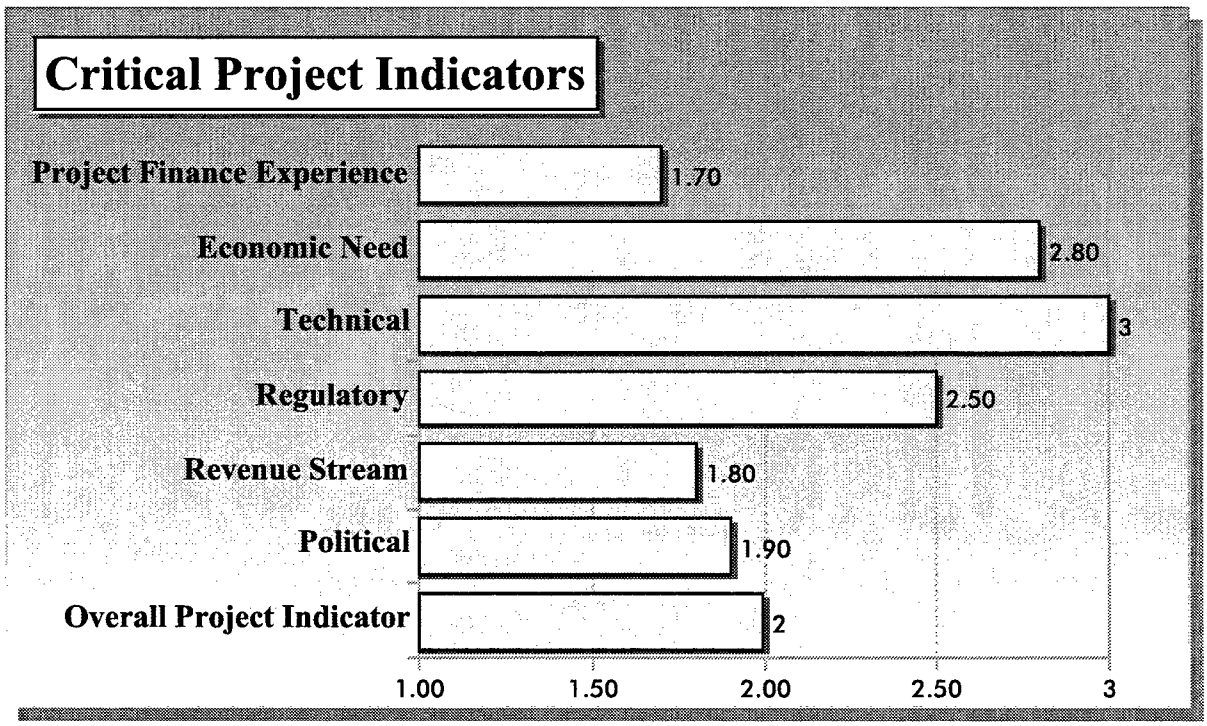
However, the project will be let as a concession where the winner signs a service contract with the state authorities and raises funding on the basis of projected revenue. As Freese & Nichols points out in its feasibility study, the fee required to make the plant more or less economically feasible is one peso per

cubic meter, a 100 percent increase on current water rates. With heavily subsidized water rates at present, such an increase would be very difficult for political and social reasons. Hence, the 70 percent debt part of the financing package has to be heavily subsidized to make the project financially viable.

FIDAGUA is currently trying to create an additional revenue source by convincing local industries to buy industrial process water from the municipal wastewater treatment plant. FIDAGUA has convinced the local industrialists that it would be cheaper to buy water from a municipal plant rather than build their own individual plants for water reuse. However, there is still hesitation in the local private sector when it comes to relying on a municipal wastewater plant for their processed water, even though it may be cheaper.

Consequently, it may be more feasible to build an advanced primary treatment plant. Nevertheless, if local industry does sign up to purchase processed water, the secondary treatment plant may be viable, depending on the fees charged.

Critical Project Indicators



Key Decision Makers

Company	**FIDAGUA**
Name	Ing. José María Fraustro Siller
Title	Manager
Location	Saltillo, Coahuila
Phone	(52-84) 16-08-24
Fax	(52-84) 15-00-97

Company	**Coahuila State Water and Sanitation Commission**
Name	Ing. José Manuel González
Title	Deputy Director of Sanitation
Location	Saltillo, Coahuila
Phone	(52-84) 12-70-69
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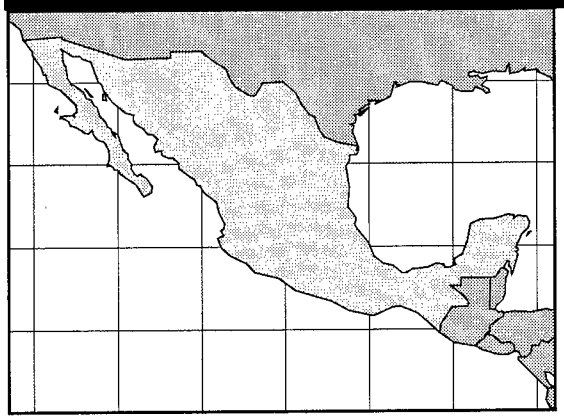
Industrial Sector Overview



Introduction

Comprising 20 percent of the country's gross domestic product, Mexican industry is well developed. Two-thirds of Mexico's industrial sector GDP is concentrated among seventeen industrial corporations, though small and medium size businesses account for half of the country's industrial employment.

Economic performance in 1995 reflected a contraction of the manufacturing base by 6.4 percent. However, the industrial sector has undergone a restructuring and is expected to grow by two to three percent in 1996. During the recent economic downturn, Mexican industrial groups were forced to become more competitive and develop exports as a means for survival. The result has been the modernization of plants and production techniques, and a growing focus on quality.

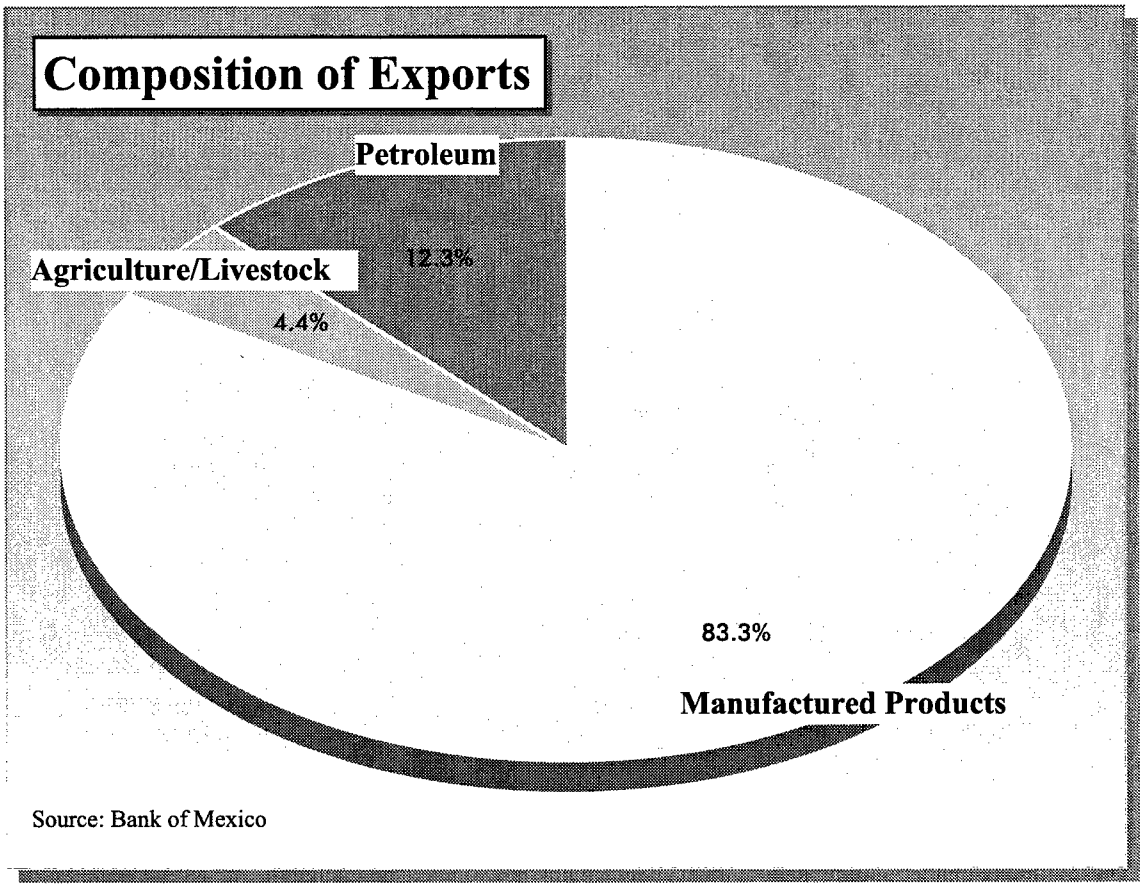
Industrial growth has spurred infrastructure development. Growth projections for Mexican industry indicate an increased need for infrastructure, primarily in the environmental, energy and transportation sectors. Industrial growth will allow many projects with uncertain markets to become more viable.

Background

Industrialization in Mexico accelerated after the Second World War, in part as a result of Mexico's import substitution policy, which fostered domestic production and discouraged exports. The policy focused on consumer goods in the 1950s, on intermediate goods in the 1960s and finally on capital goods in the 1970s.

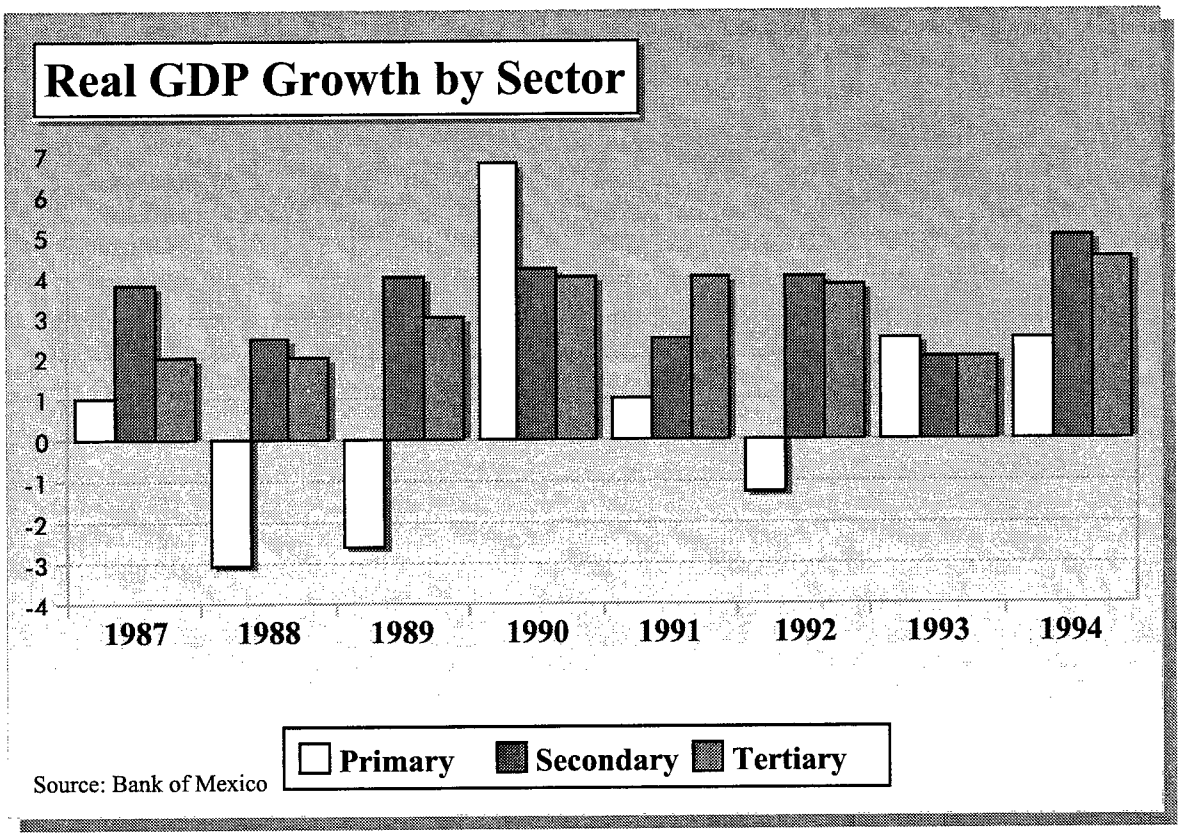
The debt crisis of the 1980s triggered a change in the direction of industrial development: away from import substitution towards export promotion--a process spurred by the trade liberalization begun after 1985.

The direct results of this are reflected by export statistics in which exports of manufactured goods relative to other exports have grown by an average of almost nine percent per year, over the past decade. The figure below illustrates the country's current breakdown of Mexican exports by sector:



Composition of Industrial GDP

The role of manufacturing in Mexico's GDP has grown much faster than that of primary and tertiary activities.

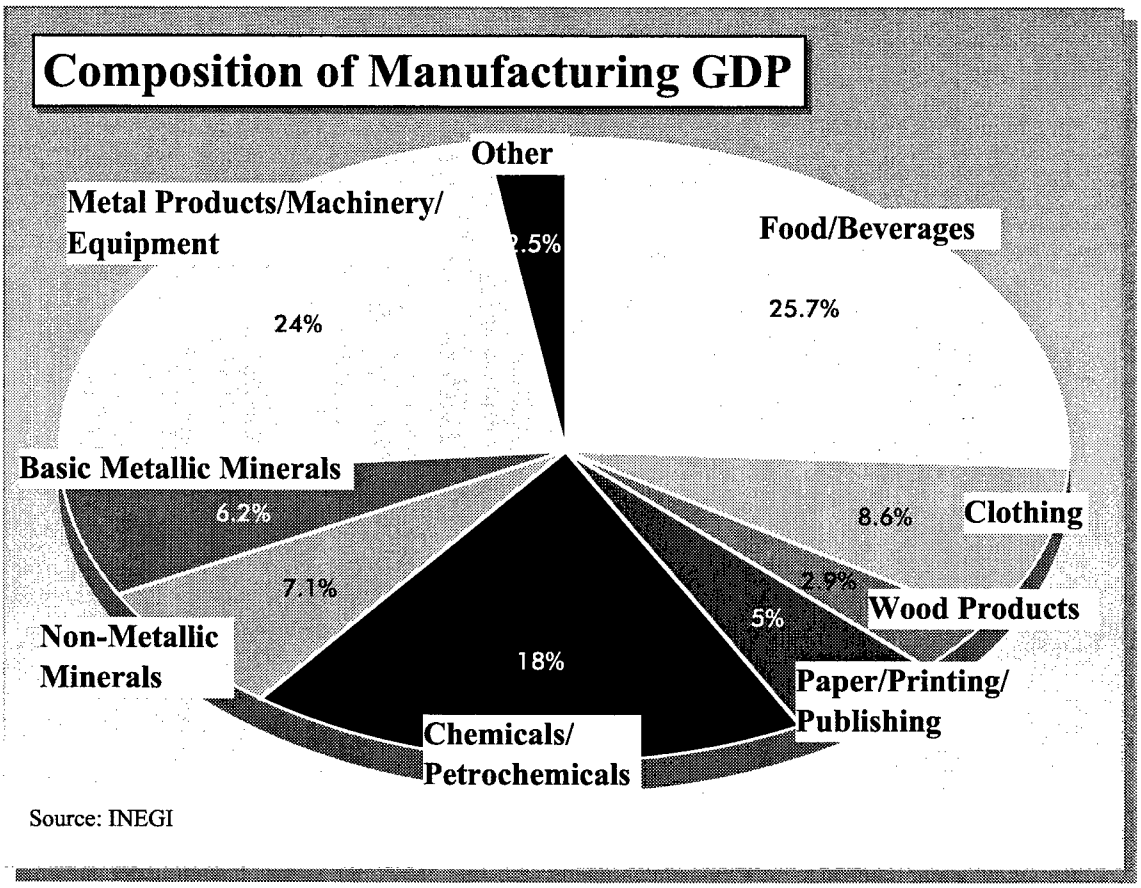


Source: Bank of Mexico

Of the manufacturing GDP, foods and beverages production and metal/machinery production are the two most important sub-segments, individually comprising approximately 25 percent of the aggregate sector GDP.

Having contracted by 6.4 percent as compared with figures with 1994, only two subsectors of the Mexican manufacturing base improved over the past year's performance. Paper printing/ publishing and basic metals, managed to compensate for the collapse of domestic demand by increasing exports. With a sustained focus on exports and quality, Mexico is expected to continue its trend of productivity growth.

During the first two quarters of 1996, Mexican manufacturing has shown recovery signs and has grown by 7.2 percent primarily driven by exports and the rebound of the transformation and maquiladora industries.

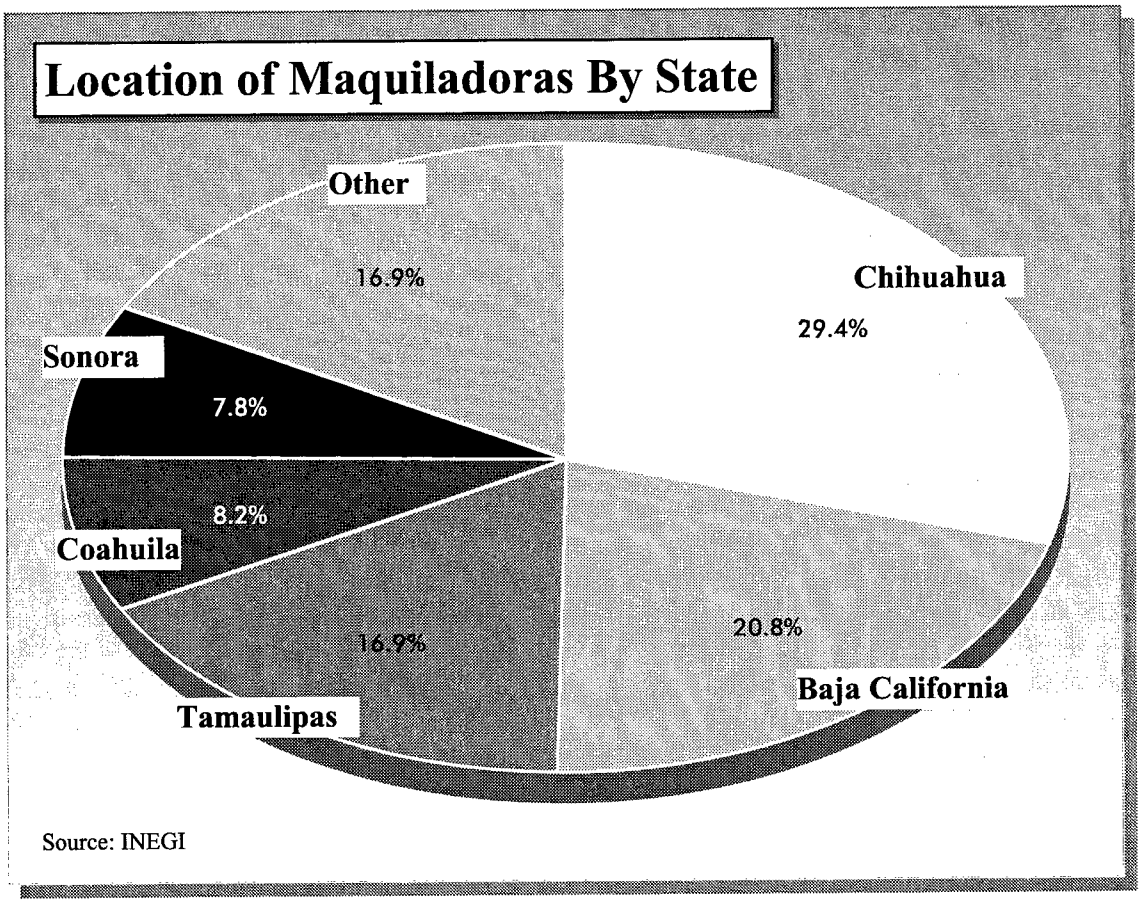


Maquiladoras

The maquiladora industry (in-bond) assembly plants) is responsible for 43.8 percent of Mexico's manufactured exports. The maquiladora balance of trade for the first half of 1996 was US$1.27 billion, according to the Banco de México. This figure is 17.8 percent higher than at the same period in 1995. The maquiladoras are becoming an increasingly important segment of Mexico's industrial sector. Registering a growth rate of 10.2 percent during the first three months of 1996, maquiladora growth handily outpaced the next fastest segment -- the transformation industry -- which grew by 3.6 percent.

The greatest concentration of the maquilas is in the States of Chihuahua, Baja California Norte, and Tamaulipas, which are also driving the demand for infrastructure development.

Nacional Financiera (Nafin), the principal Mexican Government bank for industrial promotion, has shifted its outlook on the promotion of foreign investment, since the devaluation of 1994. Nafin has now prioritized attracting foreign investors to Mexico.



Profile of Leading Sectors

Building Materials

Over the past year, the steel, glass and cement manufacturing industries have suffered due to a 22 percent decline in construction activity in Mexico. As a result of the recession's effects on construction, the production of manufactured building materials contracted 14.6 percent in 1995. Also oriented towards the domestic construction market, the lumber sector performed almost as badly, declining 14.1 percent during the same period.

The decrease in internal demand has spurred the aggressive restructuring of the sector. Industry is modernizing and reorienting its sales to international markets. The main iron and steel producers, which include Altos Hornos de México (AHMSA) and Siderúgica Lázaro Cárdenas Las Truchas (SICARTSA) and Hijalata y Lámina (HYLSA, part of Grupo Alfa), have been undergoing a period of modernization, with new investment directed towards plant modernization and new product research and development. As a result of privatization and intensifying competition, Mexican industry is investing in the modernization of its operations.

Second quarter 1996 results show a 7.8 percent increase in construction activity, once again driving domestic demand for building materials. This sector should continue to demonstrate strong growth.

Chemicals/Petrochemicals

Dating back to the early 1960s, Mexico's chemical and petrochemical industries have been among the country's most dynamic industrial sectors. With three percent of the world's production capacity, Mexico is currently the fifteenth largest chemical/petrochemical producer in the world. Accumulated investment in the industry stands at approximately US$16.3 billion, and the sector accounts for three percent of the Mexican GDP.

With 59 plants and 16 products, Petróleos Mexicanos (Pemex) is Mexico's sole domestic producer of basic petrochemicals, with an output of 11 million metric tons. Pemex also has 34 plants with a capacity of two million metric tons producing intermediate petrochemicals. Mexico is home to 28 other producers of intermediate petrochemicals including Celanese Mexicana, Petrocel, Tereftalatos Mexicanos, Polioles, Glicoles Mexicanos, IDESA and Univex.

In fertilizers, total industrial capacity in Mexico is 1.7 million metric tons. Fertimex, a former state-owned company now controlled by Grupo GAN, produces 90 percent of the country's total output. The company has sold most of its subsidiaries to private investors since 1991.

Mexico is also a strong producer of fibers and resins with 494,000 and 1.6 million metric tons of installed capacity respectively. In addition to Pemex, Grupo Desc, Cydsa, Celanese Mexicana and Alfa are the leading producers in this market.

Exports have been a primary driver behind growth in this sector which reached an annual average of 2.6 percent between 1990-1994.

Automotive

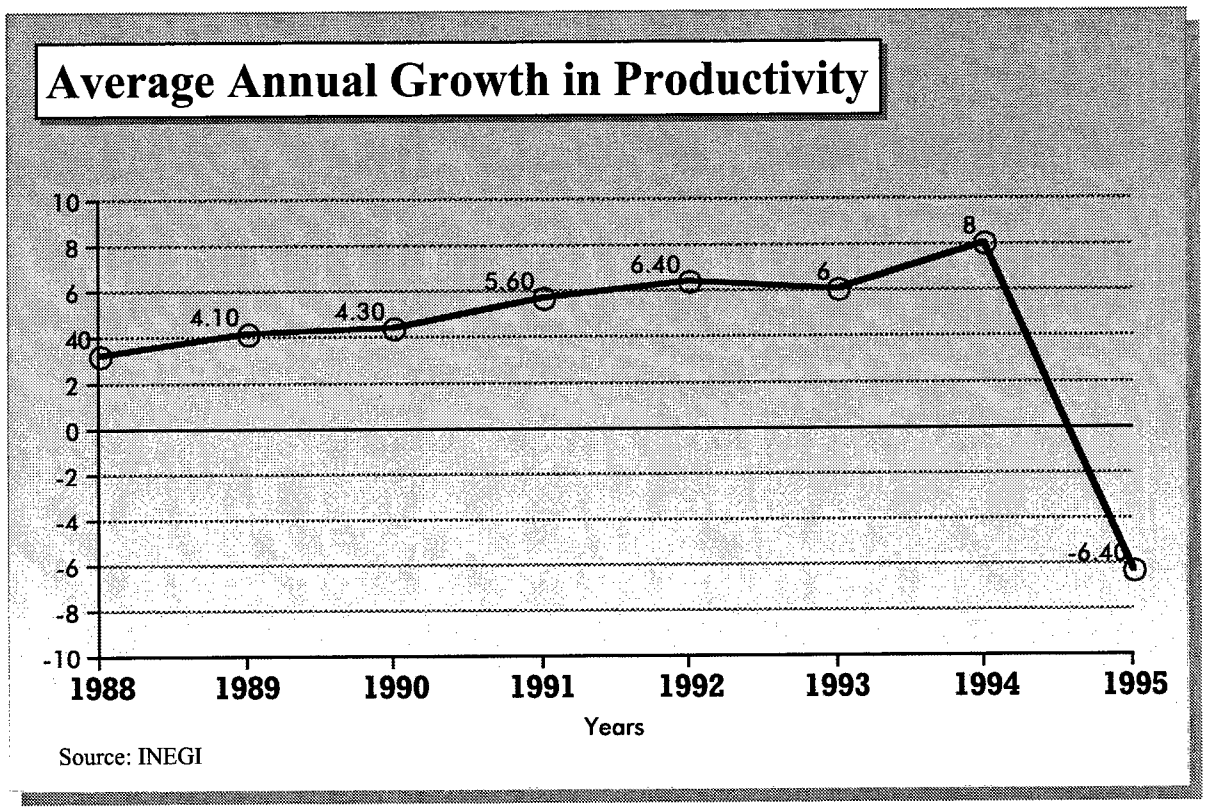
The Mexican automotive industry was born in 1925, when Ford Motors established an assembly plant in Mexico City. General Motors followed suit in 1935 and Chrysler in 1938. By 1960, there were ten assembly plants averaging 30,000 units annually. Today, Chrysler, Ford, General Motors, Nissan and Volkswagen are present in Mexico building passenger cars and trucks. In addition, Honda is stamping body panels for U.S. plants, Renault manufactures engines for Europe, and Mercedes-Benz has announced plans to start manufacturing passenger cars in Mexico for the North American market. Combined, the total expected short-term investments for these companies exceeds US$4 billion.

Mexico's automotive industry is a mature one, with an established supplier base and local engine production. The industry's high export-to-production ratio confirms that Mexico's ability to compete in world markets is based on a commitment to quality, not simply on relatively inexpensive labor. Many international parts manufacturers are present in Mexico including Dana, TRW, GKN, Bosch, Hella, Bendix, Sealed Power, Atsugi, Valeo, and Yazaki.
During 1995, the domestic retail slump caused the industry to contract by 14.9 percent: 1995 domestic

vehicle sales totaled 232,000 units. Although this sector's exports increased by 38 percent, this was not enough to offset a domestic decrease of 62 percent. The auto industry resumed its growth in 1996, and is expected to perform well given its increased export base.

Paper

The paper, printing and publishing sector suffered initially as a consequence of import liberalization. However, it was one of only two industrial subsectors which managed to fully compensate for the drop in domestic demand by boosting exports. The paper industry has modernized and is now more competitive in the world market. The paper, printing, and publishing sector accounts for approximately 5 percent of Mexico's manufacturing GDP.



Source: INEGI

Textiles

Import liberalization has taken a heavy toll on mainstream firms; however maquiladoras plants have played an important role in the development of the apparel industry in Mexico. The apparel industry contributes approximately nine percent of Mexico's manufacturing GDP and 2 percent of its overall GDP. As demand for textiles generally follows GDP growth closely, the textile industry is expected to resume growth in 1996.

Textile establishments are scattered throughout Mexico. However, 60 percent are located in Central

Mexico. Small and microenterprises (employing sixteen people or less) predominate in this region; comprising 75 percent of total output. Synthetic fibers account for approximately two thirds of aggregate production, natural fibers for the remainder. Among the largest synthetic fiber producers are: Cydsa, Celanese Mexicana, and Alfa.

Electronics

The electronics industry contributed approximately 3.9 percent of Mexico's manufacturing output and 0.9 percent of the country's overall GDP. This sector grew at an average rate of 9 percent from 1985 to 1994, with dramatic growth in computers and components.

Domestic companies, generally, were not successful in developing the technical expertise to face a more open economy. Consequently, in 1985, with the removal of tariff barriers, many domestic operations ceased production and became distributors of imported products. The industry is now dominated by the foreign in-bond plants. Over time, these plants have become more advanced and currently account for 37 percent of the aggregate maquiladora industry work force.

Food Processing

Growth in the food, drink, and tobacco industry sector has been primarily driven by domestic demand. This industrial sector accounts for 26 percent of the total Mexican industrial output.

The most dynamic subsectors are:

- Vegetable Processing
- Meat Packing
- Refining and Processing of Oil and Fats
- Alcoholic Beverages

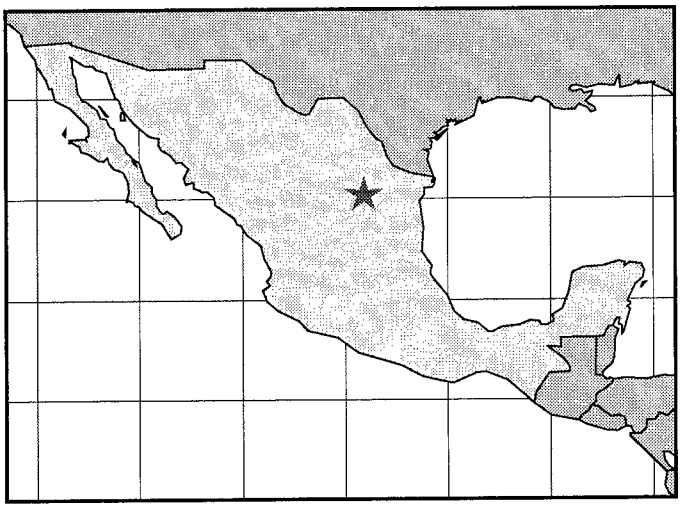
The contraction of domestic demand has fueled the reorientation toward exports, especially in processed foods and vegetables, frozen shrimp, and beer. It is expected that resumed economic growth and consumer purchasing power will stimulate growth in the domestic market.

Foreign Investment

Mexico poses no restrictions on foreign investment in any manufacturing sector. Although the economy is opening rapidly, some restrictions exist on private investment in the energy and petrochemical sector; therefore foreign investors should monitor new regulations closely. Investors should also research incentive possibilities based on certain project sizes, employment generation potential, and geographic location.

Industrial/ Petrochemical

Cadereyta Refinery Reconfiguration



Project Summary

Project No:	**IND-01**
Subsector:	**Petrochemical**
State/Region:	**Nuevo León**
Project Cost:	**$1.2 billion**
Export Potential:	**$700 million**
Owner:	**Pemex Petrochemical**

To meet new Mexican environmental regulations and changing market demand, Mexico's oil conglomerate, Pemex, is planning a major renovation of the coker system at its Cadereyta Refinery.

Technical Description

The project, with a total value of US$1.2 billion, consists of the expansion and reconfiguration of the Cadereyta Refinery. The project requires investment in equipment, operations, technology, and engineering and other services. The reconfiguration will also increase the capacity of the plant from 240,000 to 280,000 barrels per day. Although Pemex has not decided the framework under which it a private sector company will build and operate the plant, it is considering two options: a) a Build-Lease-Transfer (BLT) arrangement, or b) an Engineering-Procurement-Construction (EPC) contract.

Pemex is considering Shell's refinery at Deer Park as a model for the plant reconfiguration.

Site

The Cadereyta Refinery is located in Cadereyta, Nuevo León, 30 kilometers east of Monterrey, and 225 kilometers southwest of the U.S.-Mexican border.

Project Status

Bidding is organized in three parts: a) licensing, b) basic engineering studies and licensing agreements, and c) reconfiguration, construction, and operation of the plant.

In February 1996 Pemex signed an agreement with Foster Wheeler of the United States to license its coker technology. Following this, Pemex released nine international tenders to provide the basic engineering for each of the plants scheduled to be reconfigured. The winning companies will execute the basic engineering studies that were announced in May 1996:

Companies to Conduct Basic Engineering Studies

Plant	Company	Nationality
Hydrogen Treatment Plant for Gas	UOP	U.S.
Hydrogen Plant	Lurgi/Instituto Mexicano del Petróleo	German/Mexican
Alkylization Plant with Load Preparation	UOP	U.S.
Sulfur Plant	Parsons Overseas Company	U.S.
Naptha Hydro Sulfur Plant	Instituto Mexicano del Petróleo	Mexican
Intermediate Distilling Hydro Sulfur Plant	Instituto Mexicano del Petróleo	Mexican
Combined Plant No. 1 Expansion	Instituto Mexicano del Petróleo	Mexican
Combined Plant No. 1 Expansion	Instituto Mexicano del Petróleo	Mexican
Combined Plant No. 1 Expansion	Instituto Mexicano del Petróleo	Mexican

Source: Pemex

Pemex originally planned the second tender for construction and operation to take place in the fourth quarter of 1996. This part of the bidding may be delayed. However, once construction has begun, the project should be completed within 30 months.

Devaluation of the peso has not negatively affected this project. From a refining perspective, the devaluation has helped the company absorb its labor costs.

At the end of July 1996, the Secretariat of Energy announced that it is reviewing the legal basis for the sale of petrochemical assets which could delay private sector participation.

Equipment & Services Demand

This project offers opportunities for U.S. firms that supply pipe, tanks, pressure vessels, controls and other refining equipment to petroleum refineries.

Nature of Demand

The demand for this project is two-fold: a) changes in the petrochemical market, and b) environmental regulations.

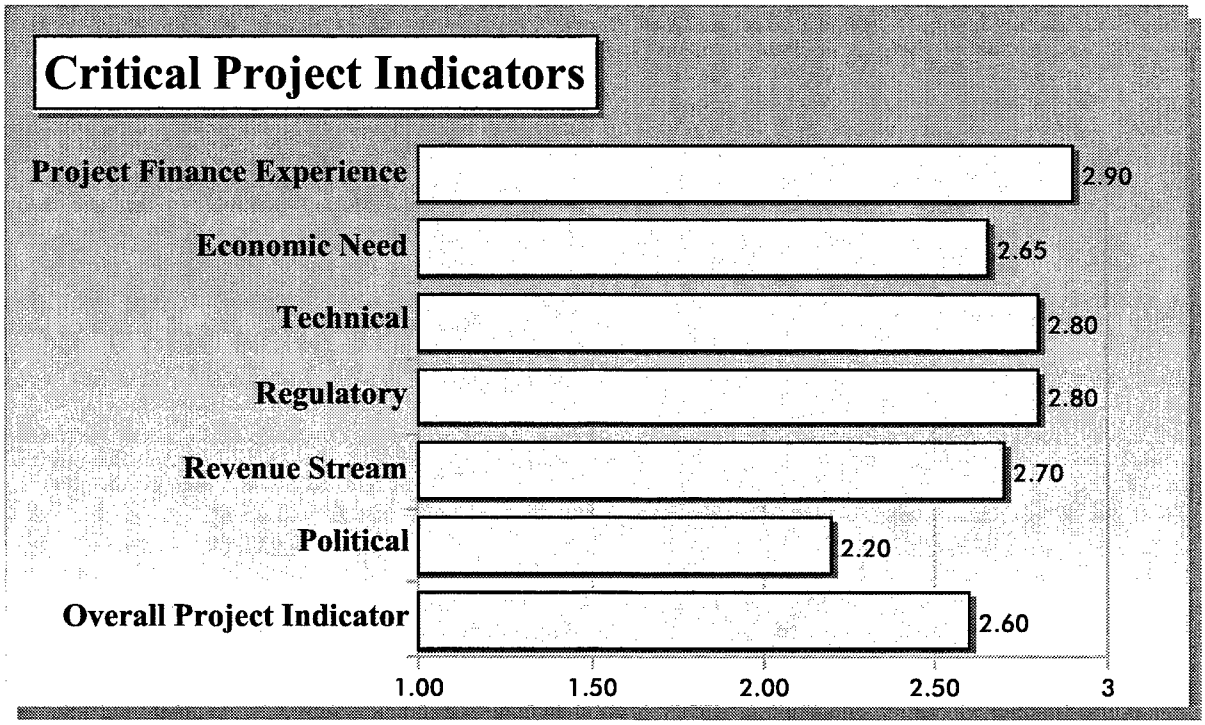
Despite an increase in demand, refining capacity in Mexico has remained the same for the last 20 years. Central distillation units at Mexico's six refineries have an average capacity of 240,000 barrels per day. Planned prior to the discoveries of heavy crude in Campeche, distillation units at these plants have a capacity for 70 percent light crude and 30 percent heavy crude. Today, crude oil production in Mexico occurs in reverse proportions.

The demand for the Cadereyta project is also driven by new environmental rules. Effective January 1998, ecological norms NOM-085 and NOM-086 will restrict the use of fuel oil, which is made of heavy crude. The Federal Electricity Commission, once a big buyer of fuel oil for its thermoelectric plants, is already using cleaner burning gas at its new plants. Thus, to avoid the excess of heavy crude, this planned reconfiguration will be necessary.

Project Assessment

With dollar-denominated revenues, Pemex is considered a stable and readily financeable company. Demand for the project is strong, as the market requires increased capacity for certain types of crudes.

Critical Project Indicators



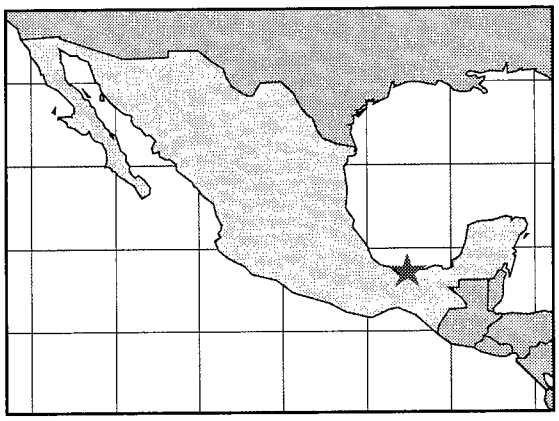
Key Decision Makers

Company	**Pemex Refining**
Name	Ing. Máximo Téllez Rosas
Title	Manager of Projects and Development
Location	México, D.F.
Phone	(52-5) 531-6355
Fax	(52-5) 254-2613

Company	**Secretariat of Energy**
Name	Lic. Francisco Aparicio Varela
Title	Coordinator, Advisors to the Undersecretary of Operations
Location	México, D.F.
Phone	(52-5) 564-9714
Fax	(52-5) 564-9716

Industrial/ Petrochemical

Cosoleacaque Petrochemical Privatization



Project Summary

Project No:	**IND-02**
Subsector:	**Petrochemical**
State/Region:	**Veracruz**
Project Cost:	**$150-$300 million**
Export Potential:	**$90-$180 million**
Owner:	**Pemex**

After years of negotiation, in October 1995, the Secretariat of Energy announced the long expected privatization of secondary petrochemical plants owned by Petróleos Mexicanos (Pemex), Mexico's state oil and gas company. The Cosoleacaque Complex will be the first of ten petrochemical complexes to be auctioned. Privatization of these plants represents an important opening in Mexico's energy market.

Technical Description

The Cosoleacaque Complex is comprised of eight separate plants: five ammonia, one paraxylene, one hydrogen, and one isomerization plant. Cosoleacaque is the largest ammonia plant in Latin America and the second largest in the world.

In 1994, the Cosoleacaque had sales of US$171 million—accounting for 10 percent of sales by Pemex Petrochemical. Cosoleacaque's annual production accounts for 86 percent of domestic production, 88 percent of which is absorbed by the fertilizer industry. In 1994, Cosoleacaque produced 5 million tons of ammonia. Hit hard by the recession, however, its 1995 production fell to 2.2 million tons of ammonia, supplemented by 35,000 tons of paraxylene and 19,000 tons of hydrogen.

Each of the ten complexes will be privatized as entire units. The option of privatizing individual plants within each complex was rejected. The other nine secondary petrochemical complexes — which contain a total of 56 plants — include: Cangrejera, Morelos, Pajaritos, Salamanca, Texmelucan, Camargo, Escolin, Tula, and Reynosa.

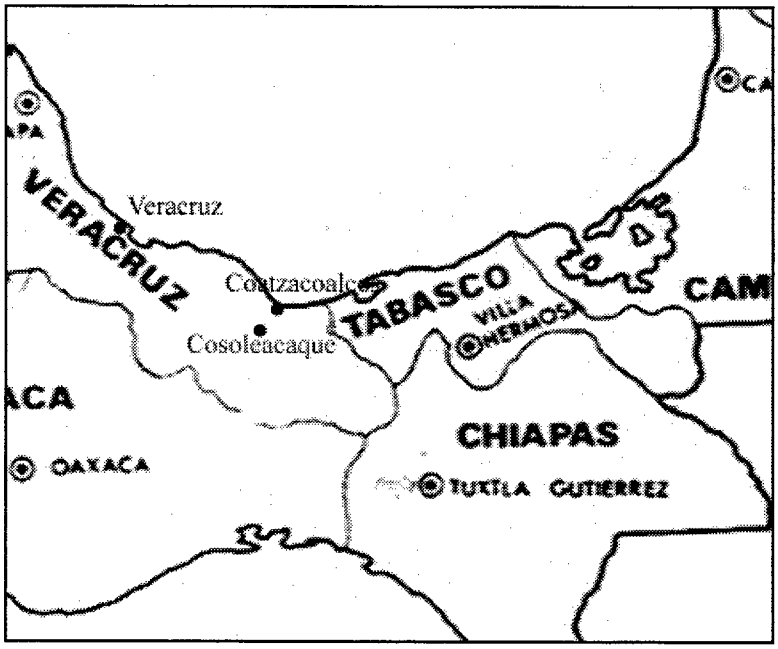
Pemex has announced its intention to maintain a twenty percent equity stake in all of its privatized facilities for approximately five years, after which time these shares can be sold. Majority foreign ownership, however, is permitted. Successful bidders will assume all current supply, labor, and pension obligations and will sign long-term supply and service agreements with Pemex's other subsidiaries: Pemex Refining, Pemex Gas, and Pemex Basic Petrochemicals.

Pemex is cautious in calculating the value of the complex. Grupo Financiero Serfín, reports that the value could be between US$150 million and US$300 million. The Mexican Government hopes to earn US$1.5 billion from the sale of all ten complexes.

Although it will relinquish its hold on its secondary petrochemical plants, Pemex will still maintain a monopoly on the basic petrochemical plants which produce butane, methane, propane and other related gases.

Site

The Complex is located in the town Cosoleacaque, approximately 27 kilometers inland from the Port of Coatzacoalcos, in southern Veracruz.



Project Status

During 1995, to preparation for privatization, Pemex Petrochemical began to reduce its work force and also completed environmental audits of the complexes.

The privatization process is being divided into three phases: a) registration, b) due diligence, and c) evaluation and award.

By the original April 1996 deadline, four firms registered to submit bids: the Norwegian firm Norsk Hydro, Agronitrogenados (part of the Mexican conglomerate Grupo GAN), and the two U.S. firms Terra and Farmland.

Equipment & Services Demand

The new owners of the Cosoleacaque Complex will need to undertake unspecified modernizations and to invest in new equipment. Until due diligence is complete, a precise estimate of the types of modernization needed will not be known.

Nature of Demand

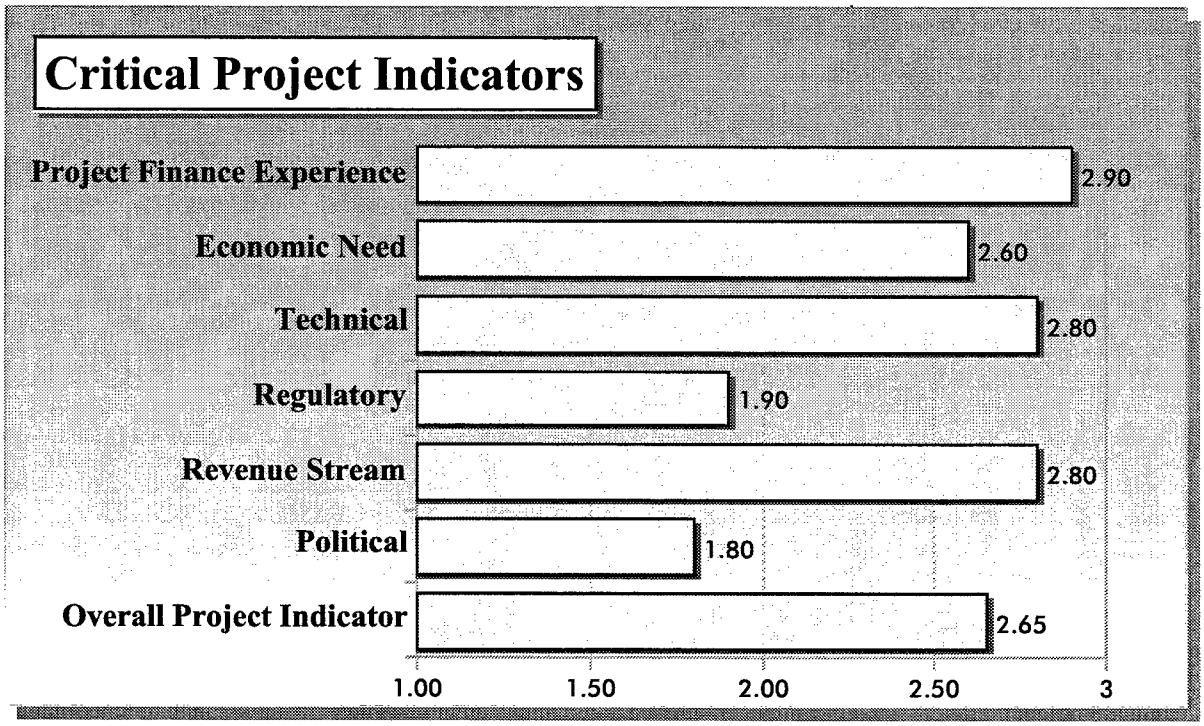
Private industry contends that privatization is essential for the long-term health of Mexico's petrochemical industry. Petrochemical prices have rebounded from lows a few years ago. The announcement of privatization continues to draw intense interest among international chemical companies, including U.S. firms.

Project Assessment

In June 1996, the Secretariat of Energy, a strong supporter of privatization, put the process on hold while the comptroller studied the alleged improprieties. It is not known when the Secretariat will allow it to move forward, as labor and opposition political parties strongly oppose the privatization.

It appears that the Secretariat will make Pemex responsible for the environmental remediation costs at the petrochemical plants. The question over who assumes the environmental liability will significantly impact international investor interest as well as the value of the plant assets.

Critical Project Indicators



Key Decision Makers

Company	**Pemex Petrochemical**
Name	Ing. Luis Puig Lara
Title	Director General
Location	México, D.F.
Phone	(52-5) 254-0935
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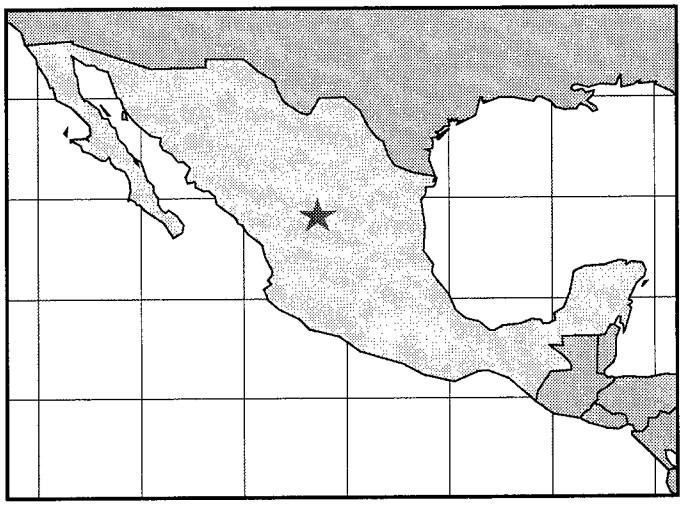
Industrial/ Manufacturing

Disposable Gas Cylinder Plants



Project Summary

Project No:	**IND-03**
Subsector:	**Manufacturing**
State/Region:	**Durango**
Project Cost:	**$15 million**
Export Potential:	**$13 million**
Owner:	**Implementos Agrícolas Lala**

Technical Description

Implementos Agrícolas Lala plans two new disposable gas cylinder projects. One project calls for manufacturing of low-pressure and torch kits; the other, high-pressure disposable cylinders.

The first project requires an investment in equipment of more than US$6.5 million and more than US$4.5 million in engineering and related services. This investment represents an expansion and consolidation of the low-pressure tank factory that is already completely built and ready to begin operating. Low-pressure cylinders, such as propane gas tanks, are used primarily for a variety of functions in the residential and construction sectors, including lighting.

The second project involves expansion of Lala's high-pressure, disposable tank factory. With the first phase already completed, Phase II will require an investment of US$2.9 million. The cylinders are designed to contain industrial and medical gases, and are manufactured under rigorous international safety standards.

Phase I of the high-pressure cylinder project consisted of redesigning the assembly line to accommodate a new production process. The completion of Phase I has increased production to the levels described below:

Shifts	Production	Units
1	37,500	tanks per month
2	71,250	tanks per month
3	101,250	tanks per month

Source: Implementos Agrícolas Lala

Site

The low-pressure cylinder plant will be located in Gómez Palacio, Durango, which is located near the cities of Monterrey, Nuevo León and Saltillo, Coahuila and only 650 kilometers from Laredo, Texas. The high pressure plant is also near the U.S. - Mexican border, located about 370 kilometers from Monterrey and 570 kilometers from Laredo.

Project Status

Both projects have been studied and evaluated by domestic and international agencies and have found support from European banks that have provided guarantees of credit to any U.S. bank that extends credit. National Financiera (NAFIN), Mexico's national development bank, also has extended a loan in support of the project.

Devaluation of the peso has not negatively affected the project. From a manufacturing perspective, the devaluation has helped the company with its labor costs.

Equipment & Services Demand

Because of this project's technical requirements, as well as NAFTA's tariff exemptions, the company's desire to comply with the most rigorous regulations, and its history of ties to U.S. firms, Lala fully expects to import almost all of the products needed from the United States.

Lala suspects that there are few Mexican firms that can match U.S. companies in terms of price for low-pressure technology or the quality for high-pressure technology. Hence, while these engineering services need not necessarily be contracted from the United States, Lala expects that most of its work will go to U.S. firms.

The low-pressure project should not encounter problems in finding suppliers of technology or in implementing the technology in the existing factory. Because of Lala's technological compatibility, it consider the following table to be quite conservative.

Goal	Time Frame
Buying of land and preparation	3 months
Plant construction and installation	4 months
Ordering and receiving all of the equipment and tools for production	2 months
Ordering and receiving all of the materials	6 months
Installation and tests of production equipment	10 months
Operating personnel and training	4 months
Beginning of production	18 months

Source: Implementos Agrícolas Lala

Nature of Demand

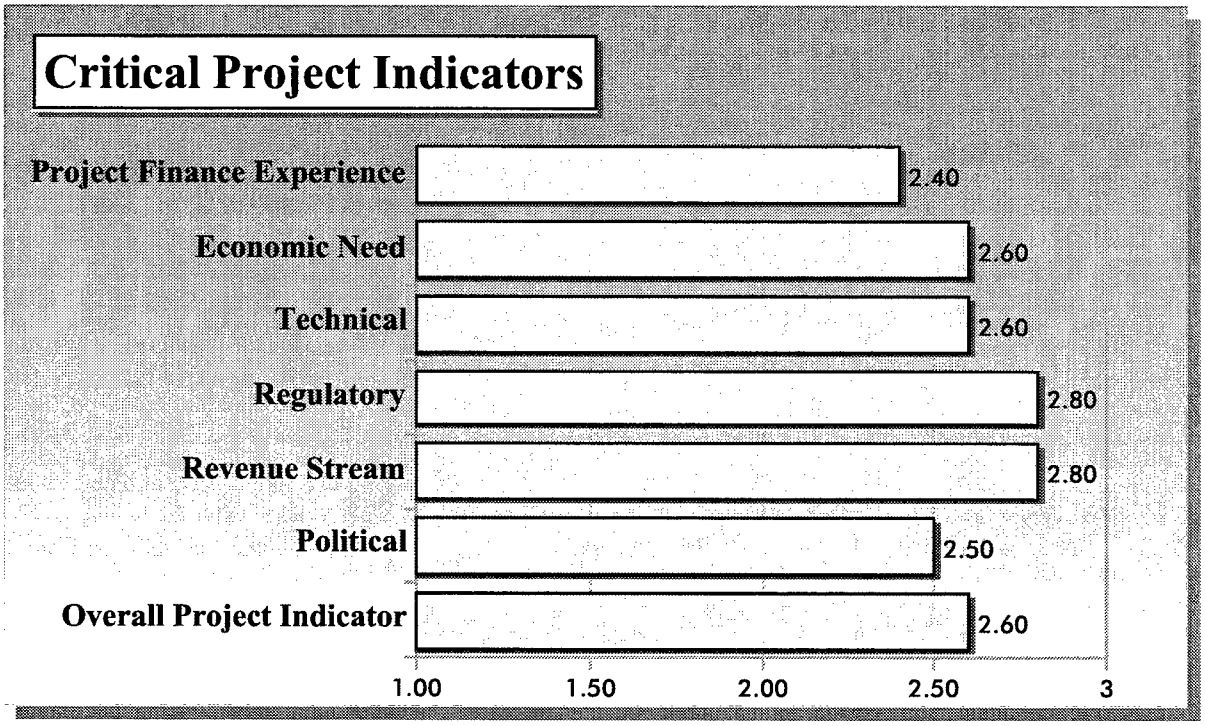
The demand for the high pressure project will not change because it represents a process of completing work in progress. Also, the necessary regulations are well-known and the market is secure. The first project, likewise, should continue unabated because of the secure plan and strategy developed by Lala. There is a strong market for these product both in Central Mexico and the United States.

Project Assessment

Both projects are very likely to be completed because the fundamental issues involved are secure. Manufacturing, unlike some areas of infrastructure, has clear rules and norms. This project is not a leap into unknown territory for either the industry or the company which has years of experience in this product line.

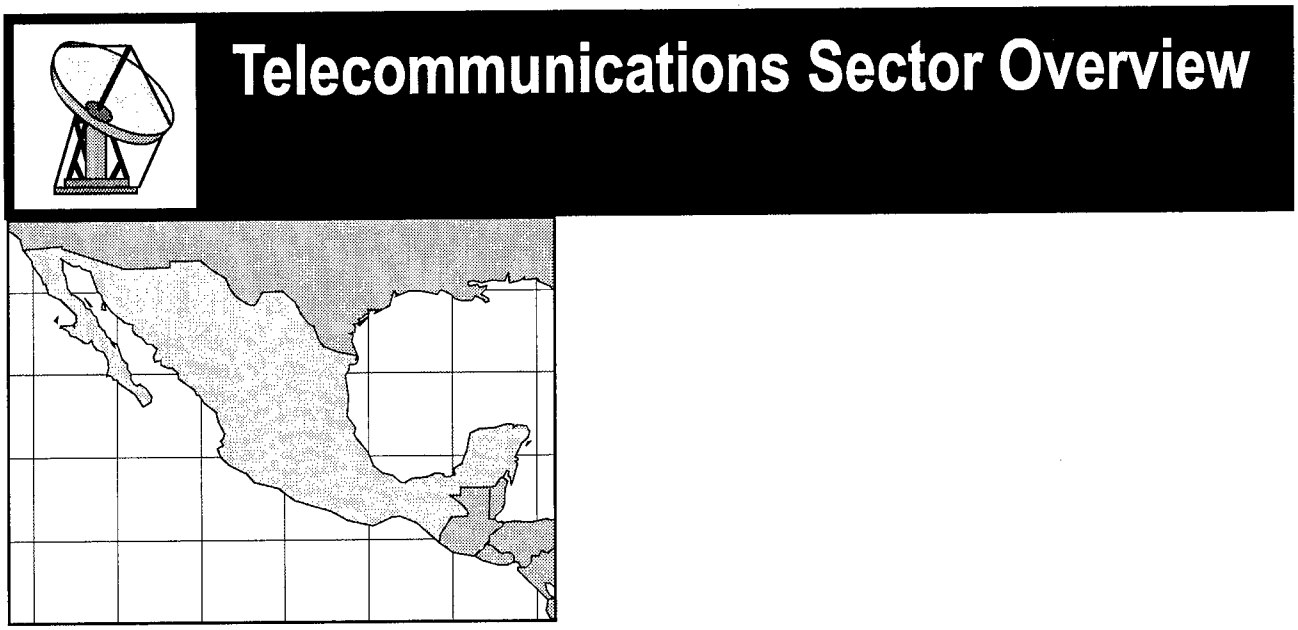
Low-pressure cylinders are basic necessities for "Do-It-Yourselfers" all over the world and demand for this product is expected to be steady. Because of this and the support that the company has received in the past from both public and private sources, this project has every chance of succeeding.

Critical Project Indicators



Key Decision Makers

Company	**Implementos Agrícolas Lala**
Name	Lic. Luis Wolff
Title	General Director
Location	Gómez Palacio, Durango
Phone	(52-17) 50-02-72
Fax	(52-17) 50-02-72



Telecommunications Sector Overview

OVERVIEW

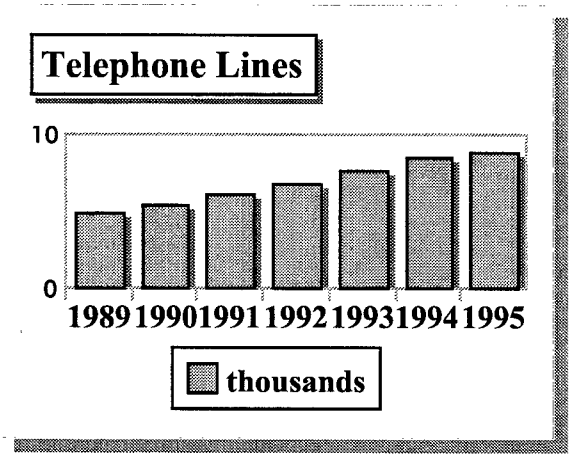
Investment and Network Growth

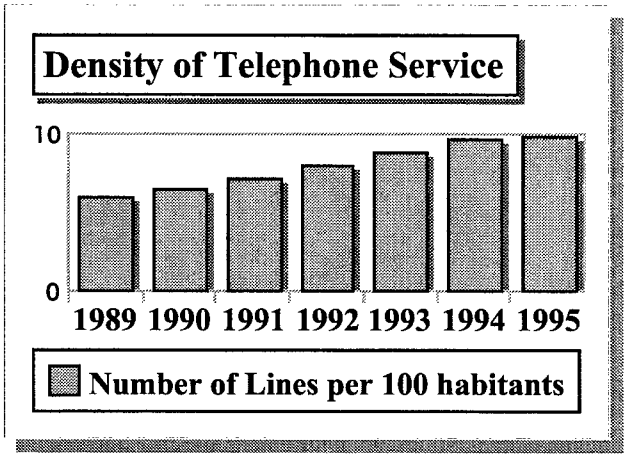
In the last six years, the Mexican telecommunications system has been transformed, largely through US$15 billion in investment by Telmex and other private concessionaires, as reported in a recent study by the International Telecommunications Union (ITU). An aggressive US$11 billion investment program was initiated by Telmex in 1990 and continued during the years following privatization. At the same time, opening the market to other telecommunications services brought a surge of investment by new private concessionaires in cellular communications, paging, mobile radio service, and value-added services. In terms of investment in the telecommunications sector, from 1990 to 1995 Mexico ranked thirteenth in the world. According to the ITU, Mexico — with an average annual investment of US$2.5 billion — placed just behind Brazil and Argentina, which invested US$2.94 billion and US$2.92 billion, respectively.

According to Telmex, Mexico's telephone network grew from 4.8 million lines in 1989 to 8.8 million in 1995, and is estimated to reach 9.1 million by the end of 1996. Line density increased from 5.9 lines per 100 inhabitants in 1989 to 9.8 in 1995. The percentage of digitalization of the network jumped dramatically from 22 percent in 1989 to 86 percent in 1995.

In the last six years, Telmex invested US$11 billion, of which US$5 billion was directed toward improving and expanding existing telephone infrastructure. The end of its mandatory investment program, coupled with the recession of 1995, resulted in slower annual growth, from an average of 12

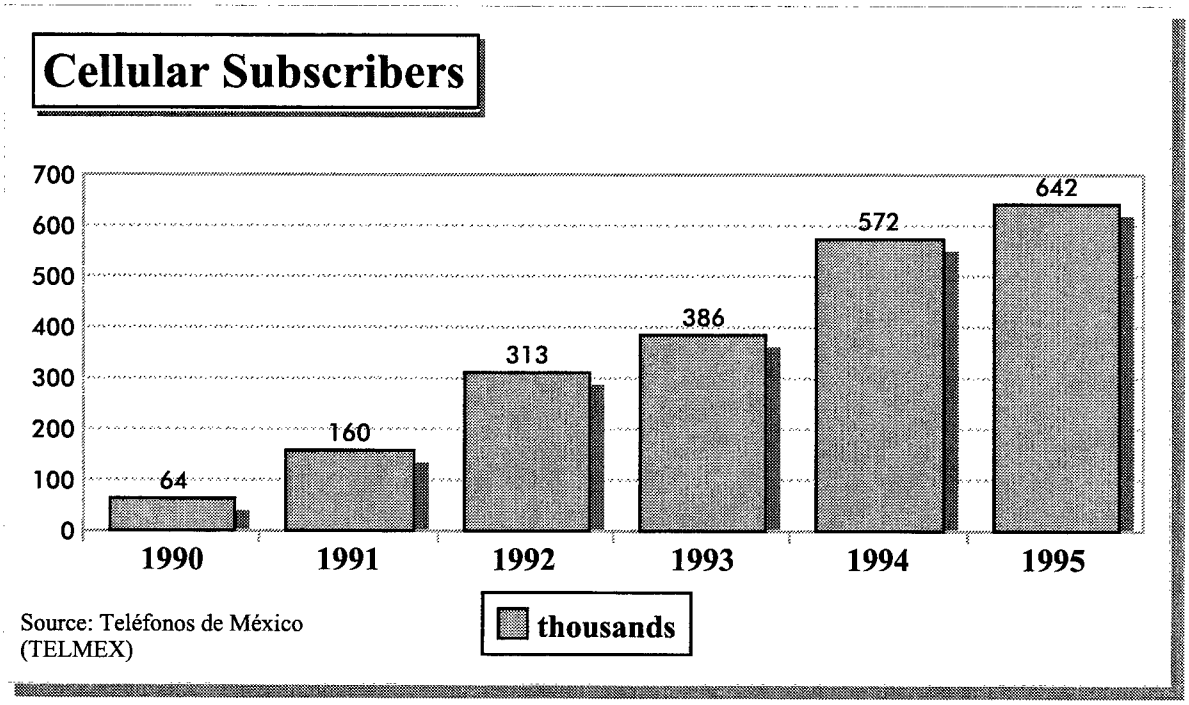
percent between 1989 and 1994 to 3.5 percent for 1995 and 1996. This represents the slowest line growth in 20 years. The peso devaluation put a dent in Telmex's earnings. Its profit margin declined from 42 percent in 1994 to 36 percent in 1995. In the first quarter of 1996, the company reported a 16.5 percent decline in revenue in real terms.





Source: Teléfonos de México (TELMEX)

Mexico has a well developed cellular network with one nationwide and nine regional concessionaires. Concessionaires installed an average of 115,000 lines per year between 1990 and 1995. According to the General Director of Radio Communication Networks, Mexico had 642,000 cellular users in 1995.



Source: Teléfonos de México (TELMEX)

Telmex and TELECOMM, Mexico's state-owned telecommunications company, have undertaken an ambitious rural telephony program. Rural jurisdictions with basic telephony service increased from 9,700 in 1990 to 25,300 in 1995.

Mexico has three communications satellites which function on Band C and Band Ku: Solidaridad I, Solidaridad II, and Morelos II. Morelos II will soon be replaced by a new satellite being built by Hughes. Mexico has two satellite control centers run by TELECOMM, located in Hermosillo, Sonora and Iztapalapa, Distrito Federal (D.F.).

Technical Description of Existing Satellites

		Morelos II	Solidaridad I	Solidaridad II
		metric tons	percent	percent
Transponders	Band C	12-36 MHz, 6-72MHz	12-36 MHz, 6-72MHz	12-36 MHz, 6-72MHz
	Band Ku	4-108 MHz	16-54 MHz	16-54 MHz
	Band L	--	1	1
Power	Watts	677	3,720	3,720
Investment		US$80 million	US$230 million	US$230 million
Manufacturer		Hughes	Hughes	Hughes
Model		HS 376	HS 601	HS 601
Launch Date		October 1985	November 1993	October 1994
Last Year Usable		1998	2007	2008
Percent Occupied		85 percent	78 percent	28 percent
Direct-To-Home TV				14 transpond., Band Ku

Source: TELECOMM

Key Players in the Sector

Until 1996, key players in the Mexican telecommunications sector could be divided into four categories:

- One federal regulatory agency.
- One dominant local and long distance provider (now privatized).
- One state-owned provider of rural telephony, satellite communications, and telegraphy.
- Multiple private concessionaires providing the panoply of non-telephone services — cable television, mobile radio, paging, cellular, data transmission, and value-added services — generally on a regional basis. Duopolistic competition is usually permitted. Many of these companies are majority Mexican-owned with foreign (primarily U.S.) minority partners.

Today the makeup of these players is in flux.

- Eight private long distance concessionaires — including several Mexican-U.S. consortia — may dwindle in number as the concessionaires merge and form alliances and begin full operation in January 1997.
- By the end of 1996, private concessionaires will be providing Direct-To-Home (DTH) television as a result of the U.S.-Mexico reciprocal satellite treaty which allows Mexican companies to beam television signals from U.S. satellites directly to Mexican homes.
- In 1997, one or more private satellite operators will emerge as winners in the sale of TELECOMM's satellite systems.
- In 1997, many new wireless telecommunications providers will win concessions for wireless local loop, PCS, satellite television, rural telephony and other services in the general radio spectrum auction which the SCT will hold in October 1996.

The **Secretariat of Communications and Telecommunications (SCT)** is the regulatory authority for most telecommunications services. The SCT grants all concessions, permits, and licenses. Until August 1996, the most important decision making body was the Undersecretariat of Communications and Technological Development. Undersecretary Carlos Casasús reported directly to the Secretary of the SCT, Carlos Ruíz Sacristán.

On August 17, 1996, the SCT approved implementing regulations to its 1995 Federal Telecommunications Law thus establishing a new regulatory body called the **Federal Telecommunications Commission (Cofete)**. Cofete, set up as an autonomous body within the SCT, will have a preeminent role in telecommunications policy making. By naming Carlos Casasús as the new president, continuity in policy will be assured. Cofete will be in charge of future radio spectrum auctions, as well as telecommunications policy, networks and wireless communications regulations, international issues regarding telecommunications, and, in the future, satellite system supervision.

Teléfonos de México (Telmex), formerly a state-owned monopoly, is the country's largest provider of local and long distance telephone service. Privatized in 1991, its monopoly on long distance service came to an end in August 1996. To put an end to cross-subsidies, at the end of 1996 Telmex will create separate divisions for long distance and local telephone service. Full competition in a multicarrier environment will begin on January 1, 1997. Although Telmex never had an official monopoly on local service, difficulties with interconnection to the Telmex network effectively blocked competition. However, a number of new companies are challenging Telmex and soon will install new wireless local loops once they obtain their frequencies from the spectrum auction.

Formed in 1989, **Telecomunicaciones de México (TELECOMM)** is Mexico's state-owned telecommunications company. Apart from operating the national satellite network, TELECOMM provides public telegraphic services and rural telephony in areas not served by Telmex's long distance and local networks. Additional services include: TDMA/DAMA transmission, VSAT, packet switching, IBS, data transmission, and electronic mail. The privatization of TELECOMM is being coordinated by the Mexican Satellite System Restructure Committee composed of officials from both the SCT and TELECOMM.

New Long Distance Concessionaires

New Long Distance Concessionaires	Members
Alestra	Alfa (Mexico), AT&T (U.S.)
Avantel	Banamex (Mexico), MCI (U.S.)
Cableado y Sistemas	Grupo Varo (Mexico)
Investcom	Grupo Comunicaciones San Luis (Mexico), Operadora Mexicano de Radiolocalizadores (Mexico), Nextel (U.S.)
Iusatel	Iusacell (Mexico), Bell Atlantic (U.S.)
Marcatel	IXC Communications (U.S.), Westel (U.S.), Radio Beep (Mexico), and Teleglobe (Canada)
Miditel	Miditel, S.A. (Mexico)
Unicom	Bancomer (Mexico), GTE (U.S.), Valores Industriales (Mexico), Teléfonica de España (Spain)

Source: SCT

Recent Laws and Regulations

The Federal Telecommunications Law enacted in June 1995 ushered in a period of revitalized competition. The entry of new players will bring significant foreign investment and an unprecedented infusion of new technologies.

Under the new law, licenses are required for four different areas of telecommunications:

- Use of radio spectrum frequencies.
- Sending and receiving satellite signals from foreign satellites.
- Use of geostationary orbital positions reserved for Mexico.
- Installation, operation, or use of public communications network.

Public bidding is required for most uses of the radio spectrum frequency.

The new law limits foreign investment in the telecommunications sector to a maximum of 49 percent. U.S. firms are actively partnering with Mexican companies. Mexican companies whose main business lies outside telecommunications sector — such as Protexa and Banamex — are forming companies with U.S. telecommunications firms to gain the use of their expertise.

Formerly reserved for the government, satellite ownership and operation is now opened to the private sector as a result of the new law. It lays down the framework for foreign companies to own and operate satellites. Foreign satellites can now be used to beam signals to Mexico. However, control of those satellites must remain in Mexico. In April 1996, the Mexican Congress approved a reciprocity treaty with the United States which will allow the sending and receiving of satellite signals from one country to the other. It is expected that both countries will soon sign a protocol to the treaty regulating the use of Direct-To-Home (DTH) television.

In June 1996, the SCT published three sets of important regulations updating the 1995 Federal Telecommunications Law:

- Fundamental Technical Plan for Numeration: This regulation provided for uniform access codes for a number of services from long distance operator connections to emergency rescue service and directory assistance.

- Fundamental Technical Plan for Signals: This laid down an adequate framework for the interconnection between networks of new private telecommunications companies and Telmex.

- Rules for Long Distance Service: This set of regulations gave the green light to private concessionaires to begin providing long distance service at the end of the Telmex monopoly on August 11, 1996. It provided rules for setting tariffs, selecting a new carrier, and billing users. It set up a Long Distance Operators' Committee made up of all the new carriers, plus Telmex, to resolve service conflicts and process user requests to switch to a new long distance carrier. A mailing will go out to Mexico's estimated nine million long distance users asking them to indicate a carrier of their choice. If the users do not return the questionnaire they will remain with Telmex.

OPPORTUNITIES AND TRENDS

Local Telephony

The demand for telephony is expected to grow considerably over the next few years. Mexico's line density has grown steadily from 5.9 lines per 100 inhabitants in 1989 to 9.6 in 1994. Based on factors such as GDP, the Mexican market could bear a line density of 14.0 lines per 100 inhabitants within the next five years, according to recent market studies reported by Grupo Iusacell.

Although it never had an official monopoly, at present Telmex is the only provider of local telephone service. However, a number of companies plan to challenge that.

Amaritel — a company made up of Grupo Radio Centro, Advanced Telecom Inc. of Mexico, and U.S. Global Communications — was formed in early 1996 to enter the local telecommunications market. Avantel is studying entry into the market as well, provided that interconnection fees paid to Telmex permit it to be viable. Iusacell, the cellular provider for Mexico City, plans to provide local wireless service to business and residential subscribers in selected markets in Mexico. Iusacell is currently conducting a successful pilot project for local wireless service. By mid-1996, it had attracted over 8,000 subscribing customers.

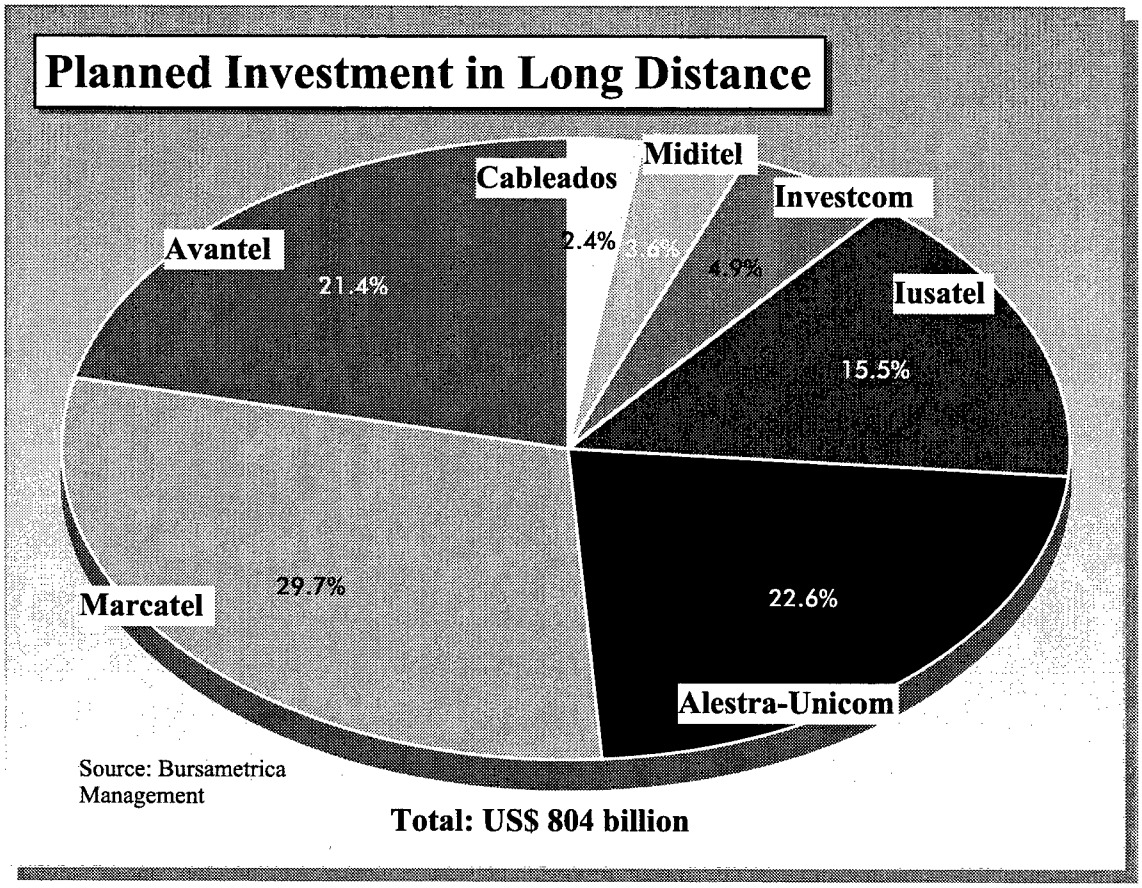
Competitors to Telmex are generally planning two strategies: a) transmission via wireless systems, and b) transmission via existing cable TV networks. More economical than laying conventional wireline is the use of fixed wireless systems. In fact, Iusacell has a wireless pilot project in operation and is now providing local telephony for 8,000 customers. To fully take advantage of wireless local telephony, it is expected that many companies will enter the radio spectrum auction to obtain frequencies for wireless

local loop systems. The other alternative being explored by companies is the use of existing cable TV networks. Mexico's largest cable television operator's association estimates that US$1 billion will be invested in 1997 in telecommunications systems that use cable networks. At first, these providers are likely to offer data transmission and Internet access; by 1998, they will expand into local telephony.

Long Distance

The Telecommunications Law of 1995 published a set of regulations that have revolutionized long distance service. Eight companies were awarded long distance concessions and will begin operations in January 1997. Revenues for long distance phone calls in 1995 reached US$2 billion. With the introduction of improved service by the new carriers, some experts expect the market to be worth more than US$3 billion annually.

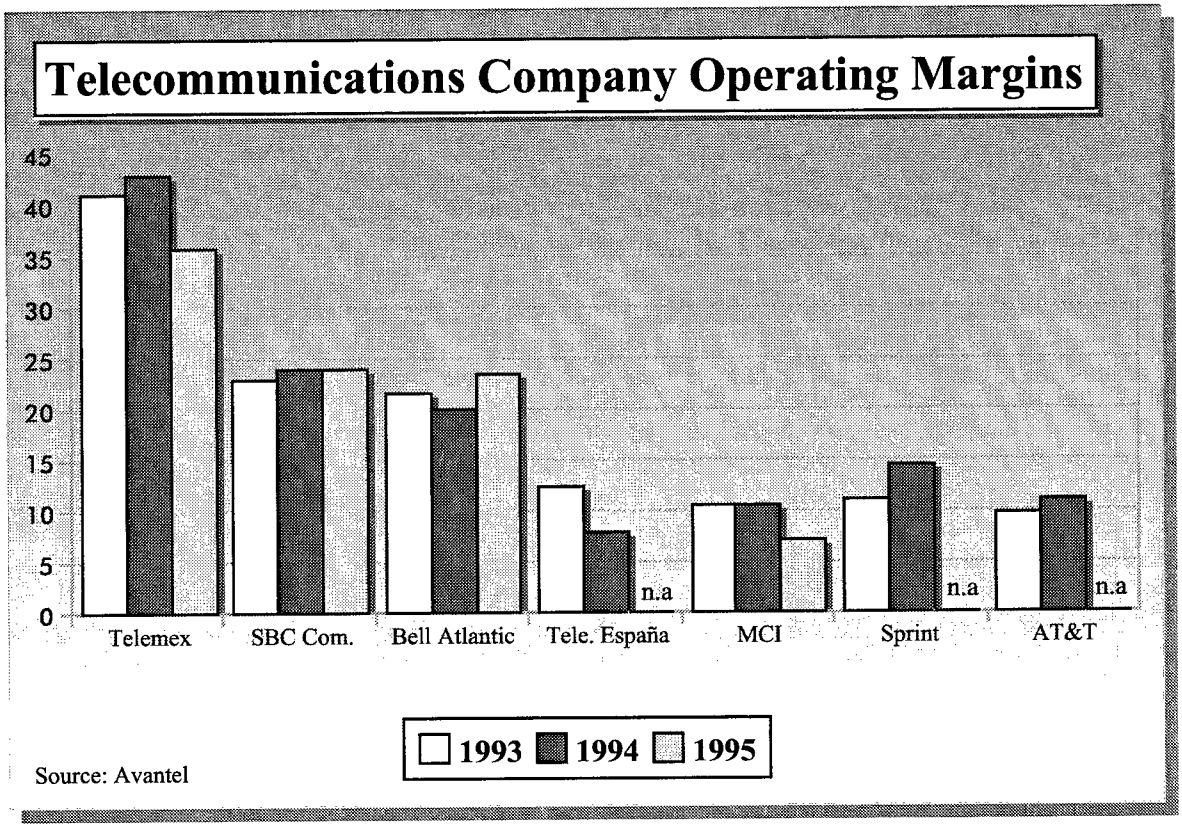
Although Mexico's market is substantial, consolidation among the concessionaires has already begun. In April 1996 Unicom merged with Alestra. In July 1996, Marcatel and Investcom agreed to join forces on the construction of a fiber optic transmission system. Some experts predict that only three or four companies may survive the current wave of mergers.



In spite of recent mergers, two additional companies are waiting to be awarded SCT concessions so they can begin building their own transmission networks and join the long distance market. PCM Comunicación Trunking, owned by Federico Wilkins of Mexico, plans to invest US$1.05 billion over the next five years in radio communications and fiber optic cable to provide long distance and data transmission service. Intelcom, made up of Alfonso Torres of Mexico and Intelcom Group Inc. of the United States, plans to invest US$50 million over the next ten years in microwave, satellite, radio, and fiber optic links to sell transmission capacity to other telecommunications companies.

International and domestic long distance calls have increased in length steadily in the last few years, and will continue to lengthen at an even faster rate with the lowering of tariffs. Between 1989 and 1994 the average length of international long distance calls increased from 0.78 minutes to 2.62 minutes. Domestic long distance calls during the same time period increased from 3.62 minutes to 6.74 minutes.

Perhaps one of the principal attractions of the Mexican telecommunications market comes from the high profit margins that Telmex has shown in the last three years. While SBC Communications and Bell Atlantic, two major local telephone and cellular providers in the United States, have recorded profit margins between 20 and 25 percent, those of Telmex have been much higher. In 1993 and 1994, Telmex's operating margins exceeded 40 percent. In 1995, despite the recession and peso crisis which squeezed its revenues, its profit margin was over 35 percent. According to the ITU, in 1995 Telmex ranked nineteenth in terms of revenues among telecommunications companies worldwide.



After much heated debate, the SCT reached a decision on the fee — 5.32 US cents for 1997 and 4.66 US cents for 1998 — charged to the long distance carriers to interconnect with Telmex's local phone system. The carriers originally asked for fees of 1.5 US cents while Telmex argued for 15 US cents. As part of the deal hammered out by the SCT, Telmex could earn as much as US$800 million annually in interconnect fees paid by the new long distance carriers.

Long distance rates are estimated to fall by at least 20 percent in 1997, although more radical estimates put the figure at between 30 and 40 percent. No one, however, expects Mexico to repeat the experience of Chile, where rates fell precipitously by 90 percent, crushing the margins of its five major carriers. Mindful of this experience, the SCT has built in mechanisms to prevent a Chilean-style tariff war.

Companies will compete for the rights to use new frequencies. This will allow them the possibility of building wireless local loop networks, which are likely to be a more economical alternative to setting up a network based on conventional land lines.

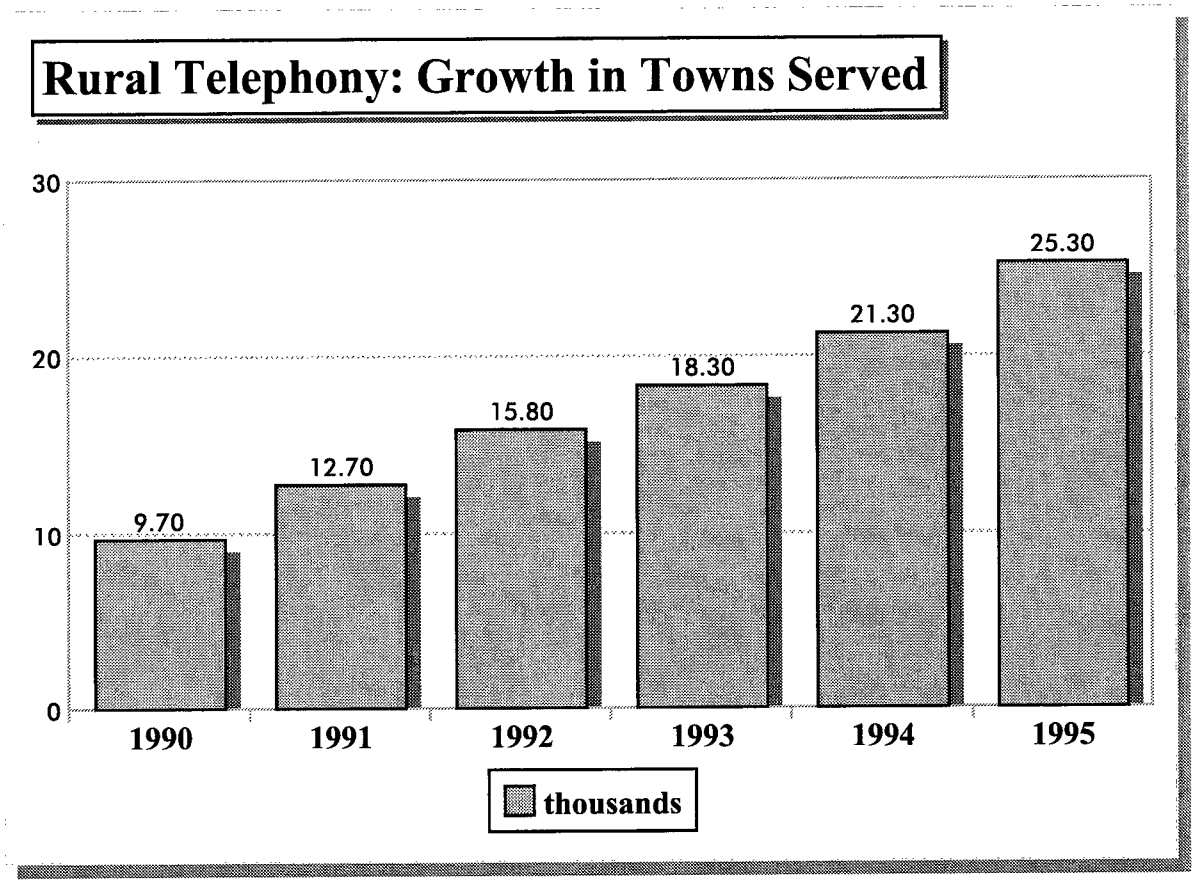
Rural and Public Telephony

In 1995, TELECOMM, Mexico's principal rural telephony provider, announced a plan to provide basic telephony to small towns which still lacked service. The first phase of the plan — to provide telephony to all towns with populations larger than 1000 — has already been implemented. TELECOMM will soon begin the second phase of the project, for towns with populations between 500 and 1000. Most sites will be located on the Gulf Coast and in the South of Mexico.

The company plans the installation of 20,000 solar-powered telephone booths. The purchase and installation of the phone booths alone will require an estimated investment of US$140 million. Because of the high cost involved, TELECOMM is negotiating guarantees so that it can proceed with a private sector concession program, which it hopes to have ready by the end of 1996.

A number of private companies have expressed interest in installing telephone service to areas of low line density. Many of these will seek some form of a subsidy from the SCT.

- Miditel, one of the new long distance carriers, has announced a project to use satellite technology to link a series of 600 public telephone booths to the public network.



- Globalstar de México has a US$60 million project that would use solar powered wireless telephone booths which transmit their signals to the company's worldwide satellite network. The target market consists of rural communities with a population above 200 people, highway rest stops, gas stations, refineries and oil exploration sites, military bases, and other remote locations lacking telephone service.

Wireless and Radio Auctions

After the privatization of Telmex and the opening of the long distance market, the largest opportunity in the Mexican telecommunications market will be SCT's auction of a broad range of radio spectrum frequencies. According to plan, dozens of companies — Mexican and international — will win the rights to become providers of wireless services from PCS and fixed wireless, to two-way paging and mobile radio. The Secretariat of Communications and Transportation is preparing to open new segments of the market and expand others by means of auctioning off radio spectrum bandwidth in three areas of the spectrum. As was the case in the long-distance carrier concessions, foreign firms are limited to 49 percent control of the firm that participates in the auction. On July 31, 1996, the SCT released the rules on the organization of the auction:

Radio Spectrum Frequencies to be Auctioned

Fequency Bands	Uses	Geographic Region
849-851 megahertz and 894-896 megahertz	To be shared with aeronautical mobile radiocommunications services	national
12.7-13.3 gigahertz	Point-to-point and point-to-multipoint microwave links	regional
929-932 megahertz	Paging and various other services	national

Source: SCT

Following the spectrum auction, the SCT will sign concession agreements — probably more than 100 — with the winners. The SCT hopes to generate significant revenues from this auction, which it has modeled after the PCS auction in the United States. Services to become available include:

- Two-Way Paging
- Wide Band Personal Communications Services
- Fixed Wireless
- Trunking
- MMDS Television

The official schedule published on July 31, 1996 is as follows:

Spectrum Auction Timetable

Activity	Date
Release of Bidding Documents/ Opening of Prequalification	August 12
Reception of Prequalification Documents	August 25-September 2
Distribution of Software for the Auction and Auction Practice Sessions	September 2-October 4
Notification of Prequalification	September 30
Participation Documents, Confidentiality Agreement, and Participant Information Due	October 1-3
Question and Answer Session	October 4
Beginning of Auction	October 7
Announcement of Results	within seven days after the end of the auction
Last Day for Incorporation of Company	within 30 days after the results are announced
Approval of Concession Titles	15 days after payment of the amount offered and completion of all requirements

Source: SCT

Paging

Paging is another growing market in Mexico. In 1995, there were over 270,000 customers in Mexico. Six major companies led by Skytel and Digital and scores of smaller firms serve the market. The radio spectrum auction is expected to expand the market for paging services. The auction of new frequencies will allow the entrance of two-way paging which does not yet exist in Mexico.

Satellite

Mexico is planning to privatize its state-owned telecommunications company, TELECOMM, which provides a number of services, including the operation of Mexico's public satellites and teleports. In these areas, TELECOMM's assets include:

- Three geostationary satellites: Solidaridad I, Solidaridad II, and Morelos II are used to provide both fixed and mobile service.
- A replacement satellite under construction: TELECOMM has recently contracted a company to build a fourth satellite to replace the aging Morelos II.
- Four unoccupied orbital positions for DBS satellites: New satellites can be launched into these positions which cover an orbital arc over North America.
- Two teleports: These route television/telephone signals and data.
- Two satellite control centers.

When fully privatized, four new DBS satellites will be constructed and launched in the orbital positions reserved for Mexico. An undetermined amount of equipment will be needed for teleports that need to be upgraded. Finally, capital investment will be needed for the purchase and operation of the Solidaridad satellites and the new satellite which will replace Morelos II. Based on the cost of the recently-awarded satellite and on current estimates of launch costs, the entire project could total between US$1.1 billion and US$1.4 billion.

Television

The television market is being driven by two major forces: a) the opening of the Mexican market to direct television broadcasts from U.S. satellites, and b) the spectrum auction and the new frequencies to be offered.

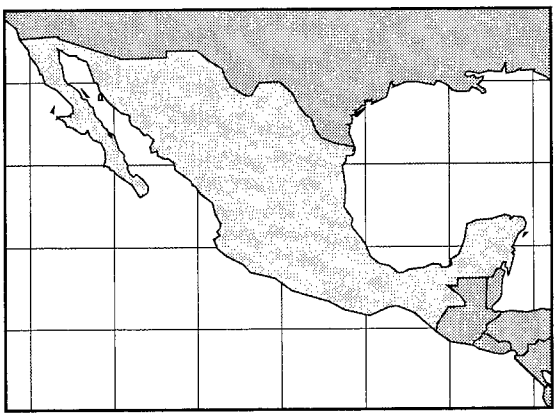
These two major drivers will greatly expand the market for pay television, which was estimated in 1995 at 650,000 subscribers. Currently Mexico has 21 concessionaires that offer pay television service using Multichannel-Multipoint Distribution Systems (MMDS). Over 170 offer standard cable television. These and other new entrants to the market believe that they can expand the subscriber base, which now represents only 12 percent of Mexico's television viewers.

Beginning in 1994, companies began the process of obtaining licenses to offer DTH. In April 1996, the signing of the U.S.-Mexico satellite treaty cleared the last hurdle. Multivisión — working in an alliance with Hughes of the United States, Grupo Cisneros of Venezuela, and TV Abril — will develop a DTH system and will transmit over one of Hughes' U.S. satellites. Televisa — in an alliance with TCI of the United States, News Corporation, and Globo of Brazil — will invest $180 million in a DTH system designed to reach all of Latin America using a Panamsat satellite. Several others companies— including Grupo Acir, Grupo Zoma and PCTV — are in the process of applying for concessions.

The spectrum auction will open 360 new frequencies all to be used for MMDS television. Audio y Video Peninsular, Ultravisión, and Teleglobo, all of which operate MMDS systems now, have expressed interest in competing for new frequencies.

Telecommunications/ Telephony

Amaritel Local and Long Distance Network



Project Summary

Project No:	**TEL-01**
Subsector:	**Telephony**
State/Region:	**Nationwide**
Project Cost:	**$600 million**
Export Potential:	**$450 million**
Owner:	**Amaritel**

Numerous Mexican companies, foreign investors, and technology providers are investing in fiber optic networks to compete with TELMEX in the newly opened long distance market. Amaritel is a new company that has recently been formed to take on TELMEX's virtual monopoly in local telephone service.

Technical Description

Amaritel plans to provide both local and long distance voice and data service in major cities on the Gulf of Mexico. The US$600 million project will be divided into five phases, each valued at an average of US$120 million. Phase I will begin in the last quarter of 1996 with an investment valued at US$70 million. Phase I will include the installation of switches and interconnection in ten Gulf Coast cities. While Amaritel will lay down fiber optic lines it also plans to work out agreements with other long distance companies to use their existing infrastructure, where such arrangements are financially viable. In areas where new infrastructure is necessary and it is too expensive to lay wire-lines, Amaritel plans to use wireless solutions, such as microwave and satellite transmission.

Amaritel's strategy is to focus on areas of Mexico that are underserved in basic and long distance telephone service. The company will also target those markets that will not be priorities of other telephony providers.

Amaritel, formed in early 1996, is majority owned by Grupo Radio Centro. It is the largest owner of radio stations in Central Mexico and has significant experience in voice transmission and microwave

transmission. Advanced Telecom, a minority partner, is a Mexican telecommunications consultant specializing in telephony. The third partner, U.S. Global Telecom, is a small U.S. firm founded in 1993 which specializes in setting up telephony systems around the world.

Financing for the first phase of the project is being finalized from undisclosed sources.

Site

Phase I will provide service to cities on the Gulf Coast in the states of Veracruz and Tamaulipas. Successive phases will provide full coverage in selected areas of Puebla, Tlaxcala, the State of Mexico, the Federal District, Oaxaca, Tabasco and Chiapas, and partial coverage in selected areas of San Luis Potosí and Hidalgo.

Project Status

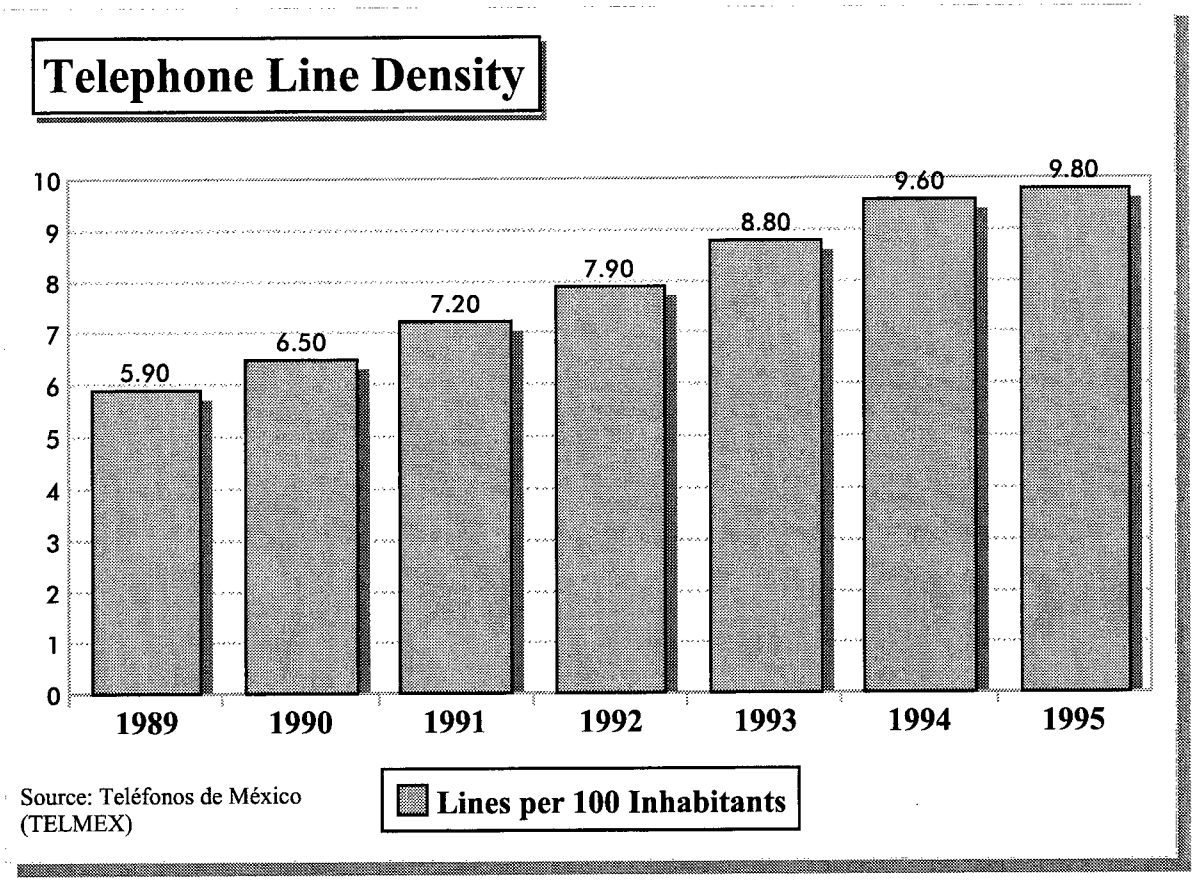
Amaritel was created in February 1996, and has applied for a concession to provide telecommunications services. Amaritel expects to get approval of its concession and other necessary permits from the Secretariat of Communications and Transport (SCT) no later than September 1996.

Equipment & Services Demand

Amaritel has begun conversations and negotiations with companies for equipment supply for Phase I. It has contacted many and short-listed seven companies and will make a decision as soon as it obtains permits from the SCT. However, suppliers for the remaining five phases have not been chosen.

Of the total US$600 million investment, approximately 20 percent will go toward fiber optic infrastructure and 70 percent for other telecommunications equipment including:

- Switching Equipment
- Satellite and Microwave Transmission Stations
- Digital Switches
- Telephone Sets
- Network Administration Hardware and Software

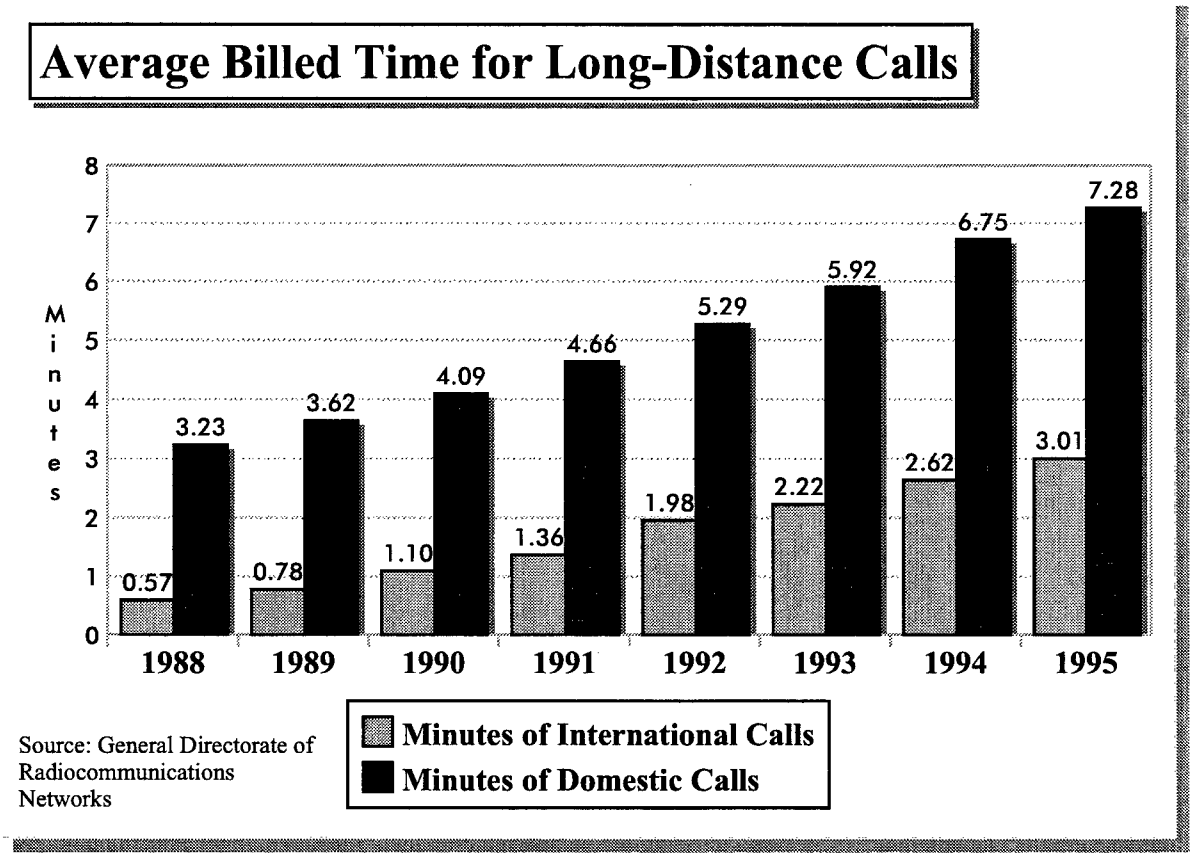


The demand for telephony is expected to grow considerably over the next few years. Mexico's line density has grown steadily from 5.9 lines per 100 inhabitants in 1989 to 9.6 in 1994. In spite of the recession in 1995 and the peso devaluation, this market has continued to grow. Line density reached 9.8 lines per 100 inhabitants in 1995. Recent market studies by Grupo Iusacell estimate that the Mexican market could bear a line density of 14.0 lines per 100 inhabitants.

Amaritel's market studies for the areas that it is targeting show a need for 1.4 million lines. Amaritel also predicts that few other companies will compete in providing local service except in a few select markets. Of all of the areas that Amaritel plans to serve, other telecommunications providers have announced plans for competing service in Central Mexico (including Puebla), Reynosa, and Coatzalcoalcos. Of the 100 local networks that the company plans to install, 90 percent are not the priority markets of its competitors.

Although it never had an official monopoly, at present TELMEX is the only provider of local telephone service. However, the end of the long distance monopoly has drawn new interest to the Mexican telecommunications market for a wide range of services. Eight companies have won concessions to provide long distance service. It can be expected that other companies will enter the market for local telephony as well.

Nature of Demand



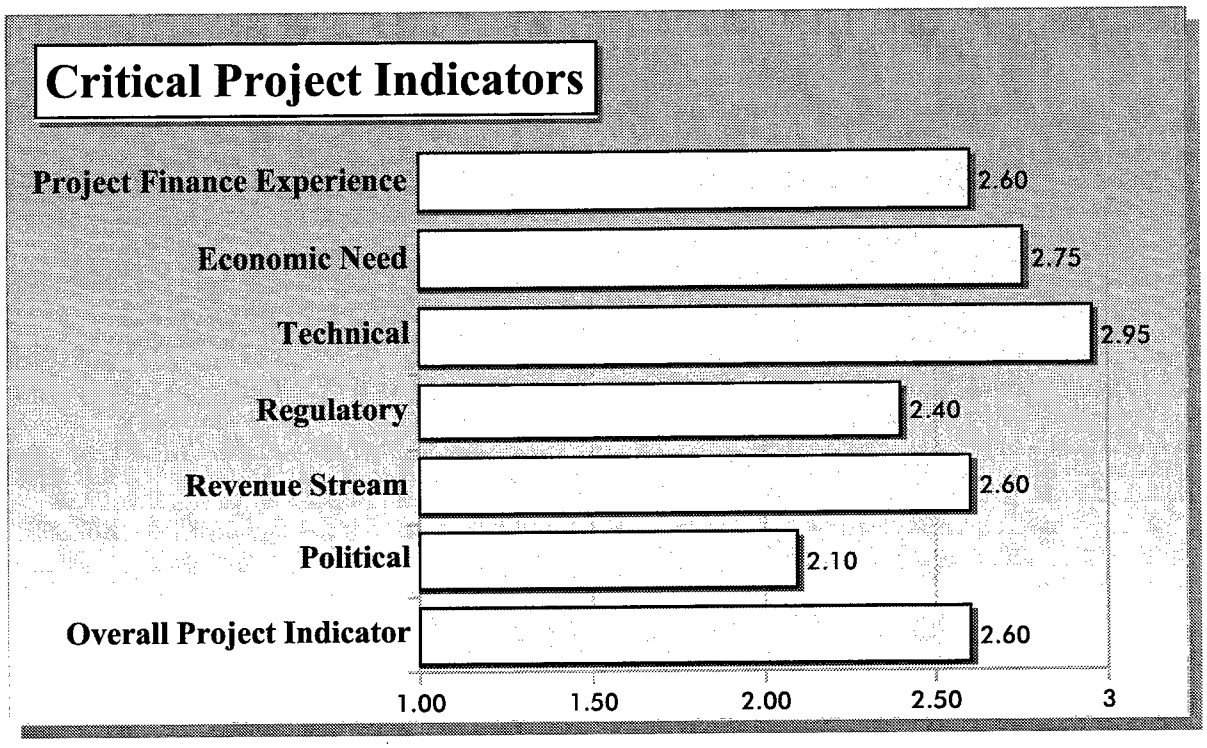
Source: General Directorate of Radiocommunications Networks

Project Assessment

It is too early to determine the nature of the competition for local telephony. One development that will spur interest in local telephony is the upcoming auction of radiospectrum frequencies. Companies, including Amaritel, will compete for the rights to utilize new frequencies that will allow them to create wireless local loop networks, which are likely to be a more economical alternative to setting up a network based on conventional wire lines.

In long distance, eight companies have received concessions. Already Alestra and Unicom have merged, and the market expects more mergers that will reduce the size of the field within the next year. Competitive issues aside, the demand for new telephony is very strong, as many areas have been underserved by the monopoly provider TELMEX. Amaritel has calculated an Internal Rate of Return of between 40 and 50 percent.

Critical Project Indicators



Key Decision Makers

Company	**Amaritel**
Name	Lic. Luis de la Fuente
Title	Director of Finance
Location	México, D.F.
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Company	**Amaritel**
Name	Lic. Germán Carmona Garduño
Title	Director General
Location	México, D.F.
Phone	(52-5) 271-1455
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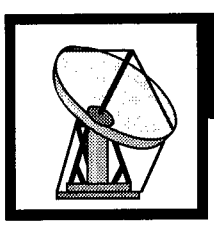
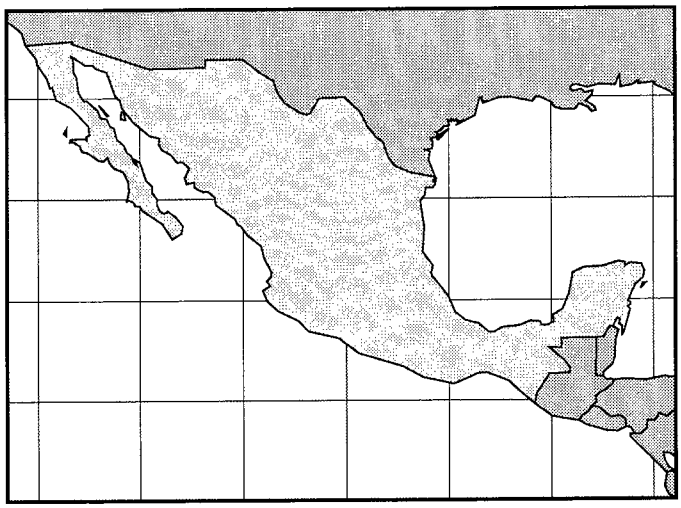


Telecommunications/ Wireless

Globalstar Wireless Network



Project Summary

Project No:	**TEL-02**
Subsector:	**Wireless**
State/Region:	**Nationwide**
Project Cost:	**$60 million**
Export Potential:	**$55 million**
Owner:	**Globalstar de México**

Globalstar de México is a partnership of leading international satellite manufacturers and wireless operators that is constructing a US$2.2 billion, 64-satellite network to provide global communications services to areas which are not covered by telecommunications services. The system is expected to be operational by the end of 1998. Globalstar de México is a consortium developing the Mexican market for incorporation in the future Globalstar satellite network. The company is made up of Telefónica Autrey (Mexico), Loral Space Communications, and AirTouch Communications, both from the United States.

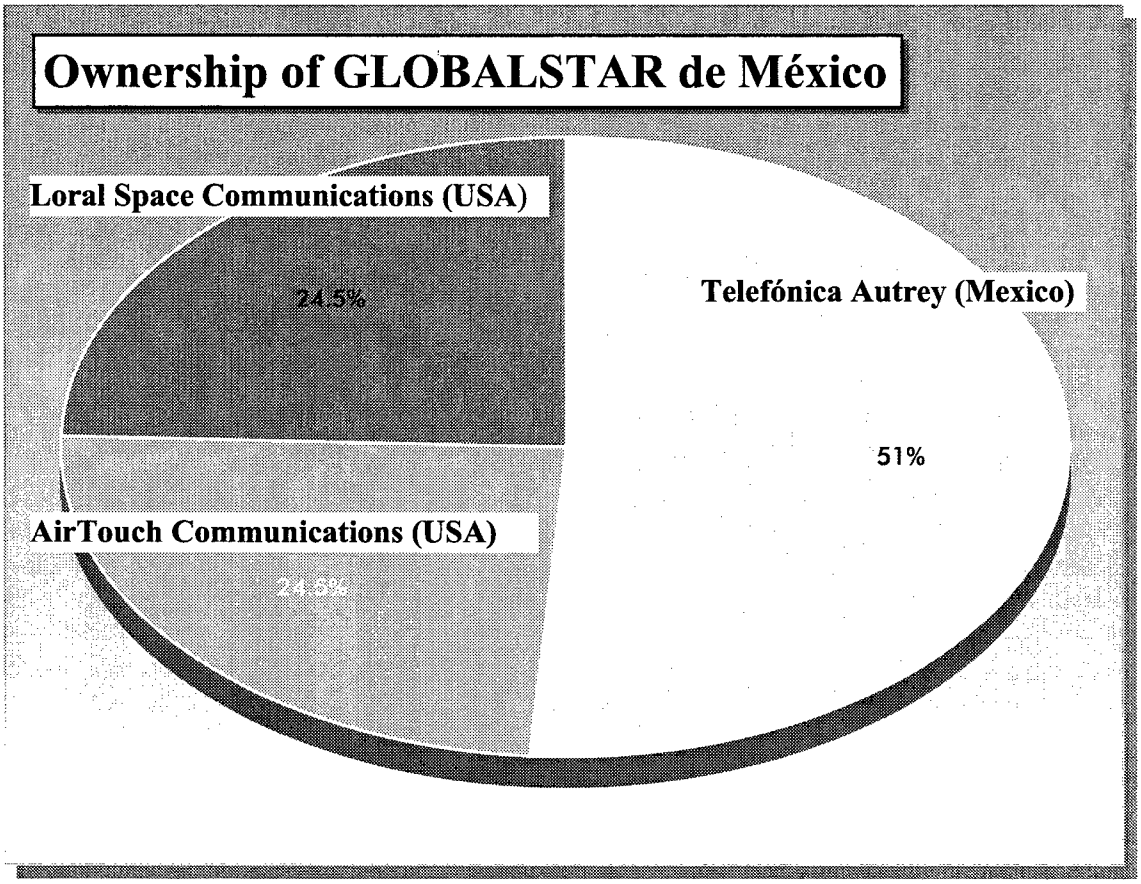
Technical Description

Globalstar de México's objective is to take telephone and other telecommunications services to areas and communities that are not covered by other carriers. The target market consists of cellular users seeking global roaming coverage as well as rural communities with a population above 200 people, highway rest stops, gas stations, refineries and oil exploration sites, military bases, and other remote locations lacking telephone service.

Solar powered wireless telephone booths will be installed which transmit their signals to the world-wide Globalstar satellite network. Globalstar de México will also install satellite ground stations and switches to forward signals to long distance carriers and then to the local phone network.

The satellite system, to which Globalstar de México will connect, will be made up of 64 low-orbit satellites allowing the network to provide individual and two-way global telecommunications services, including data transmission and voice transmission. The system will be able to serve 120,000 simultaneous users at a bandwidth of 9600 bytes per second.

Globalstar de México is made up of three partners, with the two U.S. firms holding minority stakes as described below:



Loral Space Communications and AirTouch Communications are both founding members of Globalstar, the satellite network operating firm. AirTouch and Loral have exclusive rights to provide services for Globalstar in the United States and Mexico, among other countries.

Telefónica Autrey is the local Globalstar partner in Mexico. It is a subsidiary of Grupo Autrey, one of Mexico's leading commercial groups led by the Autrey family. The company is active in a variety of sectors including mining and steel, and entered the telecommunications sector in 1992 with the creation of Optel, a company focused on providing data transmission services.

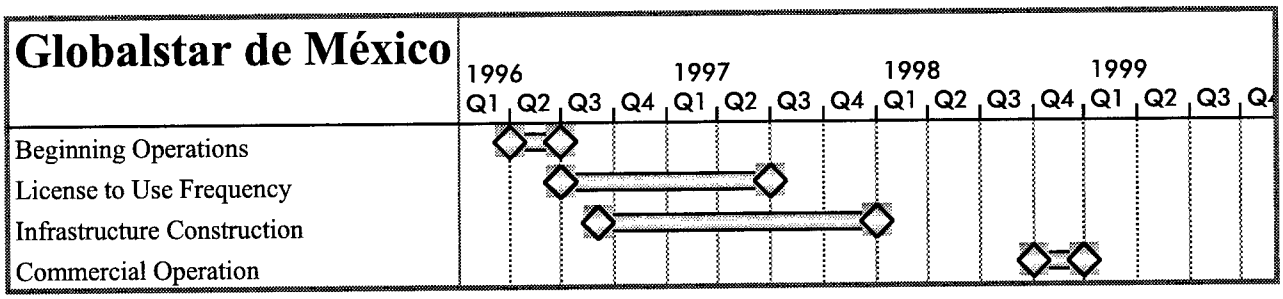
The revenue stream will come from fees charged to the users of the company's services. Rates are expected to be US$1 to US$3 per minute. Globalstar de México is considering applying for subsidies from the federal government for providing service to rural areas which would otherwise be without any telecommunications services.

Site

Globalstar plans to install the solar-powered phone booths in suitable rural and remote locations throughout Mexico.

Project Status

Globalstar de México was recently created in order to pursue this project. The company has spent most of 1996 carrying out the process of applying for licenses for use of the public networks, frequencies and spectra, as well as fulfilling other regulatory requirements. Construction of the necessary infrastructure will probably start in the last quarter of 1996 in order to initiate operations by the end of 1998 when the worldwide Globalstar satellite network is expected to be operative.



Source: Globalstar de México

Equipment & Services Demand

- Solar-powered telephone booths.
- Satellite transmission equipment for telephone booths and earth stations.
- Satellite earth stations to receive and transfer signals transmitted via satellite.

Nature of Demand

As Mexico recovers from the recession in 1995, demand for telecommunications services is expected to increase--especially in rural areas. Now that the monopoly has been effectively broken, local and long-distance services have been given room to improve and modernize. Over 70 consortia have recently announced investments in a related subsector -- fixed cellular and PCS systems. These investments are expected reach US$170 million in 1997 and US$280 million in 1998.

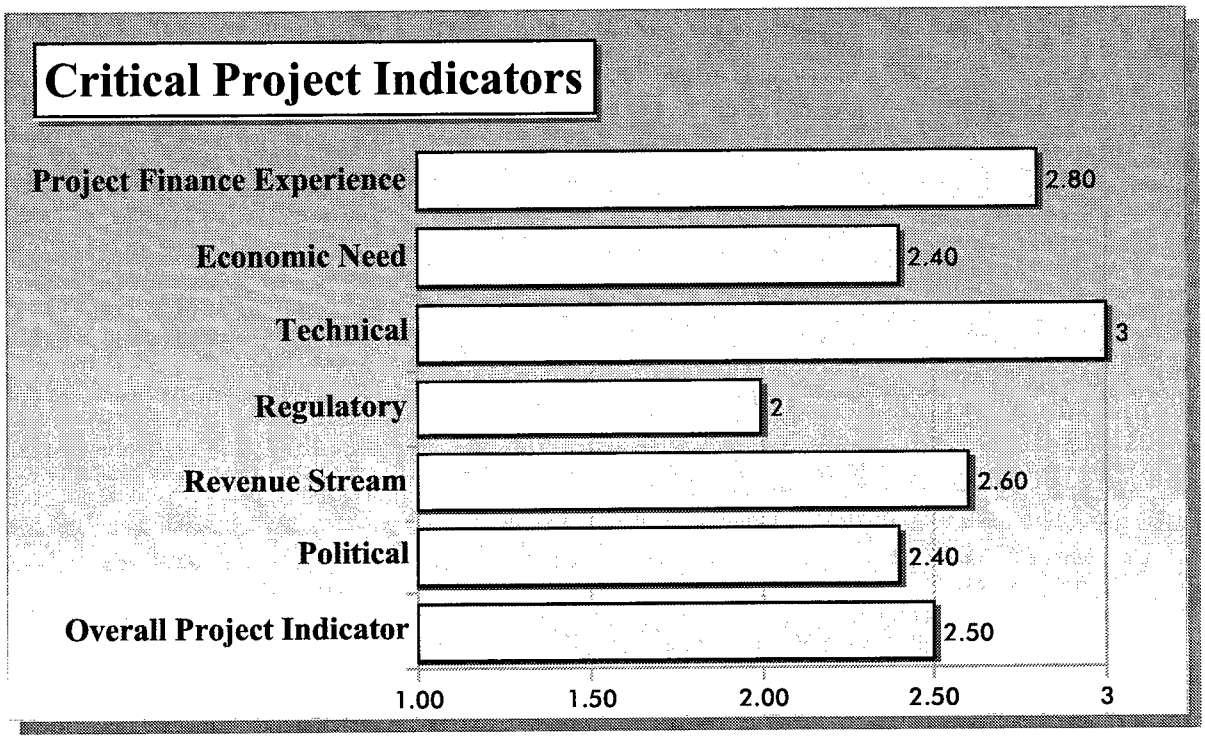
Project Assessment

The project will be financed by the equity partners in Globalstar de México. The financial muscle of Telefónica Autrey and the experience of its U.S. partners give every reason to believe that this project will be well-managed and successful. International revenues and reliance on networks outside of Mexico give the project a greater degree of stability. Moreover, use of wireless public phones connected via satellite for remote areas is a cost-effective alternative to conventional telephony.

Nevertheless, certain caution should be applied as less affluent rural communities may have problems affording non-subsidized wireless rates. It is also not clear how TELECOMM, Mexico's state telecommunications company, plans to proceed with rural telephony (i.e. subsidized private concessionaires, joint ventures with private companies, etc.).

Two major events have the potential of transforming the telecommunications market in Mexico. First, the end of the monopoly on long distance service has attracted major international telecommunications companies to Mexico, many for the first time. Given the mandate for 51 percent Mexican ownership of telecommunications providers, a number of major Mexican corporations -- such as Autrey and Banamex -- have also entered what they see as a lucrative market. The second event, a general auction of a wide variety of radio spectrum frequencies to take place by the end of 1996, should also attract more market entrants. With alliances still forming and these company's investment plans still in the formative stages, it is difficult to determine if there is enough market for all.

Critical Project Indicators



Key Decision Makers

Company	**Telefónica Autrey**
Name	Ing. Lauro González Moreno
Title	Chief Executive Officer
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Company	**Telefónica Autrey**
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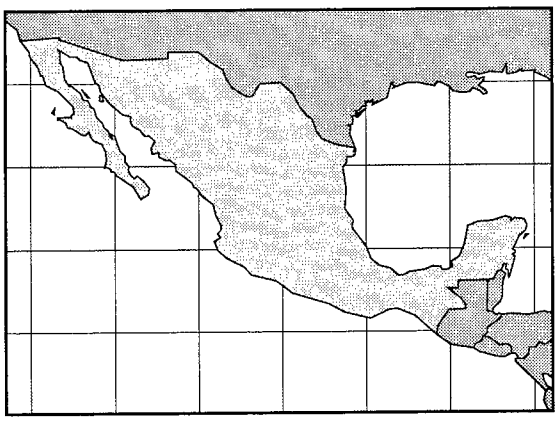
Phone	(52-5) 201-4001
Fax	(52-5) 201-4030

Telecommunications/Data Transmission

Optel Data Transmission Network



Project Summary

Project No:	**TEL-03**
Subsector:	**Data Transmission**
State/Region:	**Nationwide**
Project Cost:	**$25 million**
Export Potential:	**$15 million**
Owner:	**Telefónica Autrey**

OPTEL is a subsidiary of Grupo Autrey, one of the major industrial groups in Mexico. The company began operations in 1993, and now provides services in Internet access, teleport, satellite, digital networks, electronic mail, and data transmission. Now OPTEL is planning an expansion of its data transmission network.

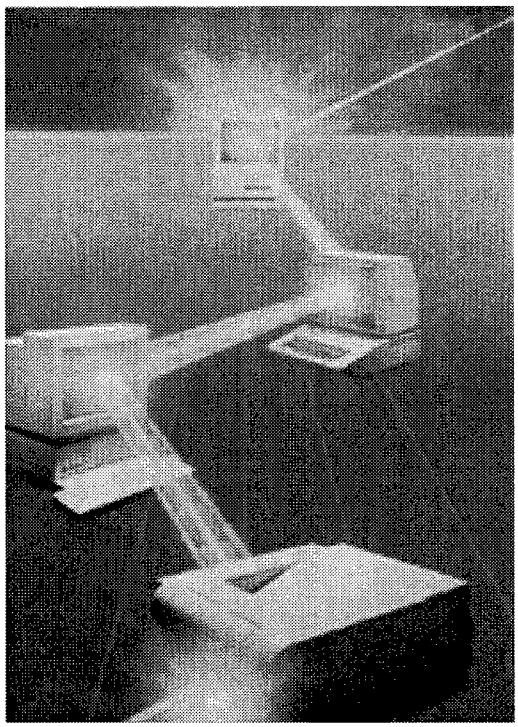
Technical Description

OPTEL is planning to invest US$25 million to expand its data transmission network over the next two years. Currently the company has 17 data transmission nodes located in the principal cities of Mexico. The network is linked using TELMEX's fiber optic cables and satellite connections. Thus far, OPTEL has invested US$7 million in its network.

Subscribers connect to the OPTEL network through dial-up or dedicated line accounts. OPTEL's network is based on the X.25 protocol with speeds of 19.2 to 64 kilobytes per second for dedicated lines and 1.2 to 9.6 kilobytes for dial-up accounts. Dial-up service is currently available in Mexico City, Guadalajara, Monterrey, Ciudad Juárez, Tijuana and Puebla. In November 1996, coverage will be extended to 11 other cities.

OPTEL has a strategic alliance with Global One (formerly SprintNET) for its international data communications, which provides access to over 110 countries. OPTEL is now looking for a partner to help develop its network within Mexico.

Site



The 17 existing data transmission nodes are located in: Mexico City, Tijuana, Hermosillo, Ciudad Juárez, Chihuahua, Torreón, Reynosa, Monterrey, Culiacán, Mazatlán, Guadalajara, León, Veracruz, Puebla, Coatzacoalcos, Tuxtla Gutiérrez, and Mérida.

Project Status

OPTEL has all of the proper permits from the SCT to sell value added, public network, and teleport services. The company plans to select a partner before it defines a time frame for upgrading its data transmission network.

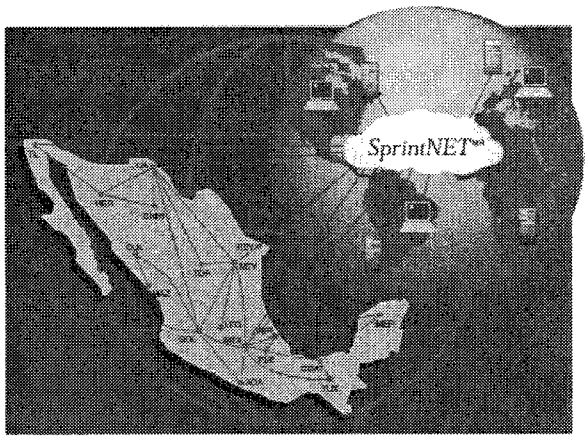
Equipment & Services Demand

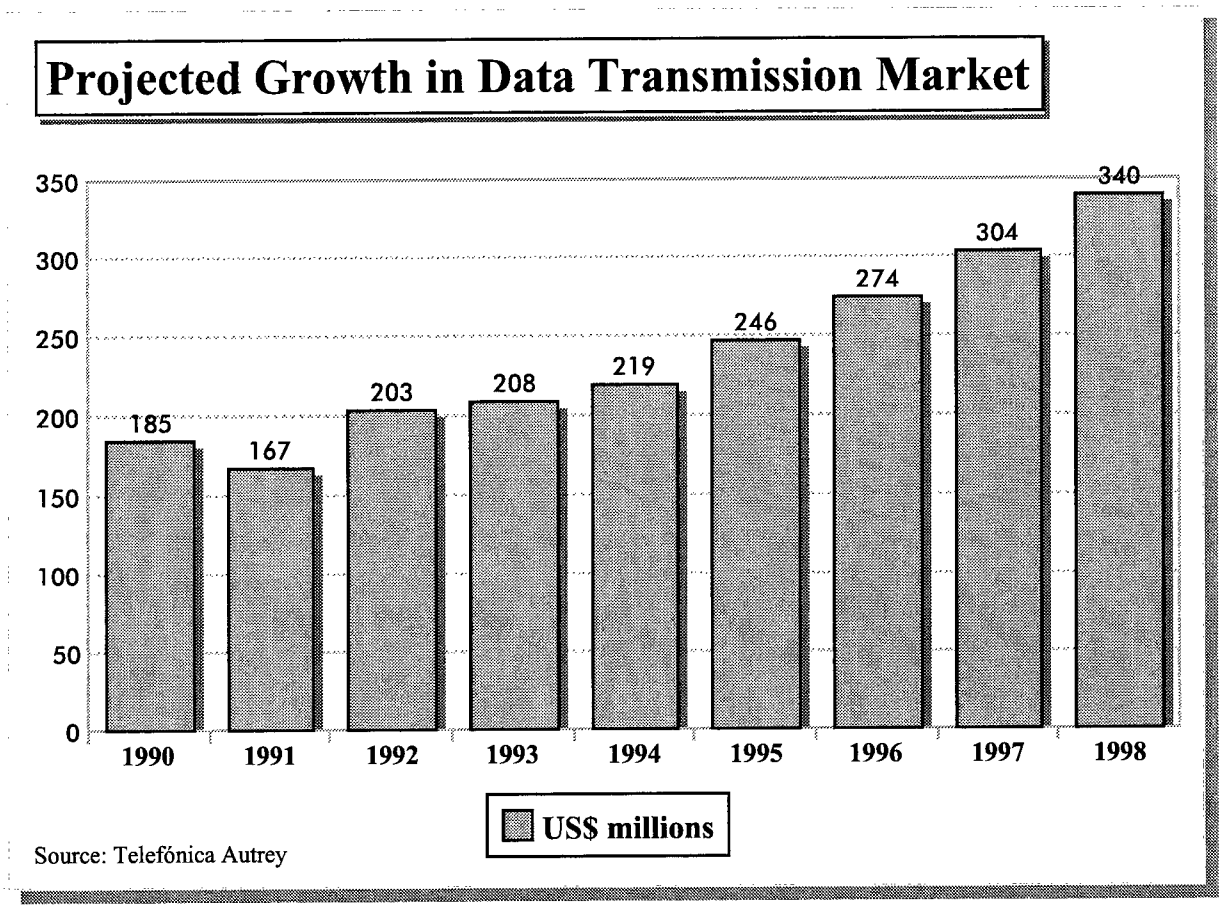
OPTEL's network expansion will require investment in equipment including:

- Data transmission nodes with fiber optic and satellite connections
- Switches and PBXs
- Multiplexors
- Routers
- Satellite communication equipment

Nature of Demand

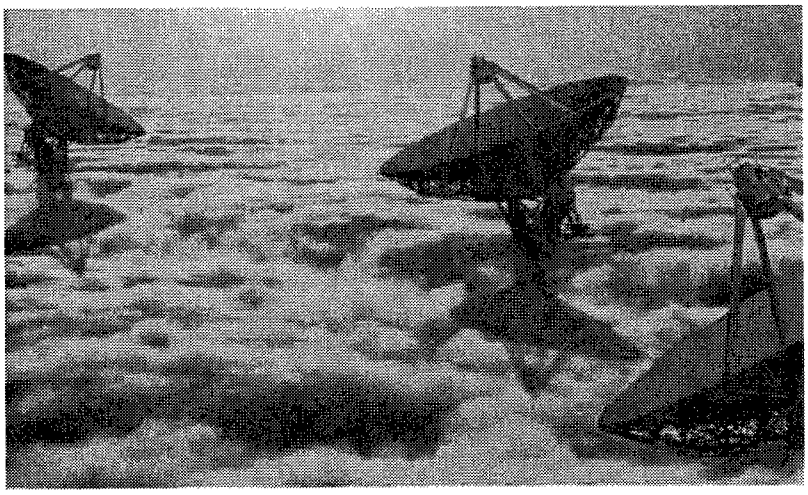
In its two years in business, OPTEL has over 65 clients, the majority of which are trading, transportation or financial firms. OPTEL foresees strong growth in demand for data transmission, and for that reason is planning a major expansion. OPTEL projects that the data transmission market will grow four percent in 1996, and ten percent in 1997. The recovery of the Mexican economy should boost demand for telecommunications services such as data transmission.



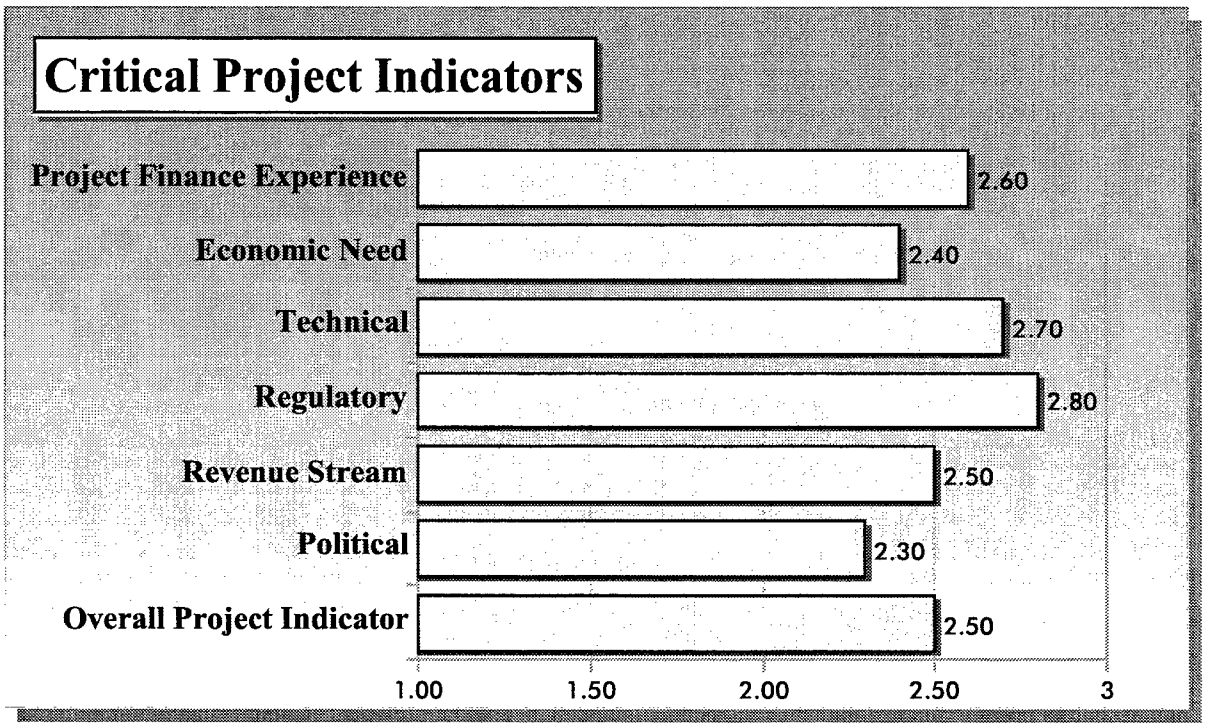


Project Assessment

OPTEL's success will largely depend on the technology partner that it chooses. As an upstart division of Telefónica Autrey, it will benefit from the financial support and experience of one of Mexico's largest conglomerates. The market for data transmission services appears to be strong, considering past and projected growth. However, competition is likely to be intense as many of the new long distance carriers -- many of which have experienced foreign telecommunications firms as partners -- may also choose to provide data transmission services.



Critical Project Indicators



Key Decision Makers

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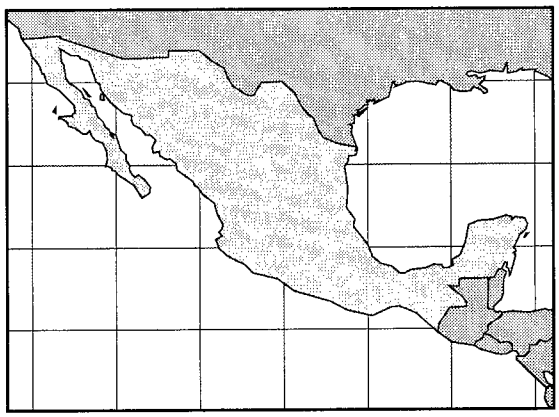
Telecommunications/ Paging

Paging Spectrum Auction



Project Summary

Project No:	**TEL-04**
Subsector:	**Telephony**
State/ Region:	**Nationwide**
Project Cost:	**$120 million**
Export Potential:	**$59 million**
Owner:	**SCT**

The Ministry of Communications and Transportation's (SCT's) upcoming auction of new radio spectrum frequencies represents the single largest telecommunications market to open in Mexico after the privatization of Telmex and the opening of the long distance market. Mexican and international firms will compete to win the rights to become providers of a broad range of wireless services from PCS and fixed wireless to television and trunking. Among the most promising of these opportunities is paging, which still has a relatively low penetration rate in Mexico.

Technical Description

The SCT is organizing the auction of 36 spectrum frequencies for paging services. These frequencies correspond to 36 independent concessions — nine with nationwide service areas and 27 with service areas in predetermined regions. The frequencies occupy the radio spectrum from 929 megahertz to 931.8375 megahertz. The SCT will award concessions to the highest bidders. No mandatory investment program is required. The concession period will be 20 years.

Regulatory Framework

Paging in Mexico is governed by the 1995 Federal Telecommunications Law. The radio spectrum auction is organized through SCT regulations published on July 31, 1996. A paging concession may only be awarded to a Mexican entity, no more than 49 percent of which is made up of foreign capital. As in other telecommunications services, the 1995 law prevents foreign companies from owning a majority stake.

Project Status

Paging frequencies will be awarded at the SCT's general radio spectrum auction on October 7, 1996. The auction timetable announced on July 31, 1996, is as follows:

Spectrum Auction Timetable for Paging

Activity	Date
Release of Bidding Documents/ Opening of Prequalification	August 12
Reception of Prequalification Documents	August 25-September 2
Distribution of Software for the Auction and Auction Practice Sessions	September 2-October 4
Notification of Prequalification	September 30
Establishment of Surety Guarantee	October 1-2
Participation Documents, Confidentiality Agreement, and Participant Information Due	October 1-3
Question and Answer Session	October 4
Beginning of Auction	October 7
Announcement of Results	within seven days after the end of the auction
Last Day for Incorporation of Company	within 30 days after the results are announced
Approval of Concession Titles	15 days after payment of the amount offered and completion of all requirements

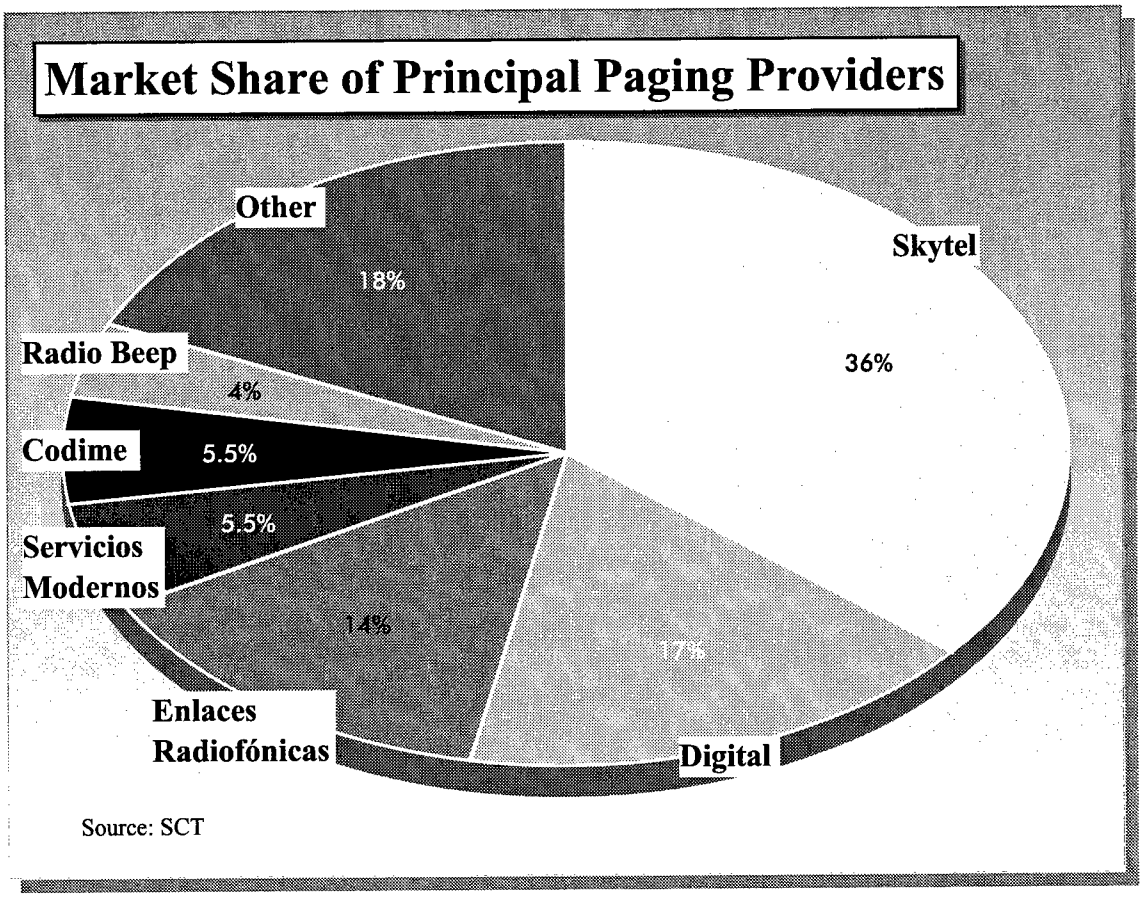
Source: Official Register

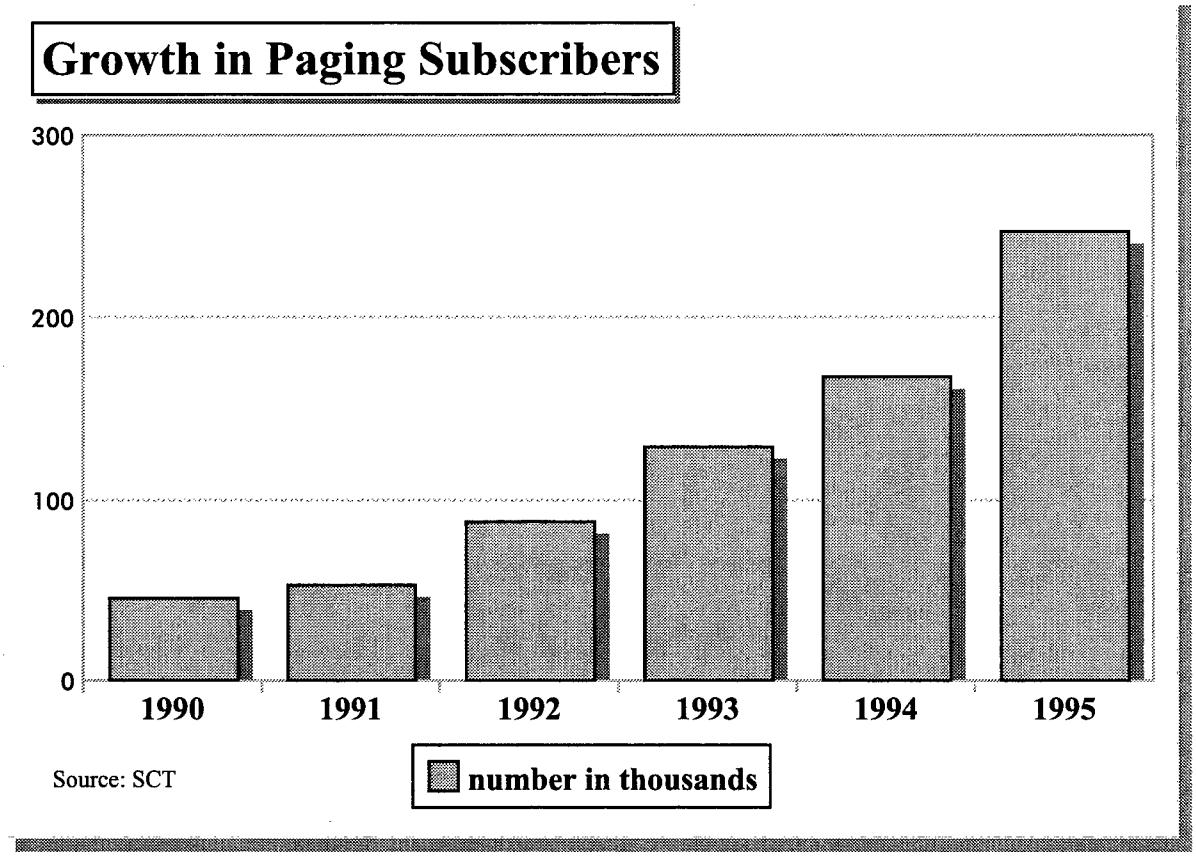
Equipment & Services Demand

After the auction, many new players will be entering the market at the same time that established companies will be expanding their coverage and range of services. These companies will need to make significant investments in transmission equipment, software and paging receivers, particularly those designed for two-way paging.

Nature of Demand

In 1995, there were over 270,000 paging customers in Mexico. Six major companies and scores of smaller firms serve this market. Skytel, owned by Televisa of Mexico and MTEL of the United States, leads the market with 36 percent of the market. The second largest provider is Digital, formed by Humberto Galindo of Mexico and Telesystem Communications of the United States, with a 17 percent share of the market. The other principal paging companies are: Enlaces Radiofónicas with 14 percent, Servicios Modernos with 5.5 percent, Codime with 5.5 percent, and Radio Beep with 4 percent.





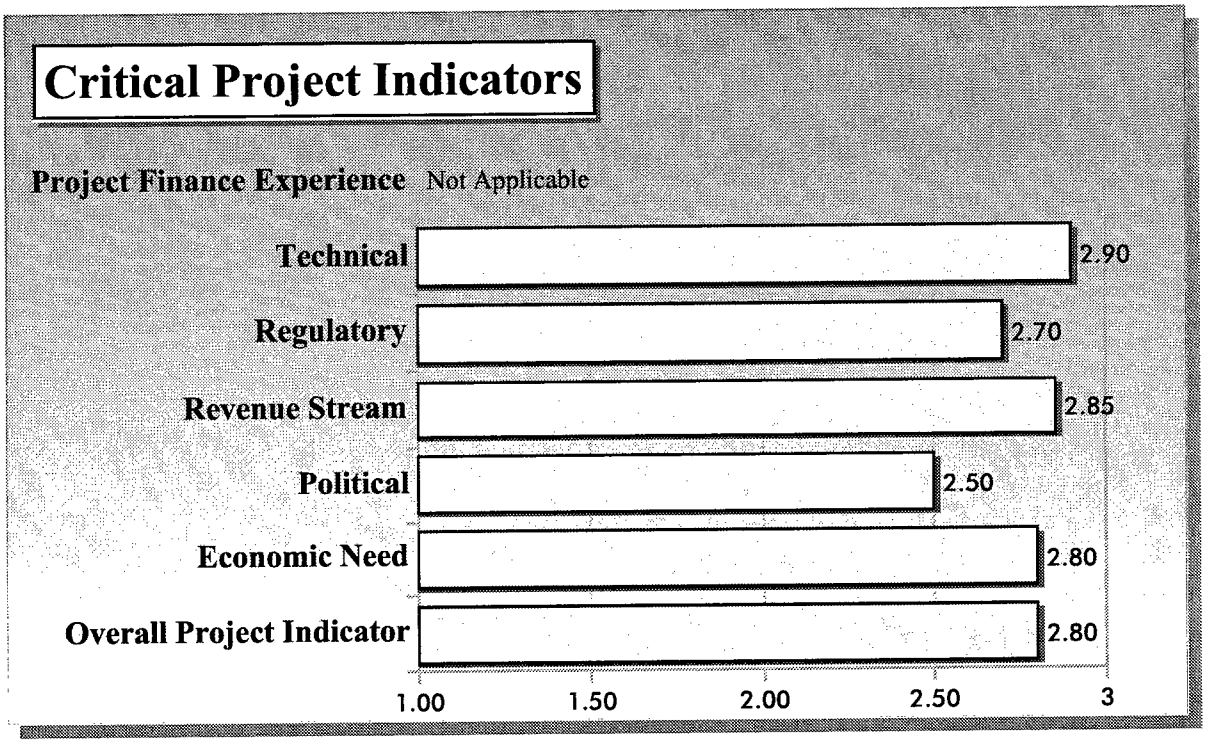
In Mexico only 0.3 percent of the general population subscribes to paging services. For specialized services such as paging via satellite, the penetration is barely 0.07 percent. Nevertheless, paging has shown strong growth in the last six years. In spite of the recession, the number of paging subscribers increased by 47 percent in 1995. Average annual growth has been 41 percent.

The radio spectrum auction is expected to greatly expand the market for enhanced paging services. The auction of new frequencies will allow the entrance of two-way paging, which does not yet exist in Mexico.

Project Assessment

Mexico's conventional paging market (one-way) is still growing strong. The introduction of two-way paging is sure to make the market expand further. Like many subsectors of telecommunications, it is dependent on foreign-produced equipment but generates peso revenues. Neither the foreign exchange issue nor the recession appear to have dampened the market's roaring growth in 1995. Although the winners of the auction will not be known until October 1996, it is likely that a number of U.S. and international companies will be minority partners in the consortia, adding substantial financial strength and technological experience.

Critical Project Indicators



Key Decision Makers

Company	**Federal Telecommunications Commission - SCT**
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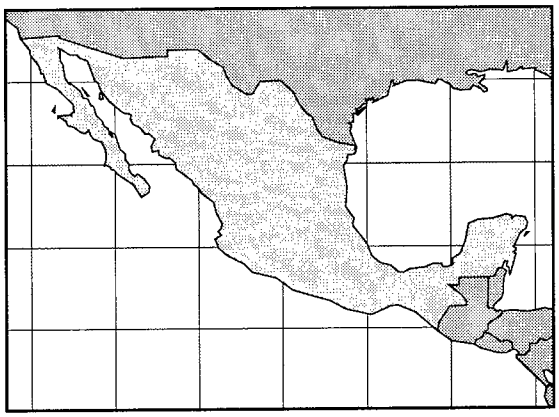
Telecommunications/ PCS

PCS Spectrum Auction



Project Summary

Project No:	**TEL-05**
Subsector:	**PCS**
State/Region:	**Nationwide**
Project Cost:	**$300 million**
Export Potential:	**$149 million**
Owner:	**SCT**

The Ministry of Telecommunications and Transportation's (SCT's) upcoming auction of new radio spectrum frequencies represents a unique opening of the Mexican telecommunications market to a broad range of wireless services. New frequencies will enable companies to expand and improve existing services such as paging and MMDS television. The awarding of other frequencies will open up new markets, such as those for Personal Communications Services (PCS).

PCS is a relatively new digital technology that integrates wireless telephony, paging, trunking, electronic mail, data transmission and reception, and other services. When compared to conventional mobile telephony, the tariffs for PCS are lower, due to the fact that PCS doubles the coverage of each cell site.

Technical Description

The SCT will use the auctions to award multiple concessions for PCS. The SCT is still in the process formulating the auction rules and the regulation of these services in Mexico. However, the SCT wants a regulatory framework that promotes competition and ensures quality service. Concessions will be awarded through the auction process on a highest bid basis, similar to that which is now underway for paging, point-to-point links, and mobile aeronautic radio frequencies. The duration of concession periods has not been determined yet.

PCS operators will utilize frequencies of 1.8 gigahertz, 2.4 gigahertz, and 3.4 gigahertz.

Regulatory Framework

All telecommunications services in Mexico are governed by the 1995 Federal Telecommunications Law. Although regulations on the PCS auction have not yet been released, it is likely that foreign participation in the operation company will be limited to 49 percent, as stipulated in the 1995 law. The regulations issued for the first three spectrum auctions also limited foreign control to 49 percent.

To prevent conflicts in the use of spectrum frequencies along the border, the United States and Mexico have agreed to coordinate the use and licensing of frequencies for PCS.

Site

As with cellular telephony, the SCT is likely to propose a series of nationwide and regional concessions to promote competition among service providers.

Project Status

The SCT wants to gather industry input as it formulates regulations organizing the auctions. The SCT will hold a forum with telecommunications industry representatives at which they can discuss rules and timetable for the spectrum auctions. This forum is planned for the first week of September.

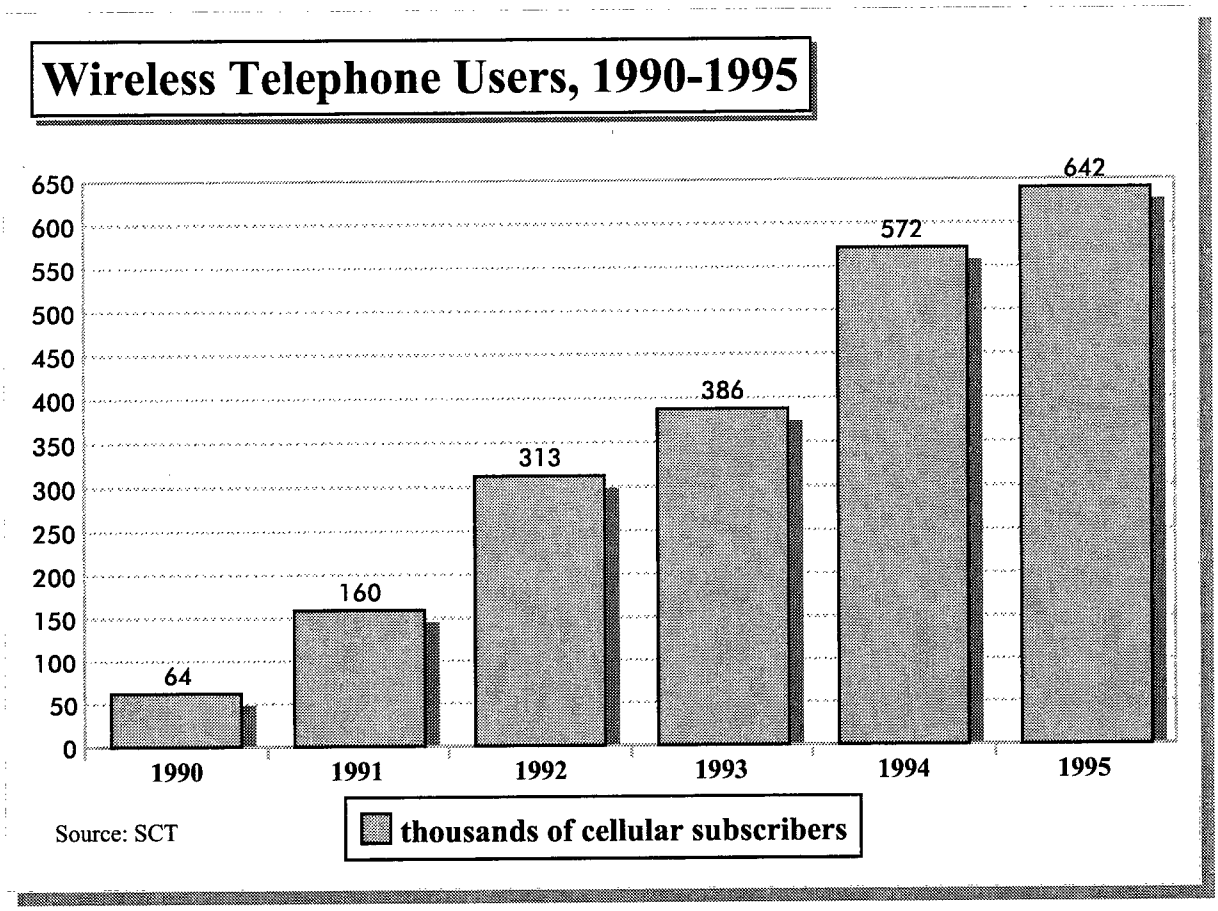
With input from industry, the SCT hopes to resolve any issues that may arise to stall PCS development in Mexico. Regulations and dates for the PCS spectrum auction should be published by the beginning of 1997.

Equipment & Services Demand

The project represents an excellent opportunity for U.S. firms to supply equipment both to concessionaires who will need to erect networks of base stations or cell sites, and to consumers who will need digital PCS receivers. The design of the system and the area that it covers will be entirely up to the concessionaire.

Nature of Demand

PCS is a unique service that integrates a number of telecommunications services and provides them in an efficient and cost effective manner. The mobile telephony feature of PCS will make it likely to draw from a similar (although not exclusively identical) market as cellular telephony. Cellular telephony in Mexico has grown rapidly, increasing its number of subscribers at an average annual rate of 44 percent from 1992 to 1995. Other services, such as paging, grew at 41.6 percent during the same time period.



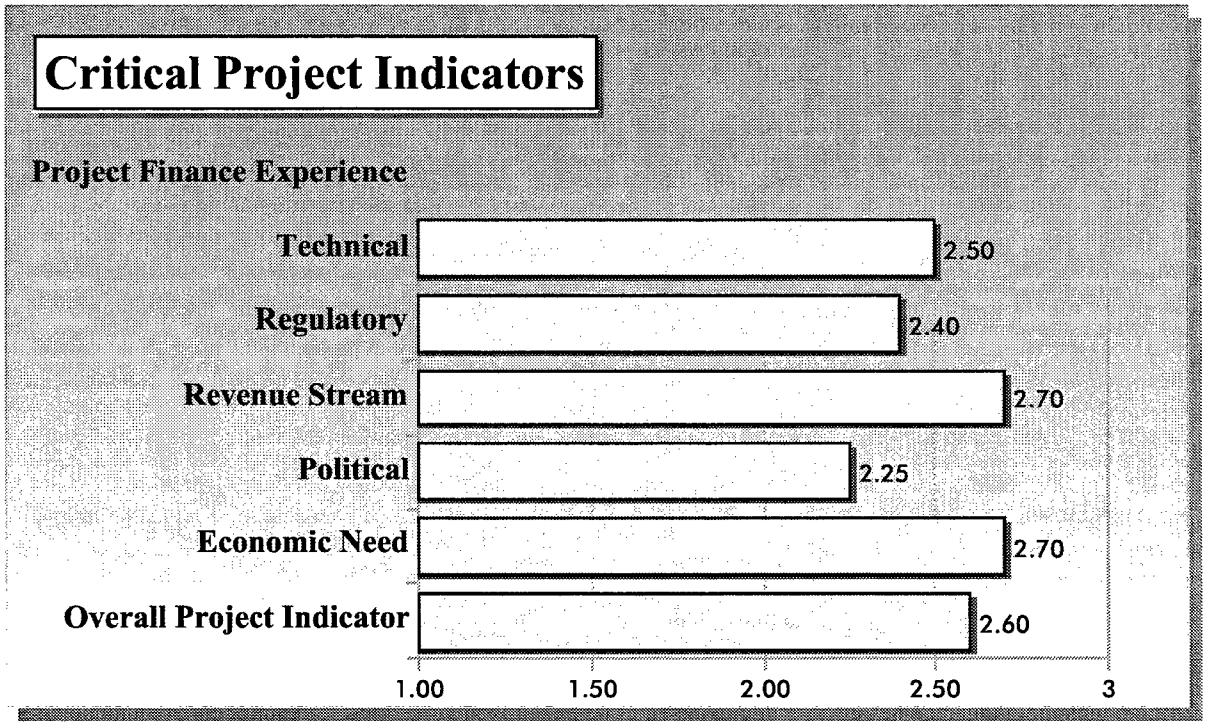
Telmex's subsidiary, Telcel, has the only nationwide cellular service area. The remaining companies each operate in one of nine defined geographic areas. In the Mexican cellular market, Telcel has a 41 percent market share. The next largest company is Iusacell with 32 percent, which provides service to the Valley of Mexico region.

Project Assessment

As cellular telephony continues to grow rapidly, it appears that the market will continue to accommodate providers of services such as mobile communications. In spite of the recession of 1995 and increases in tariffs by many carriers, the number of cellular subscribers still increased by 12 percent. Like many subsectors of telecommunications, PCS will be dependent on foreign produced equipment, but will generate its revenues in pesos. Nevertheless, neither the foreign exchange issue nor the recession appear to have dampened the roaring demand for telecommunications services.

Given the recent introduction of PCS to the Mexican market and the lack of Mexican PCS providers, it is likely that a number of U.S. and international providers will be minority partners in the winning consortia, adding financial strength and technological experience.

Critical Project Indicators



Key Decision Makers

Company	**Federal Telecommunications Commission - SCT**
Name	Lic. Carlos Casasús
Title	President
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Company	**Federal Telecommunications Commission - SCT**
Name	Dr. Enrique Melrose Aguilar
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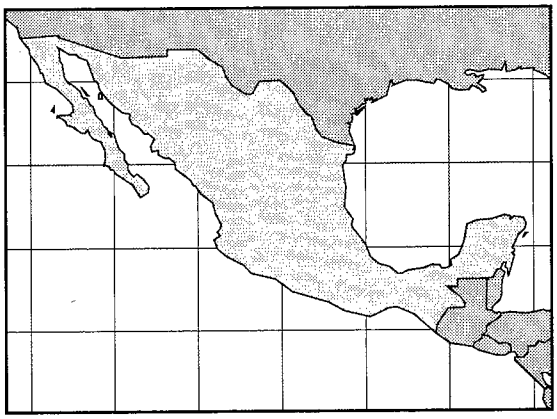
Telecommunications/ Rural Telephony

TELECOMM Rural Telephony



Project Summary

Project No:	**TEL-06**
Subsector:	**Rural Telephony**
State/ Region:	**Nationwide**
Project Cost:	**$140 million**
Export Potential:	**$140 million**
Owner:	**TELECOMM**

Rural telephony is an important priority of the Secretariat of Communications and Transportation (SCT). In 1995, the SCT Division of Telegraphy, which coordinates Mexico's rural telephone coverage, announced a plan to encourage telephone companies to provide basic telephony to small towns which lack service. Phase I of the plan — to provide telephony to all towns with populations larger than 1000 — has already been implemented. TELECOMM, a state-owned provider of satellite, rural and other telecommunications services, will soon begin looking for private companies to assist in the implementation of the second phase of the project for towns with populations between 500 and 1000.

Technical Description

TELECOMM is planning the installation of 20,000 solar-powered telephone booths in areas of low telephone density. Given the isolated areas in which these towns are located, TELECOMM calculates that a wireless system will be less expensive than conventional wireline. The new booths will be connected to the public telephone network via Band L satellite links. The purchase and installation of the phone booths alone will require an estimated investment of US$140 million. Because of the high cost involved, TELECOMM will not have adequate resources for this expansion program. TELECOMM will provide guarantees — the details of which are still being worked out — so that it can proceed with a private sector concession program, which it expects to have ready by the end of 1996.

TELECOMM is considering a number of models for private sector involvement: a) the Mexican government would provide long term bonds for the financing of the equipment purchase, b) a series of concessions to be financed exclusively by the private companies, or c) a coinvestment arrangement

between TELECOMM and the private sector. The proportions of investment to be made by each coinvestment partner have not yet been defined. Any concession or coinvestment arrangement would involve the participation of Mexican and international financial institutions and providers of rural telephony systems.

Regulatory Framework

The 1995 Federal Law of Telecommunications charges the SCT with the responsibility of elaborating plans for rural telecommunications coverage. The SCT's plans can be executed by any concessionaire, as there is no monopoly on rural telephony service. TELECOMM provides rural telephony, as do Telmex, Telnor, and the cellular companies which have mandatory investment programs and concession requirements. Foreign participation in operating companies is limited to 49 percent.

Site

It is estimated that there are 20,000 towns with populations between 500 and 1,000. Most of the telephones will be installed in the towns on the Gulf Coast and in the south of Mexico.

Project Status

TELECOMM wants to open bidding by the end of 1996.

Equipment & Services Demand

TELECOMM has calculated the equipment need of US$140 million based on an estimate of US$7,000 per booth. Among other equipment and systems, the project will require the purchase of solar power generators, telephone booths, and wireless public telephones.

Nature of Demand

Investment in rural telecommunications has boosted coverage significantly since 1990, due to the SCT's policy of expanding coverage as well as the mandatory investment requirements placed on Telmex and Telnor. The SCT calculates that in 1994, 21,300 rural towns had basic telephone service as compared to 6,700 in 1990. As part of its mandatory investment program, Telmex installed basic telephone service using multi-access rural radio systems (MARRS) in approximately 12,000 rural towns between 1991 and 1994.

In Baja California, Telnor extended service to 78 towns in its service area between 1990 and 1994.

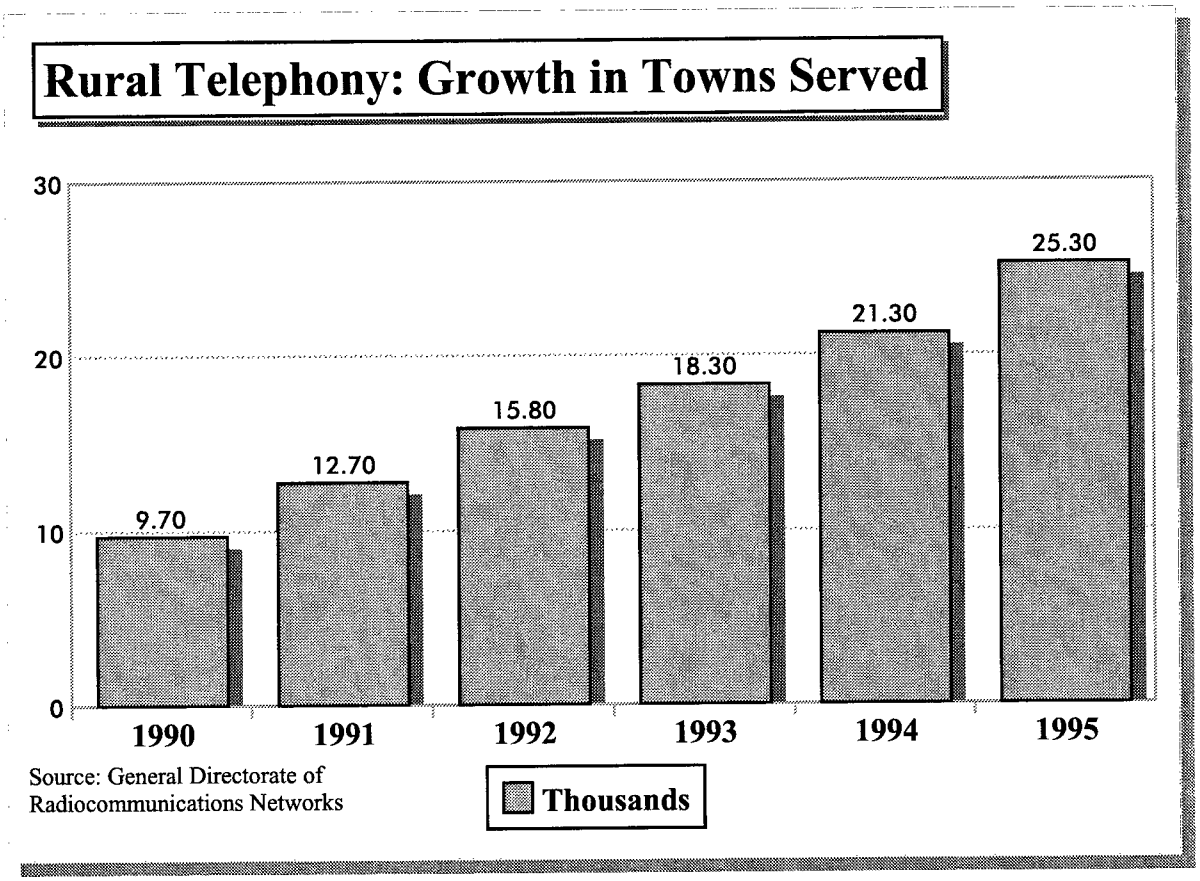
Telnor is an independent local and long distance provider for Baja California, owned by the federal government, but independent of Telmex.

To fulfill the terms of its concession, Iusacell uses available cellular capacity to provide service to private residences, buses, and public telephone booths. In 1996, Iusacell had 1,000 customers.

Apart from these investments, a number of private companies have expressed interest in installing telephone service to areas of low line density. Many of these will seek some form of a subsidy from the SCT.

- Miditel, one of the new long distance carriers, has announced a project to use satellite technology to link a series of 600 public telephones to the public network.

- Globalstar de México has a US$60 million project that would use solar-powered wireless telephone booths which transmit their signals to the company's worldwide satellite network. The target market consists of rural communities with populations above 200, highway rest stops, gas stations, refineries and oil exploration sites, military bases, and remote locations lacking telephone service.



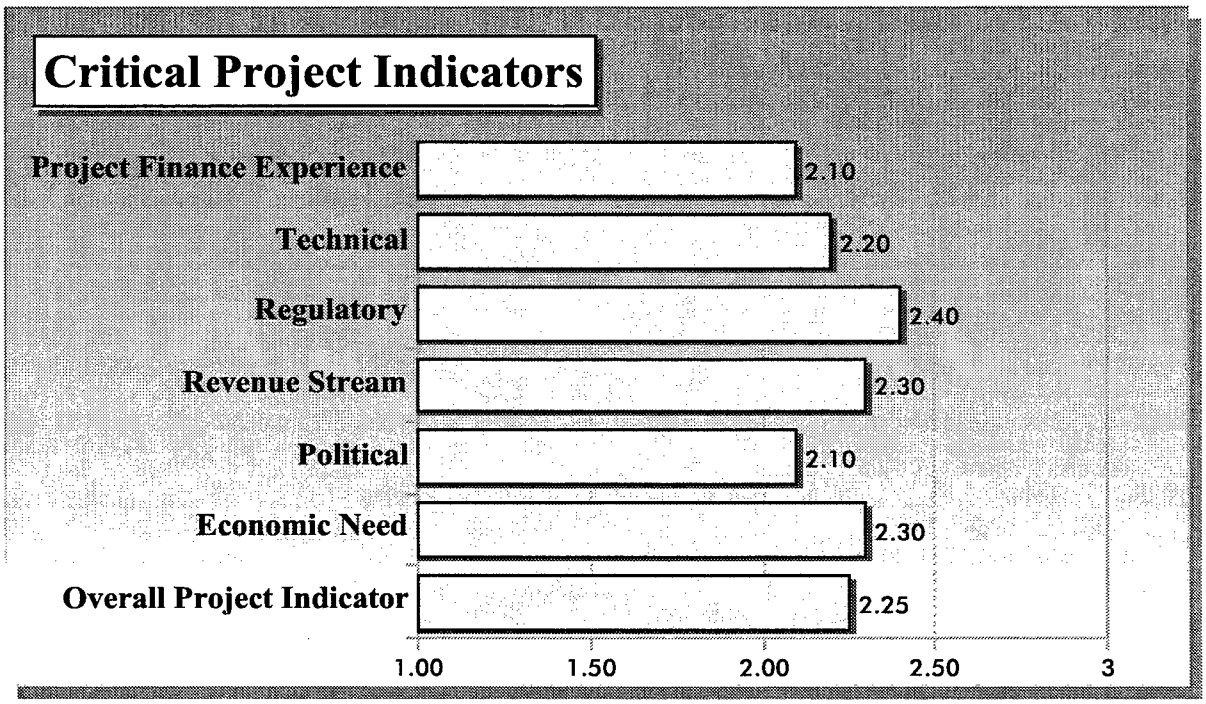
Project Assessment

The geographic isolation of many rural towns makes installation and maintenance of rural telecommunications systems relatively expensive. For this reason, utilization of a wireless system theoretically makes sense. However, it is not clear if the use of expensive technologies such as solar powered generators and satellite links are the most cost-efficient alternative to wireline systems. The high capital cost based on TELECOMM's own estimate could make cost recovery difficult. The use of high technology implies a high import content; however, the revenue stream will be in pesos.

Many private companies have demonstrated interest in rural and public telephone concessions. The key to this project's success will be structuring private sector involvement. Subsidies may be necessary to make these concessions viable.

Although "rural telephony" is associated with providing service to less affluent areas, a number of private Mexican telecommunications companies are applying for rural telephony licenses. Their plans target other geographically isolated consumers, such as ranches, oil platforms, truck stops, etc., which presently lack service but are in a different income category. Nonetheless, the majority of rural areas do have a lower average per capita income than the large cities and, consequently, a lower carrying capacity for telecommunications services than urban cellular and paging consumers.

Critical Project Indicators



Key Decision Makers

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Company	**Telecomunicaciones de México (TELECOMM)**
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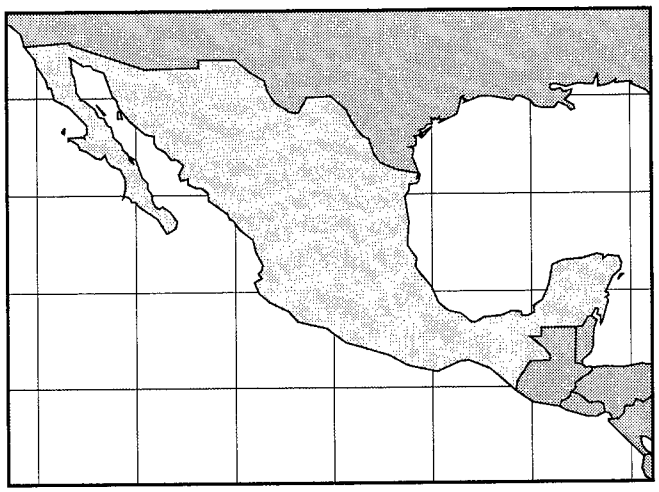
Telecommunications/ Satellite

TELECOMM Satellite Privatization



Project Summary

Project No:	**TEL-07**
Subsector:	**Satellite**
State/Region:	**Nationwide**
Project Cost:	**$1.1 - $1.4 billion**
Export Potential:	**$880 million - $1.1 billion**
Owner:	**TELECOMM**

Mexico is broadening its policy of opening the telecommunications sector to competition and private participation. Mexico has already privatized its long distance and local telephone company, Telmex. Now Mexico is organizing the privatization of its remaining state-owned telecommunications company, TELECOMM.

Formed in 1989, Telecomunicaciones de México (TELECOMM), apart from operating the national satellite network, also provides public telegraphic services and rural telephony in areas not served by Telmex's long distance and local networks. Additional services include: TDMA/DAMA transmission, VSAT, packet switching, IBS, data transmission, and electronic mail.

Technical Description

Mexico is planning to privatize its state-owned telecommunications company, TELECOMM, which provides a number of services, including the operation of Mexico's public satellites and teleports. In these areas, TELECOMM's assets include:

- Three geostationary satellites: Solidaridad I, Solidaridad II, and Morelos II are used to provide both fixed and mobile service.
- A replacement satellite under construction: TELECOMM has recently contracted a company to build a fourth satellite to replace the aging Morelos II.
- Four unoccupied orbital positions for DBS satellites: New satellites can be launched into these

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positions which cover an orbital arc over North America.
- Two teleports which route television/telephone signals and data.
- Two satellite control centers.

In 1995, TELECOMM posted revenues of US$160 million and a profit of US$50 million. While representing only 3.4 percent of TELECOMM's personnel, satellite systems generated 47.7 percent of the company's income.

Lazard-Freres has been retained to study options for privatization of TELECOMM. The form of the privatization is still under discussion. A number of models are being discussed:

- One model would sell off the all assets as one unit.
- Another model would sell off the satellites, teleports, and orbital positions independently.
- Another model would privatize the teleports separately from the rest.

Satellites

The following describes the basic characteristics of the three satellites in operation:

Technical Description of Existing Satellites

		Morelos II	Solidaridad I	Solidaridad II
		metric tons	percent	percent
Transponders	Band C	12-36 MHz, 6-72MHz	12-36 MHz, 6-72MHz	12-36 MHz, 6-72MHz
	Band Ku	4-108 MHz	16-54 MHz	16-54 MHz
	Band L	--	1	1
Power	Watts	677	3,720	3,720
Investment		US$80 million	US$230 million	US$230 million
Manufacturer		Hughes	Hughes	Hughes
Model		HS 376	HS 601	HS 601
Launch Date		October 1985	November 1993	October 1994
Last Year Usable		1998	2007	2008
Percent Occupied		85 percent	78 percent	28 percent
Direct-To-Home TV				14 transpond., Band Ku

Source: TELECOMM

In July 1996, TELECOMM awarded a contract to Hughes Communications International of the United States to construct a new US$90.5 million satellite which will replace Morelos II in 1998. By the third quarter of 1996, TELECOMM will award the launch contract, for which three bids were entered: Arianespace of France, International Launch Services of the United States and Long March of China.

Teleports

TELECOMM has two teleports which are used to create a nationwide network through Solidaridad I and II and Intelsat. Additionally, the company operates 11 earth stations which allow it to provide television, radio, and telephone service to Mexico's major cities. The teleports also provide the basis for a number of private virtual networks:

- VSATCOMM Network: This is primarily used for data transmission.
- Malta Multiserve Network: This has nodes in 12 major cities.
- Infosat Network: This serves to distribute news to 500 remote stations.

Regulatory Framework

The Mexican Government has established the necessary legal reforms to allow incorporation of private capital in the operation and administration of satellite services. After chipping away at the state satellite monopoly since 1988, the 1995 Federal Telecommunication Law finally removed the state's control over satellite communications. Foreign participation, however, was restricted to 49 percent. In June 1996, the United States and Mexico signed a reciprocity agreement for sending and receiving satellite signals. Foreign satellites can now be used to beam signals down to Mexico, although the control point for those satellites must be located in Mexico.

Site

Morelos II is located at 116.8 degrees west. Solidaridad I and II are positioned at 109.2 degrees west and 113 degrees west respectively. The Mexican satellite system covers 23 countries in the Western Hemisphere but not Eastern Brazil and Guyana.

TELECOMM has two satellite control centers and two teleports located at their facilities in Iztapalapa, D.F., and in Hermosillo, Sonora. The 11 earth stations are located in Tijuana, Mexicali, Hermosillo, La Paz, Monterrey, Guadalajara, Morelia, Mexico City, Mérida, Cancún, and Chetumal.

Project Status

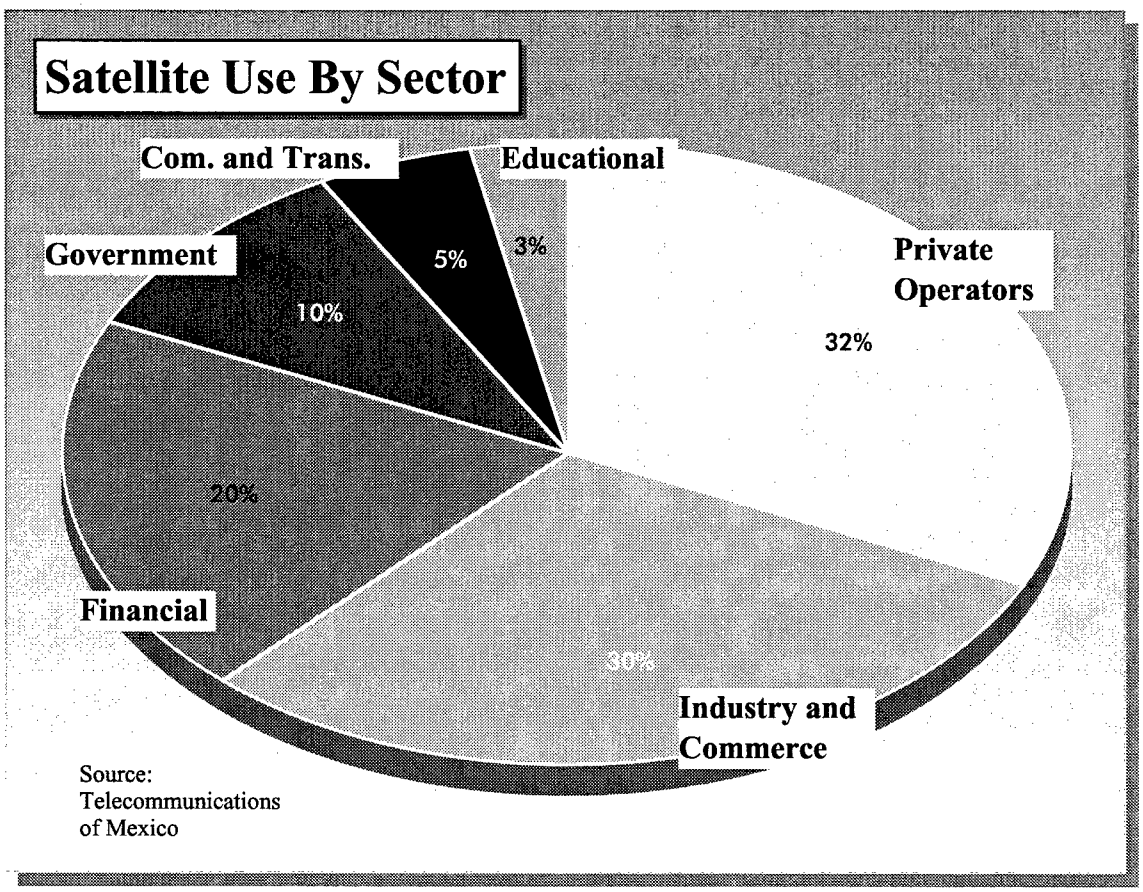
As of August 1996, TELECOMM was still in the process of deciding how the company will be privatized. No time line will be defined until TELECOMM analyzes the privatization study being completed by Lazard-Freres.

Equipment & Services Demand

The project has the potential of requiring vast amounts of equipment, services, and capital. When fully privatized, four new DBS satellites will be constructed and launched into orbital positions reserved for Mexico. An undetermined amount of equipment will be needed for teleports which need to be upgraded. Finally, capital investment will be needed for the purchase and operation of the Solidaridad satellites and the new satellite which will replace Morelos II. Based on the cost of the recently-awarded satellite and estimates of launch costs, the entire project could total between US$1.1 billion and US$1.4 billion.

Nature of Demand

In 1995, approximately 85 percent of the transponders on the three satellites were used for domestic communications. Sixty-three percent of their capacity was being utilized. Almost 58 percent of the transponder capacity was utilized for voice and data communications, while 42 percent was dedicated to radio and television.



Demand for transponders which support C Band — primarily used for radio diffusion services — grew at an average annual rate of 15.6 percent between 1988 and 1995. In the same period, demand for Ku Band transponders — primarily used for voice and data networks — grew at an average annual rate of 30 percent. Data network transponders are used by over 300 private voice and data network for some of the country's most important institutions, Pemex, the Federal Electricity Commission (CFE), and the National Autonomous University of Mexico (UNAM). In 1995, radio diffusion transponders carried 65 signals.

TELECOMM sees growth in the market for mobile communications which will require an expansion of the L Band capacity. Technological innovation could enable these services to be handled by low and medium orbit satellites. TELECOMM also sees growth in the market for Direct-To-Home (DHT) television.

Project Assessment

The telecommunications transmission market will be affected by four major forces: a) opening of the market to direct transmission from the United States; b) privatization of TELECOMM; c) construction of fiber optic networks by new long distance carriers; and d) the radio spectrum auction. TELECOMM's figures, supported by industry estimates, show strong growth in the demand for satellite services.

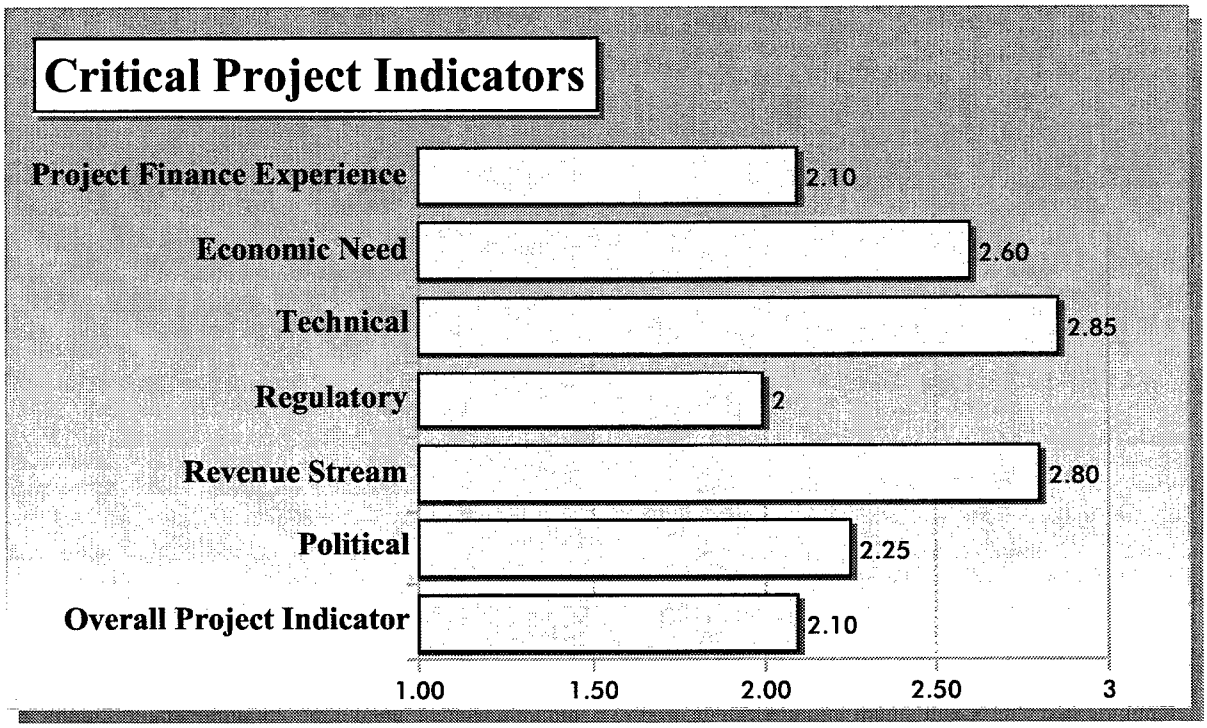
It is difficult to assess the market demand for satellite transmission service in the Solidaridad and Morelos satellites with the new market now opened to competition from U.S. satellites. The Direct-To-Home television market is growing rapidly and using signals from U.S. satellites.

With the possibility of using U.S. satellites to beam signals to Mexico it is not clear whether TELECOMM's satellites can maintain their customer base when they no longer enjoy a captive market. It is not known how many other market entrants there will be to take business away from TELECOMM satellites.

Although satellite and fiber optic modes of transmission are not completely interchangeable, some customers which use satellite links may opt for fiber optic transmission if the present construction boom pushes rates down below those charged by Telmex.

On the other hand, the Secretariat of Communications and Transportation's upcoming spectrum frequency auction is set to draw dozens of new players into the market, offering wireless services which will need to use satellite links.

Critical Project Indicators



Key Decision Makers

Company	**Telecomunicaciones de México (TELECOMM)**
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Company	**Secretariat of Communications and Transportation (SCT)**
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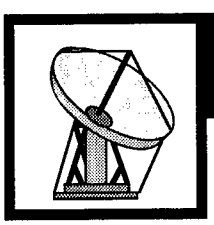
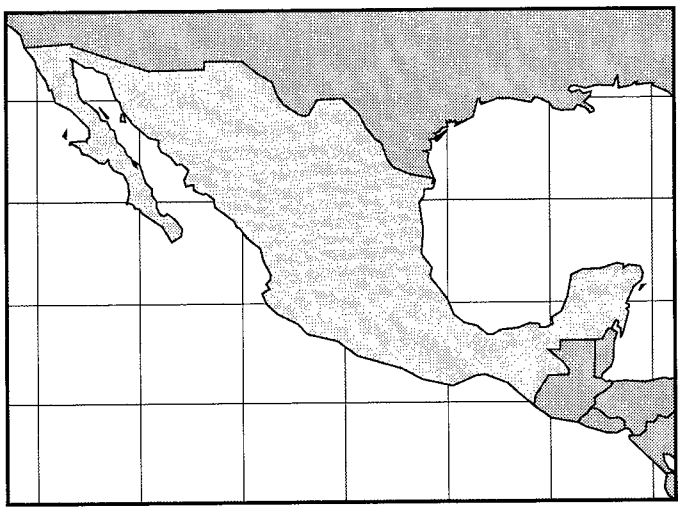


Telecommunications/ Networking

UNAM Videoconferencing Project



Project Summary

Project No:	**TEL-08**
Subsector:	**Networking**
State/Region:	**Nationwide**
Project Cost:	**$14 million**
Export Potential:	**$9 million**
Owner:	**National Autonomous University of Mexico (UNAM)**

To open up new opportunities for citizens throughout the country, UNAM — Mexico's largest and most prestigious public university located in Mexico City — is preparing to use a new telecommunications network to link its faculty with universities, hospitals, and teaching centers around the country. High-tech telecommunications links are being established as a cost-efficient way to disseminate the work of UNAM professors throughout Mexico.

Technical Description

UNAM is planning a major expansion of its videoconferencing network--with the goal of linking 200 facilities over the next five years. Since August 1995, UNAM has established eight functioning videoconferencing centers and plans to complete the remaining 192 over the next five years. The equipment alone for these new centers will cost US$9 million.

The core of this project will outfit new centers to connect professors at UNAM and students from other campuses across Mexico. Two important subprojects also exist. The Telemedicine Project will use fiber optics to link UNAM's Medical School to primary care facilities, taking high-quality care to areas of the country which lack qualified doctors. A telemedicine pilot project, linking the School of Medicine to a model primary care facility in rural Mexico, is already underway. The Veterinary Extension project plans to link the School of Veterinary Medicine with educational centers in the field to teach the latest techniques in cattle raising.

UNAM is also discussing with PEMEX the idea of establishing continuous videoconferencing centers at the company's facilities on the Gulf Coast. PEMEX has a continual need for postgraduate courses to improve its professionals' skills. The best science departments, however, are located at UNAM. Although nothing has been concluded, PEMEX is very interested in videoconferencing.

Site

The current videoconferencing centers include: the Mascarones Extension Center, the Cuautitlán School of Higher Education, the Iztacala School of Higher Eduction, the Educational Center for Foreigners, the School of Veterinary and Zootechnical Medicine, the School of Medicine, and the San Antonio Permanent Extension School in Texas.

UNAM's next high-priority centers will be located at universities in Querétaro, Cuernavaca, Morelia, and at six or seven veterinary extension centers throughout the country.

Project Status

UNAM will procure equipment as needed for use in centers it adds to its network. Since over two hundred centers will be built over the next five years, equipment procurement will take place on an ongoing basis.

Equipment & Services Demand

UNAM is looking for companies that have technologies to improve the quality of their videoconference links and to reduce transmission costs. The eight existing videoconferencing centers use cameras and monitors made by Fitel of the United States. All new centers for general academic use will have to be outfitted with bidirectional videoconferencing equipment, microphones, monitors, and software.

Videoconferencing centers are linked using both microwave and fiber optics. Microwave transmission uses the TELECOMM's Morelos II satellite and UNAM's fixed point-to-point microwave transmission stations. Fiber optic transmission uses TELMEX's E1 fiber optic cable for transmission within Mexico, and MCI and Southwestern Bell for the portions in the United States. Because of the high cost of transmission over fiber optics, UNAM is considering a number of new options including negotiating a better fiber optic deal with new long distance carriers and also using the Internet. The Internet may be a cheaper alternative. However, the current 128 kilobytes per second transmission speed is considerably slower than the 384 offered by E1 fiber optic cables.

The Telemedicine Project will require higher resolution monitors and improved transmission links, to allow doctors to consult and properly examine and diagnose patients. With improved technology, assistance during surgery may be possible.
The UNAM Videoconferencing and Telemedicine Project has a high export potential, given that existing equipment is manufactured by a U.S. company and that U.S. companies are highly competitive in fiber optics, satellite and microwave links, and software.

Nature of Demand

There is a great demand for improved educational and medical services in areas of Mexico outside the capital. By one UNAM estimate, over 80 percent of Mexico's medical doctors are located in Mexico City.

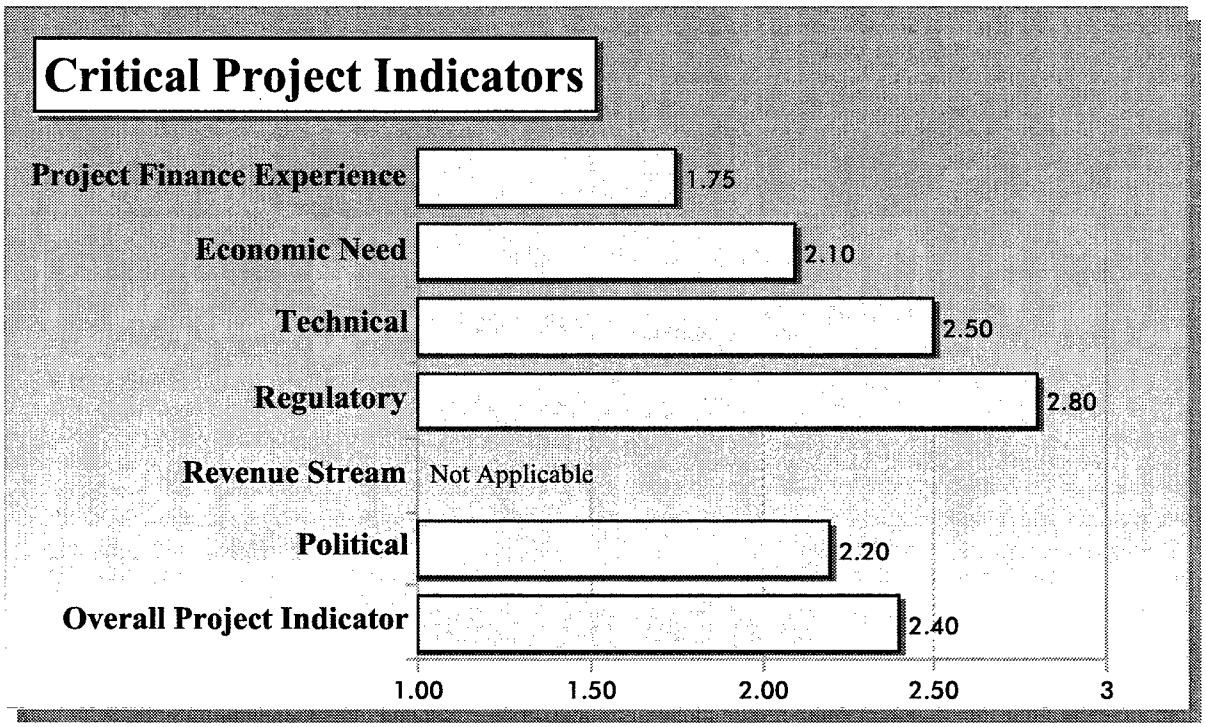
UNAM's project is highly representative of the small but numerous opportunities that exist in the Mexican market for value-added telecommunications services and networked systems. The commercial market for videoconferencing equipment is expected to grow substantially in the next few years.

Project Assessment

The project is being undertaken by the General Directorate for Academic Computing which has a substantial part of the university's total budget. Nevertheless, UNAM's plan for video links to 200 centers is rather ambitious. Without proper funding the number of videoconferencing units is likely to be reduced.

The General Directorate is looking actively for alternative sources of funding--including multilateral development banks, international organizations, and private telecommunications companies to assure that it can fully implement the project.

Critical Project Indicators



Key Decision Makers

Company	**National Autonomous University of Mexico (UNAM)**
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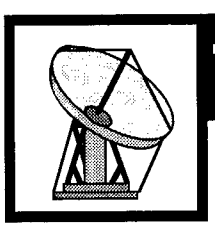
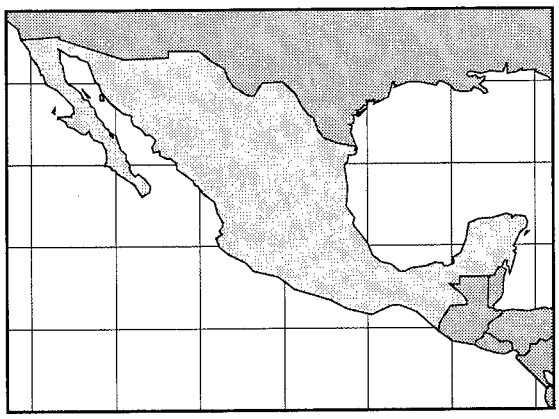


Telecommunications/ Wireless

Iusacell Local Wireless Network



Project Summary

Project No:	**TEL-09**
Subsector:	**Wireless**
State/Region:	**Nationwide**
Project Cost:	**$48.5 million**
Export Potential:	**$35 million**
Owner:	**Grupo Iusacell**

Iusacell plans to provide local wireless service to business and residential subscribers in selected markets throughout Mexico. Iusacell is one of a number of companies challenging Telmex, which up to now has been Mexico's only local telephony provider.

Technical Description

Grupo Iusacell, one of two cellular providers in the Valley of Mexico, was founded by Mexico's Peralta family. In 1993, Peralta sold a 42 percent stake to Bell Atlantic for US$1.04 billion. Today, Bell Atlantic owns a 44 percent share in the company.

The US$48.4 million network will be based on fiber optic transmission; however, it may also employ microwave and wireline solutions. Iusacell would like to take advantage of its existing cellular network and use the frequencies in the 440 megahertz to 450 megahertz and 485 megahertz to 490 megahertz ranges to connect with subscribers where possible.

Of the total investment needed, roll-out costs are estimated at US$44 million. Preoperational and development costs will add an additional US$4.4 million. Using modern transmission and digital switching technologies, the Wireless service will use readily available radio and microwave frequencies to set up its network.

Iusacell is now conducting a successful pilot project for local wireless service. By mid-1996 it had over 8,000 subscribing customers, up from 3,400 customers at the end of 1995.

Site

Iusacell is waiting for the Secretariat of Communications and Transportation (SCT) to define the local calling areas where providers are permitted to offer wireless service.

Project Status

Once the SCT approves Iusacell's economic and technical plan, Iusacell can begin to build a full-scale system. In addition to approvals from the SCT, a process which has experienced general delays, the project will depend on the elimination of authorized and unauthorized use of certain frequencies within Iusacell's allocated bandwidth.

Equipment & Services Demand

The project will require investment in a combination of wire line, fiber optic, and microwave transmission systems. The project will utilize modern digital switching, transmission, and subscriber connection technology.

Nature of Demand

Iusacell has identified significant demand for basic and enhanced telecommunications services in areas that are not served or are underserved by Telmex. Independent market research together with Iusacell market studies have concluded that a substantial base of potential business and residential subscribers exists. Based on factors such as telephone density to GDP, the Mexican economy is estimated to have the capacity to support telephone line penetration of 14.0 lines per 100 inhabitants. In 1995, Telmex reported a line density of 9.8 lines per 100 inhabitants. Based on these statistics, Mexico may have a market for over 4 million additional lines.

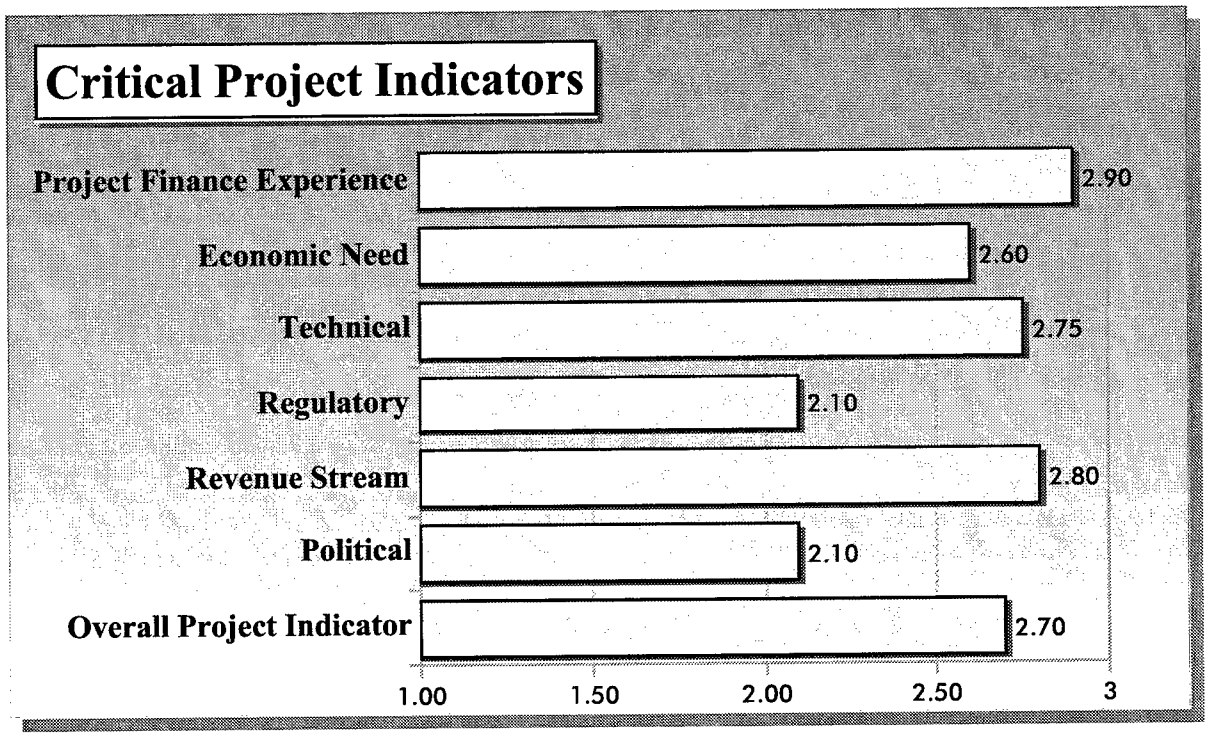
Project Assessment

The fact that Iusacell has a successful cellular business, a functioning local wireless pilot project, and minority ownership by a major U.S. telecommunications company are all factors which make this project strong and attractive.

Although local wireless systems generate lower revenues per minute than mobile cellular, they will have wider use among the general population, for which cellular is too expensive. In addition, in the future, local wireless will require a lower infrastructure investment per telephone unit than conventional wire line, it will have a steady revenue base, and be less susceptible to customer fraud. In terms of rates, Iusacell is confident that it can keep its rates on par with those of Telmex.

The only issues that may hold this project back are regulatory issues, as this would be one of the first entrants to the local telephony market after Telmex. The project is very much dependent on SCT approvals, which have been subject to delays in the past.

Critical Project Indicators



Key Decision Makers

Company	**Grupo Iusacell**
Name	Mr. Edward Kingman
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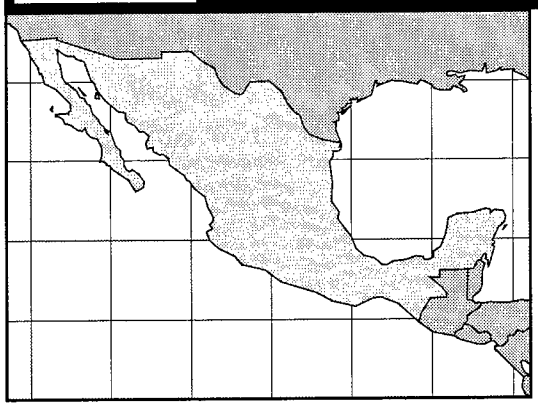
Transportation Sector Overview



Introduction

The transportation sector in Mexico has seen dramatic increases in demand since the early 1990s and the passage of the North American Free Trade Agreement (NAFTA). In order to handle the problems created by increased traffic, expansion and modernization needs, and the lack of public funds, privatization and concession programs for the port, railway, and airport sectors are being started or have already started in the last few years. The highway concession program has been restructured and is making a comeback, though at a slower pace than in previous stages.

There are ample opportunities for foreign and Mexican investment in the transportation sector, coupled with such a strong demand that, even during the recession in 1995, few areas within the transportation sector saw any major contraction.

THE MEXICAN PORT SECTOR

The passage of North American Free Trade Agreement (NAFTA) and the resulting rapid increase in trade volume is the principal catalyst for Mexico's program of restructuring and privatizing its port sector. Increased trade flow has put stress on Mexico's transportation infrastructure, highlighting the urgent necessity for the modernization and expansion of its ports. In fact, even during the severe 1995 recession, imports from the U.S. were still US$4.7 billion higher than they were before NAFTA. In addition, Mexico is also becoming an increasingly important entry point into the North and South American markets for global import/export firms and manufacturers. Due to Mexico's location, between Europe and Southeast Asia, it can offer access to both Atlantic and Pacific shipping. The numer-

ous free trade agreements signed by Mexico are augmenting its role as a springboard for the region.

Improving reliability and efficiency are two of the key challenges for the Mexican port sector. Moving cargo by truck can be up to ten times as expensive as shipping it. However, due to frequent delays and lack of reliability, for example, many manufacturers have ignored maritime transportation in favor of trucks. As reliability and efficiency rise and costs go down, Mexico's port sector will attract increasing amounts of cargo that are currently being shipped by truck.

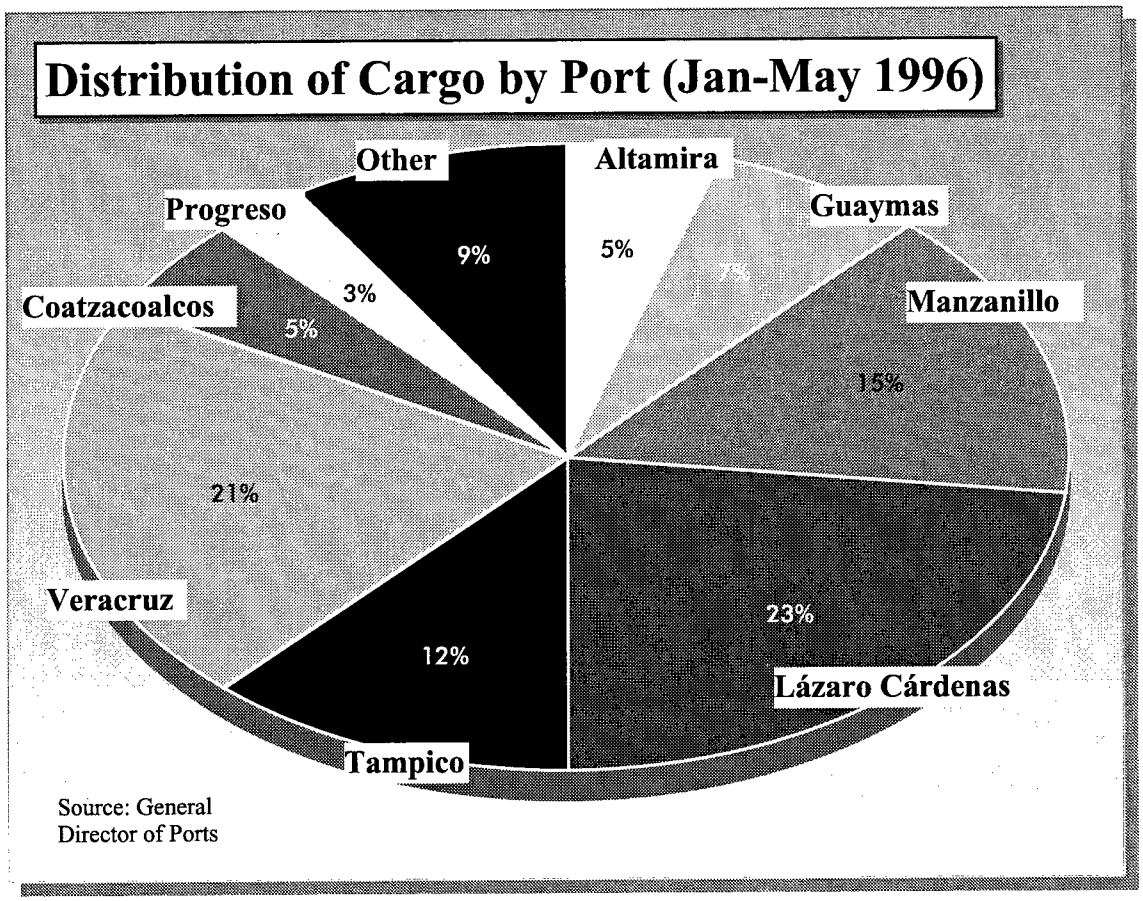
Mexico's port privatization program was initiated in 1993 to decentralize the administration of ports and to involve the private sector in operations. The objective is to increase operational efficiency, to strengthen Mexico's port infrastructure, and to create a multi-modal transportation network across Mexico integrating sea routes with land transportation, including rail.

In 1996, Mexico entered the second stage of the privatization of port operations with the privatization of the Port Authorities created by the new Port Law of July 1993. In addition it continued with the concessions of individual terminals.

Size and Market Drivers

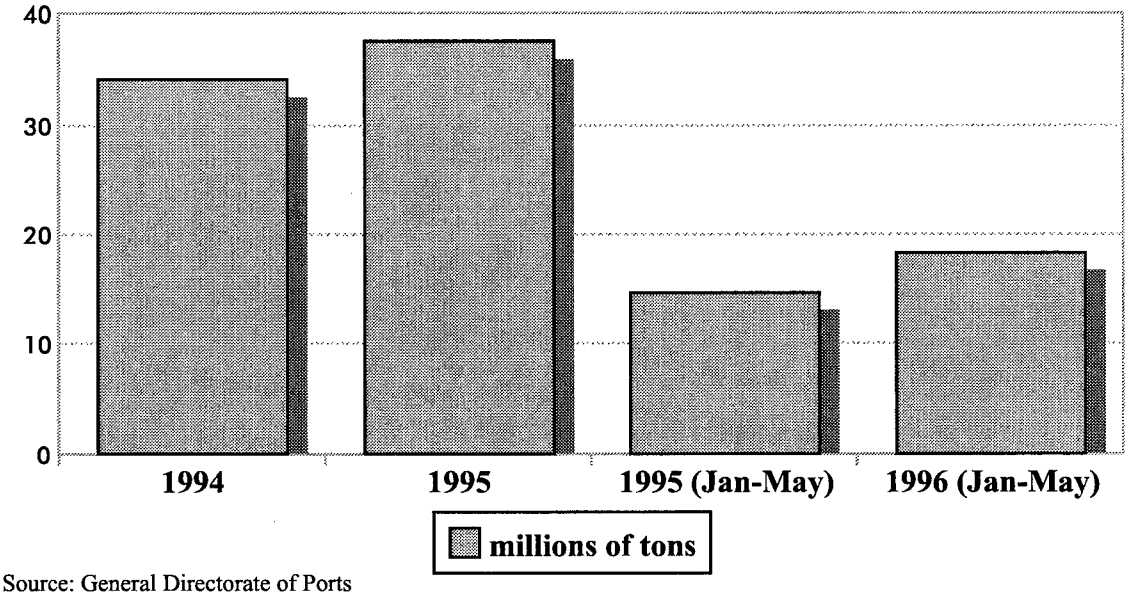
The port of Veracruz is Mexico's largest port, handling approximately 21 percent of the country's maritime cargo. The other three ports in the quartet that dominates Mexican maritime cargo handling are Manzanillo, Lázaro Cárdenas, and Altamira.

In the first five months of 1996, Veracruz, Lázaro Cárdenas, Manzanillo and Altamira accounted for approximately 64 percent of all maritime cargo moved in Mexico. The most important cargo ports during the same period were Lázaro Cárdenas, Veracruz, Manzanillo, and Tampico.



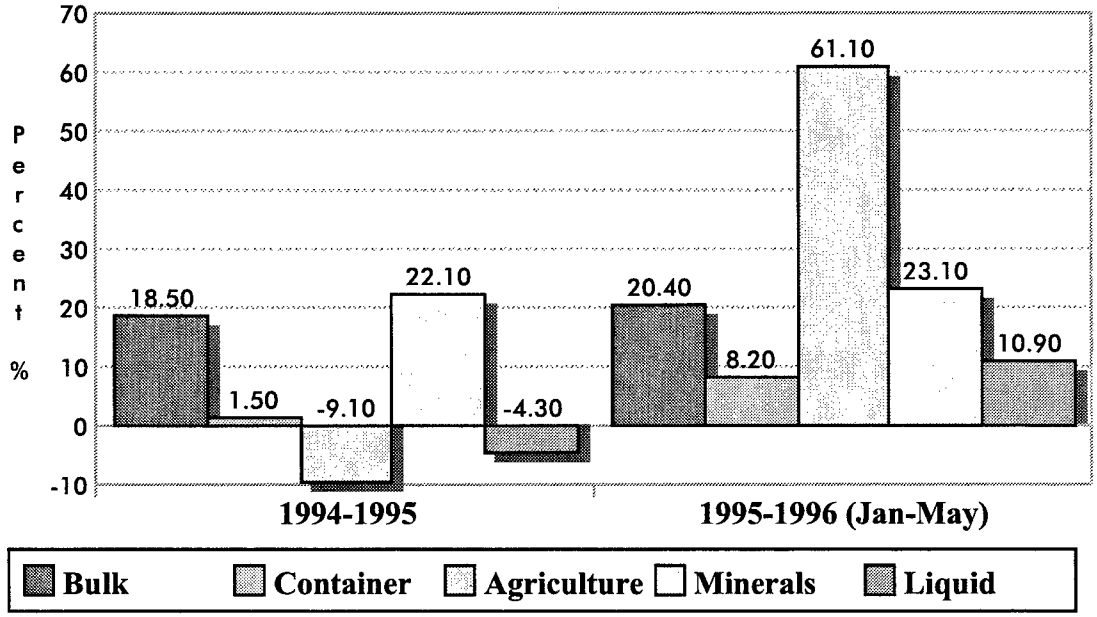
The recession which started in December 1994 had a significant impact on the amount of cargo moved through the ports. However, due to the resilience of U.S.-Mexican trade, it only slowed the growth in cargo handled. The 1994 to 1995 increase of 9.9 percent in cargo moved was limited to bulk and mineral cargo, while liquids and agricultural products fell. In 1996, minerals are expected to continue growing while agricultural goods are expected to grow explosively -- at over 60 percent in the period January to May --as compared with the same period in 1995. Overall cargo transported is expected to increase by 25 percent from 1995 to 1996. (Please see the following graphs.)

Cargo Handled by Mexican Ports



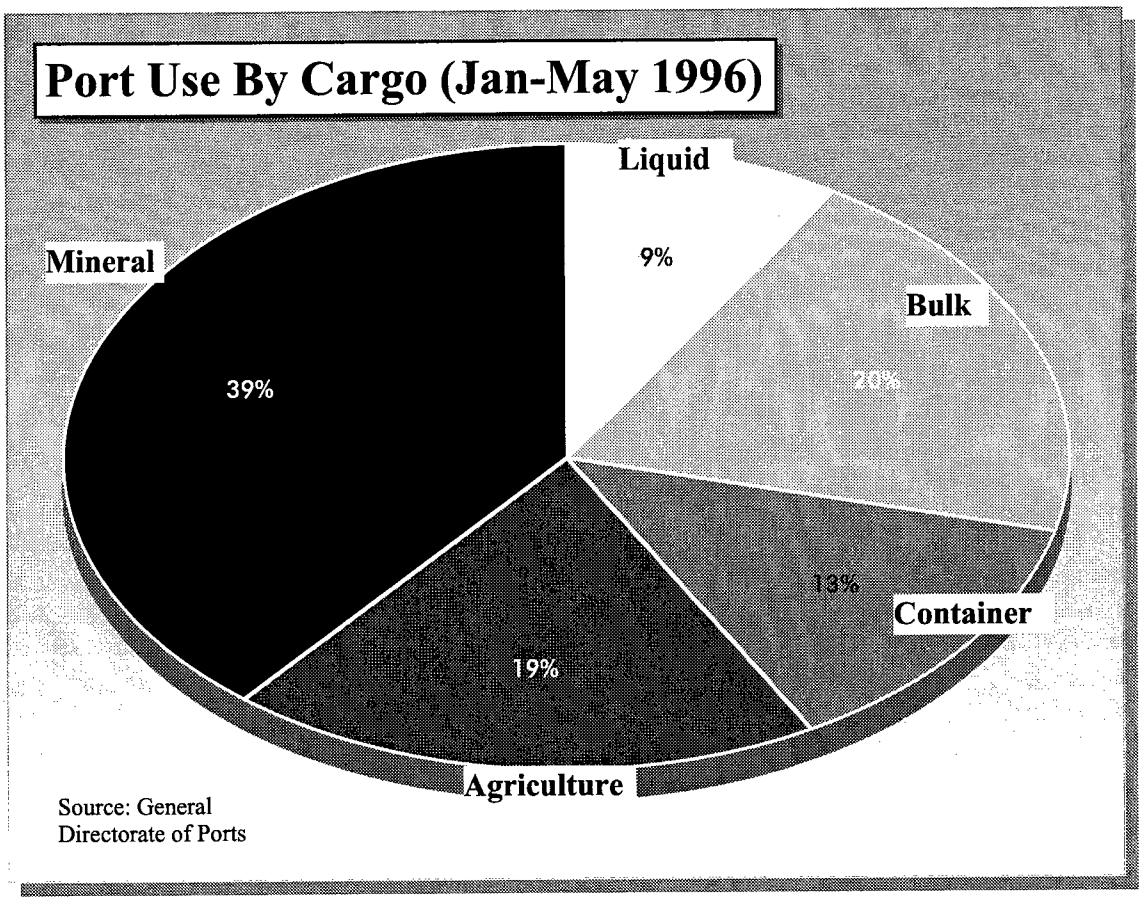
Source: General Directorate of Ports

Growth in Type of Cargo Handled by Mexican Ports



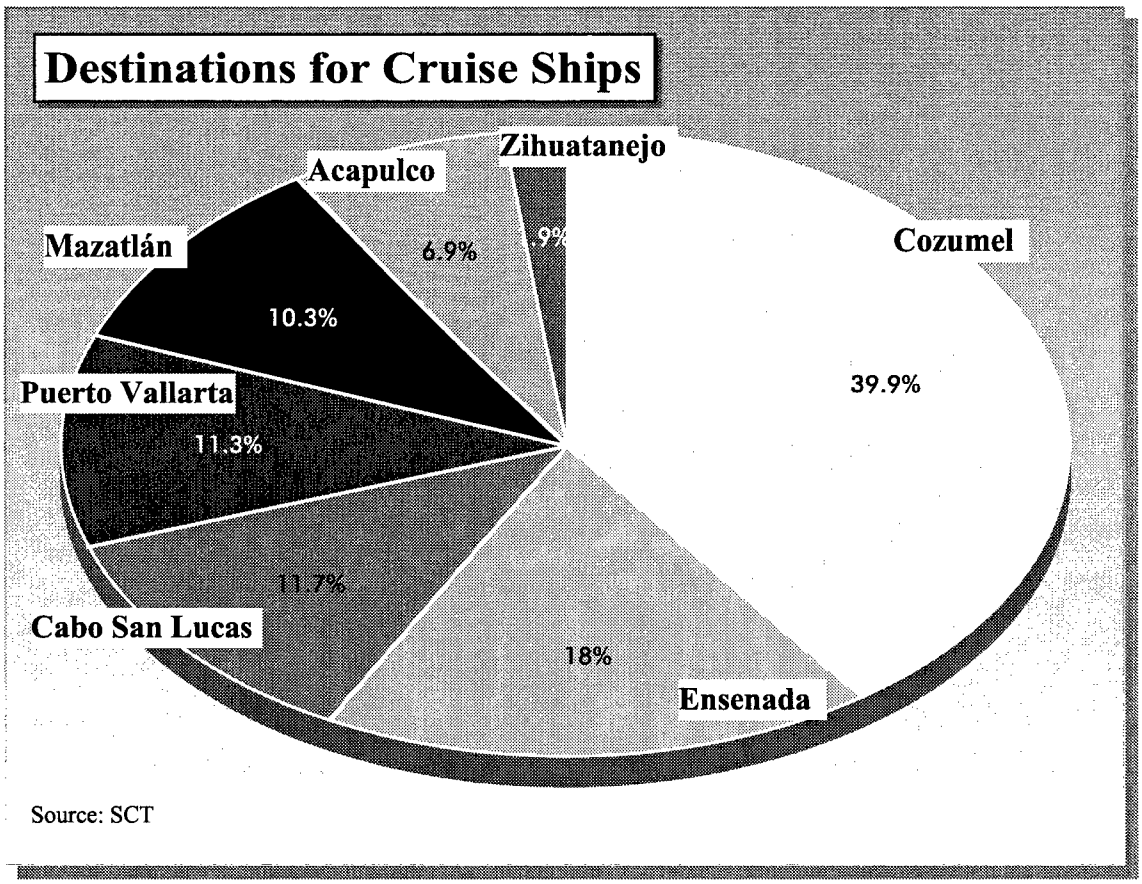
Source: General Directorate of Ports

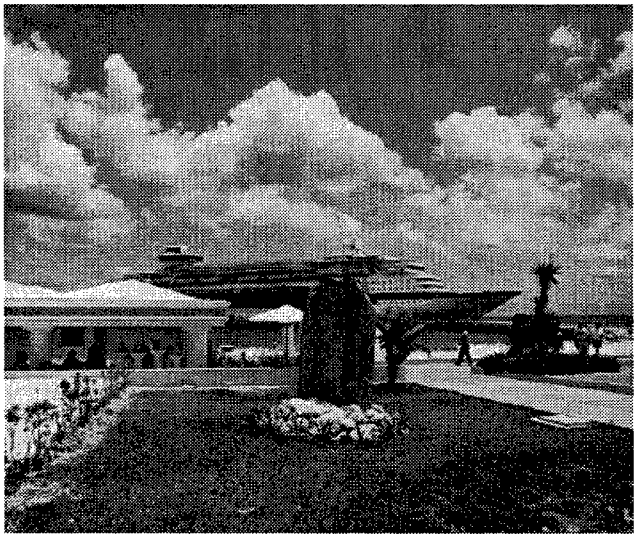
The majority of cargo shipped through Mexican ports is mineral shipments (39 percent), followed by bulk cargo and agricultural goods. Containerized cargo still has a lot of room for expansion as it is the second smallest category of cargo handled. Only 13 percent of cargo shipped through Mexican ports is containerized. (Please see chart below.)



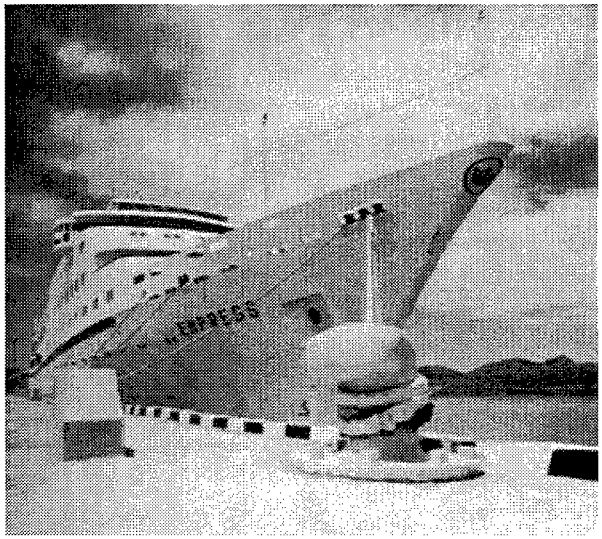
In addition to cargo, the tourism industry is very important for the Mexican port sector, as ports process many cruise ships and their passengers. The Secretariat of Communications and Transportation estimates that Mexican ports received 1.3 million cruise ship passengers in 1990. In 1995, that figure rose to 2 million.

The most important port in terms of cruise ships attended is Cozumel with 39.9 percent of the total. (Please see the following diagram.) The Port of Acapulco receives on average 120 cruise ships per year, or 6.9 percent of the total. Approximately 200 cruise ships call on Puerto Vallarta each year, representing 11.3 percent of the total.





Cruise Ship Visiting the Port of Cozumel



Cruise Ship Visiting the Port of Pichilingue

Legal Basis

The current Port Law (Ley de Puertos) was enacted by the Mexican Congress in July 1993, calling for widespread decentralization and privatization of Mexico's Pacific, Atlantic and Caribbean seaports. A key feature of this strategy was the creation of individual federal port authorities (Administraciones Portuarias Integrales, APIs.) Seventeen APIs were created by the Port Law. The APIs assumed responsibility for assets, administration, concessioning for expansion and operation of terminals and other port services.

On the Pacific Coast, the APIs include:

- Ensenada
- Guaymas
- Topolobampo
- Mazatlán
- Puerto Vallarta
- Lázaro Cárdenas
- Acapulco
- Salina Cruz

In the Gulf of Mexico, APIs were created for ports including the following:

- Altamira
- Tampico
- Tuxpan
- Veracruz
- Coatzacoalcos
- Progreso

A state port authority was also created for the Port of Quintana Roo.

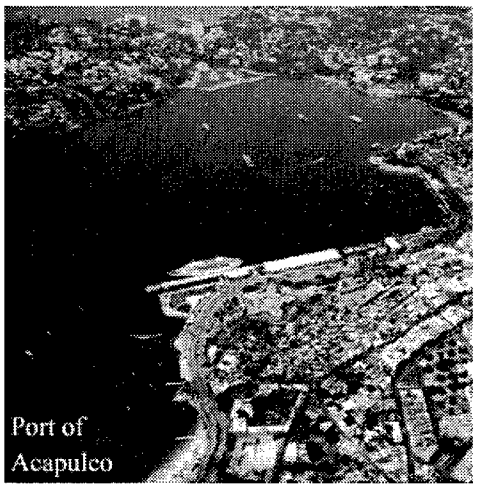
These independent port authorities became responsible for the use, operation, construction, administration, and maintenance of all port facilities. In effect, the APIs became the landlords of the port, with the task of increasing efficiency and performing port improvements. Creation of the APIs was the first step in preparing the framework for private sector entry into port and terminal administration.

In November 1994, the Port Law was amended, clarifying the role of the port authorities. According to the Law, the APIs are chartered corporations owned by the federal government. When they were first created in 1993, the APIs were the property of the federal government. A plan to privatize the APIs was put into action in 1996, although the private sector had already become involved in port development with some operations concessions that took place in 1995.

Privatization of the APIs consists of selling 100 percent of their shares to the highest bidder. The API is subsequently given a concession up to 50 years to operate the port, with the exception of the Acapulco API, which was given a concession of only 30 years. Each concession can be renewed for another 50 years.

The APIs are privatized, or concessioned, through international tender, but foreign companies are limited to a 49 percent equity stake of a bidding consortium. Concessions to operate terminals or other facilities and to provide port services can be wholly owned by foreign companies.

The APIs have the power to subcontract with third parties in the private sector for the operations of terminals and facilities including shipyards, silos, and tanks. They can also act as contractors for services including stevedoring and dredging. Concessions for terminals and other services have been let by state-owned APIs and the Mexican government since 1994.


Port of Acapulco

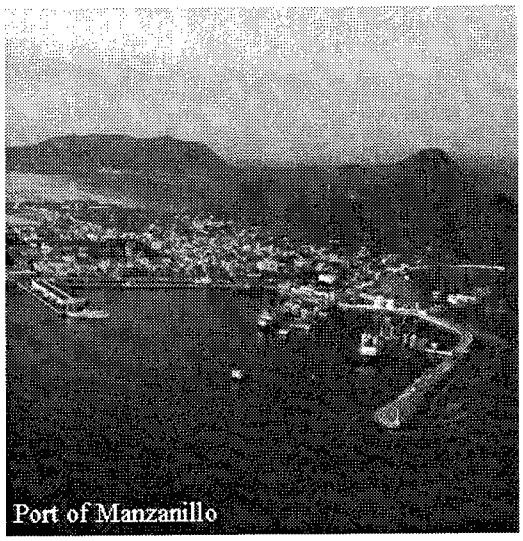
The new Port Law also included provisions designed to prevent regional or national monopolies from developing. The law prohibits any company from operating more than one port or terminal on the same coast, i.e. on either the Pacific or the Atlantic Coast. However, this does not apply if the terminals or ports operated are in different businesses, i.e. cargo and tourism/cruise ships. Consequently, Transportaciónes Marítimas Mexicanas (TMM) was awarded the API of Acapulco, principally a tourist port, while it had already won a concession for the container terminal in Manzanillo. On the other hand, it was forced to relinquish the API of Puerto Vallarta, where it was the only bidder, since it was prohibited from operating two tourist ports on the same coast.

Port Privatization Before 1996

In 1995, the Mexican government started to let concessions for the operation of port terminals in the largest ports, Veracruz, Manzanillo, Lázaro Cárdenas and Altamira. It let the two main container terminals in Mexico and six multi-use terminals. These terminals have been privately run too short a time to be able to evaluate any progress in efficiency. However, in 1993, specialized terminals such as grain terminals were privatized. The result has been that privately run grain elevators are turning bulk carriers around in three days instead of 20.

The container terminal of Veracruz, on the Atlantic coast, was let to ICA and the Philippine company International Container Terminal Services (ICTS). On the Pacific coast, TMM won the concession for the container terminal of the port of Manzanillo in partnership with the U.S. company, Stevedoring Services of America.

In Altamira, Tribasa and Remaconst won the concession for one multi-use terminal each. In Lázaro Cárdenas, Ipsat Mexicana and Siderúrgica LC Las Truchas won the concession for a multi-use terminal each.


Port of Manzanillo

In the first half of 1996, the privatization process continued and the port authorities of Acapulco and Puerto Vallarta were put out to bid. Acapulco attracted the most interest, with bids from ICA, TMM, and Tres Estrellas de Oro. Offering 60 million pesos (approximately US$8 million), TMM won the bid for Acapulco and, as noted, TMM was the only bidder for API Puerto Vallarta. As TMM is prohibited from operating a second tourist port on the same coast, the bid for the Puerto Vallarta API was rescheduled for a later date.

In the second half of 1996, the SCT will continue to privatize the APIs of some of the smaller ports, such as Tuxpan, Guaymas, Topolobampo, and Mazatlán, while the APIs for the four largest ports will wait until 1997. (Please see Infrastructure Project Profile TRA-04.) The Port of Ensenada is a special case since it is being packaged with the Tijuana-Tecate and Ensenada-Tecate railroads in order to promote multi-modal integration. (Please see Infrastructure Project Profile TRA-06.) Terminals in the Ports of Veracruz, Altamira, Lázaro Cárdenas and Tampico are scheduled to be concessioned in 1996.

Considerations for the Future

Despite careful planning and execution of the port privatization program, uncertainties remain concerning regulations and possible undue preferences exhibited by port authorities.

The Port Law of 1993 states that regulations for the operations of ports will be issued to coordinate different government entities with jurisdiction over the ports. More than ten government agencies have jurisdiction in such areas as health, migration, customs, environment and agriculture. However, regulations have not been issued and may cause confusion, delay and costs in the future.

There have also been misgivings about privatization of the APIs, because it makes a coordinated port strategy more difficult. It also puts a considerable burden on the regulatory body which will oversee a port sector run by some of the largest companies in Mexico. Regulatory overview is an area in which many countries encounter serious difficulties. In addition, there are also concerns that there will be conflicts of interests with anti-competitive results. For example, there is a distinct risk that shipping lines that own and run a port or a terminal will exert undue preference for their own ships.

Nevertheless, the outlook for the port sector is very positive and one of the main problems may be the ability of port operators to keep up with demand.

RAILROAD SECTOR OVERVIEW

In early 1995 the process to let concessions for the railway system was set in motion. The program began in July 1996 with the opening of bids for the Chihuahua-Pacific Line.

Ground Rules for Concessions

The Mexican railroad sector was opened to private investment by an amendment to Article 28 of the Mexican Constitution making the sector a priority for the nation. This amendment was passed in February 1995. Private sector involvement is regulated by the Law Regulating Railway Services passed in May 1995.

The highlights of the new law are the following:

- Time: Concessions can be granted for a maximum of 50 years and may be extended for an additional maximum of 50 years.

- Foreign Ownership: Foreign ownership of a concession cannot exceed 49 percent. However, if a foreign company would like to have greater ownership, special permission can be solicited from the National Commission for Foreign Investment (Comisión Nacional de Inversiones Extranjeras). Hence, foreign majority ownership is discouraged but is not impossible.

- Tariff Setting: The concessionaire is free to set its own tariffs. However, the SCT reserves the right to regulate the tariff if it finds that effective competition does not exist.

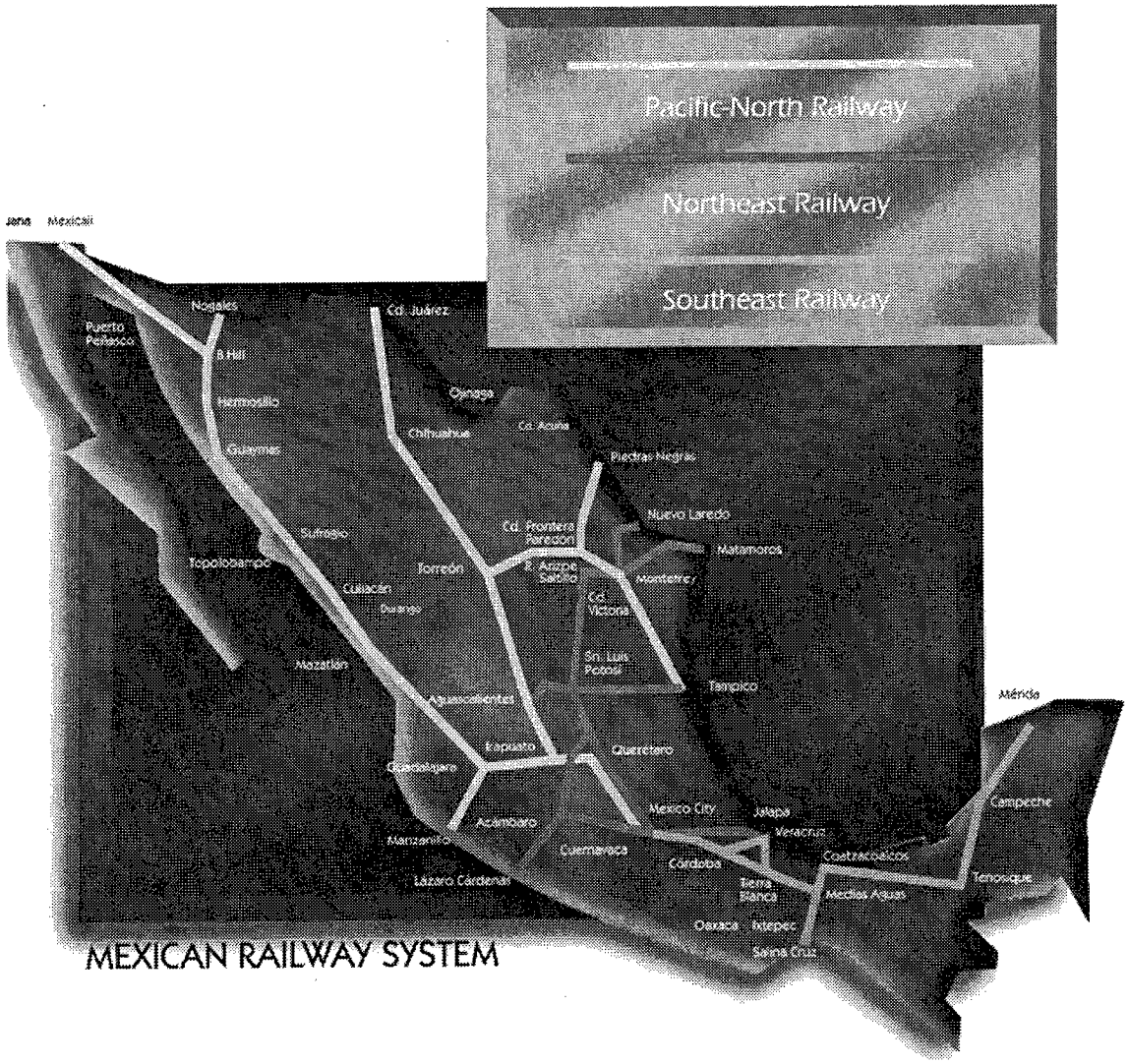
- Right of Way Usage: Authorization from the SCT is required for the installation of electric power lines, fiber optic cable or any other surface or aerial work within the right of way.

- Other Services: Rail service can be provided by the private sector through concessions. Other related services require permits.

- Direct Concessions: The SCT can grant direct concessions to states, municipalities and state-owned enterprises.

Railroad Concession Anatomy

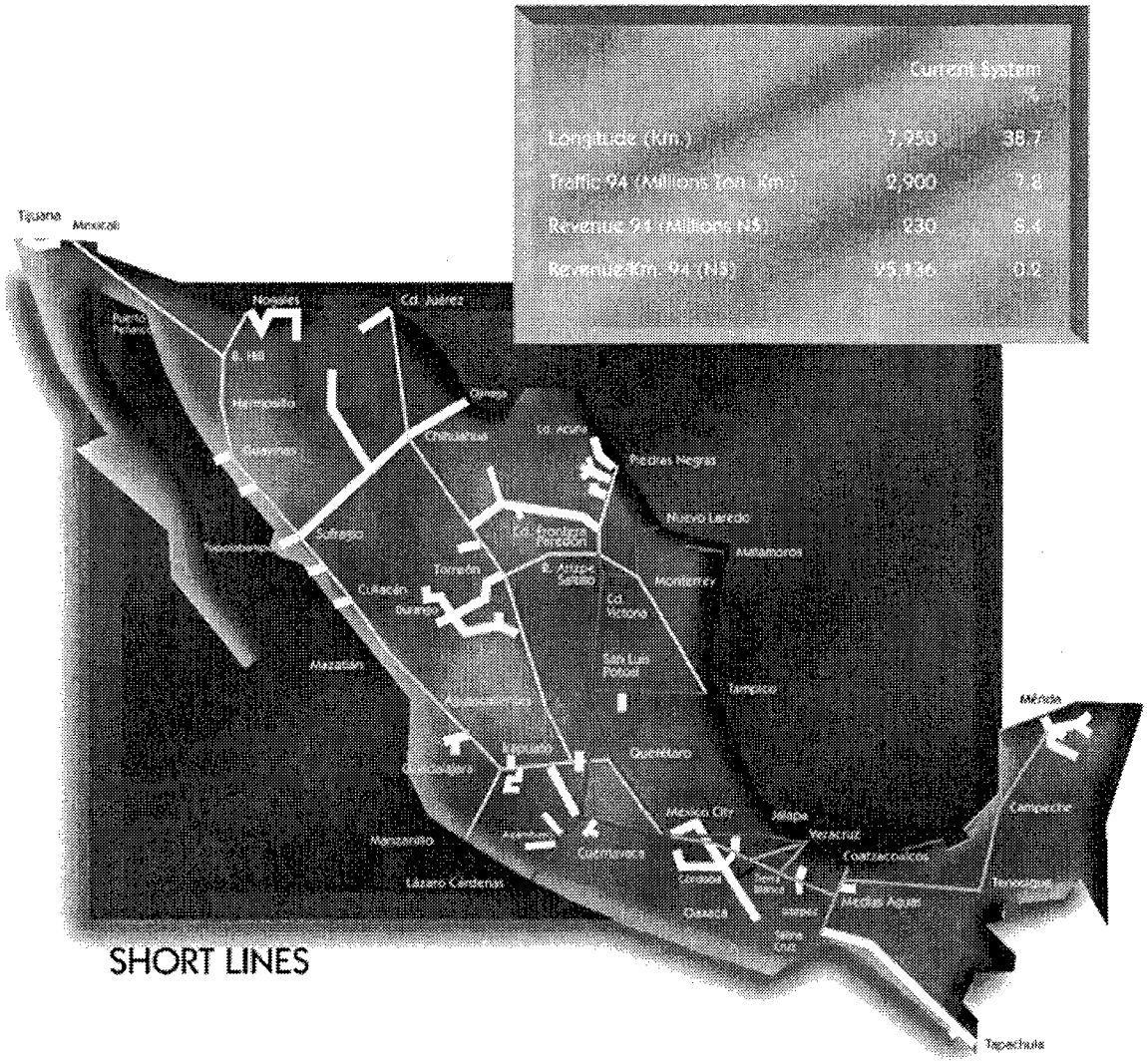
The objective of the railroad concession program is to modernize the Mexican railroad sector, making it a competitive, efficient, and reliable transportation alternative. This includes integration with the



country's ports and its trucking industry, making the railroad system a key component in a multimodal network servicing the entire country.

The Mexican government decided to follow the example of other countries further along in the privatization process. It divided the railway system into regional units. Each unit is vertically integrated and responsible for all aspects of railway transportation service. This approach allowed the creation of economically coherent business units able to focus on servicing a specific region and respond more quickly to macroeconomic or regional changes.

In addition to the track, all directly related equipment and facilities are included in the concession, such as rolling stock, locomotives, signaling and communications systems and cargo handling facilities.



The system was divided into three regional pieces, listed below in the order of size:

- Northeast Railway (Infrastructure Project Profile TRA-07)
- Pacific-North Railway (Infrastructure Project Profile TRA-08)
- Southeast Railway (Infrastructure Project Profile TRA-09)

All the short lines, approximately 7,950 kilometers of track, were placed in a fourth group to be concessioned individually. (The short lines are illustrated in white in the map above.)

The Chihuahua-Pacific Railroad is the longest of the Short Lines at 1,800 kilometers. The SCT decided

to start with this line, as it has an independent economic base, in order to test the concession process and gain more experience before letting the three large concessions listed above. Initially, the SCT planned to offer the cargo handling terminal in Mexico City as a separate concession. However, that decision was taken under review in June and July 1996. A decision as to whether divide it among the three regional lines or keep it an independent entity is expected in the last quarter of 1996.

The SCT does not yet have estimates of how much each concession will cost, as it does not want to prejudice the market. However, the concessionaire is expected to cover the cost of the equipment included in the concession as well as the value of the right to operate. The latter is somewhat more complex to estimate. However, Canac, a subsidiary of FNM, estimates that the total value of equipment, track and other facilities amounts to approximately US$1.4 billion.

Railroad: Current State

Although the Salinas government made significant investments in the railway system, the need for further investment is considerable. The entire system consists of 26,477 kilometers of track. The Mexican Investment Board reports that of the 40,000 kilometer-tons of cargo transported in 1993, half was handled by only ten percent of the system's track resources. A large part of the system is in need of repair and is consequently underutilized.

Rolling Stock for Passenger Service

Type of Equipment	Quantity
Passenger Railroad Cars in Operating Condition:	
Dorms	107
Bars and Restaurants	31
Special First Class	73
First Class	51
Second Class	180
Express	97
Postal Service	11
Other	2
Cars in Repair	259
Total	811

Source: FNM, 1994

Rolling Stock for Cargo Service

Type of Equipment	
Locomotives (Average Age:14 years)	1,426
Cargo Railroad Cars in Operating Condition:	
Box Cars	11,649
Gondola Cars	8,572
Hopper Cars	2,319
Platform Cars	1,717
Tank Cars	1,553
Cage Cars	278
Refrigerated Cars	110
Racks	2
Cars in Repair	5,510
Total	31,706

Source: FNM, 1994

Of the 26,477 kilometers of track, 77 percent are primary lines, making up the three main lines to be concessioned. The remaining 23 percent are private or short lines. In 1994, the system had at its disposal: 1,426 locomotives, 31,706 cargo rail cars and 811 passenger rail cars. It is notable that 17 percent of cargo cars and 32 percent of the passenger cars were under repair in 1994, which illustrates the need for further investment in the rail sector.

In mid-1996, Canac, a subsidiary of FNM, concluded an inventory and evaluation study of the railway system. In addition to confirming the inventory above, Canac produced figures on railroad ties, bridges, and tunnels. (Please see table below.)

Railroad Ties	Bridges	Tunnels
47,000,000	10,800	300

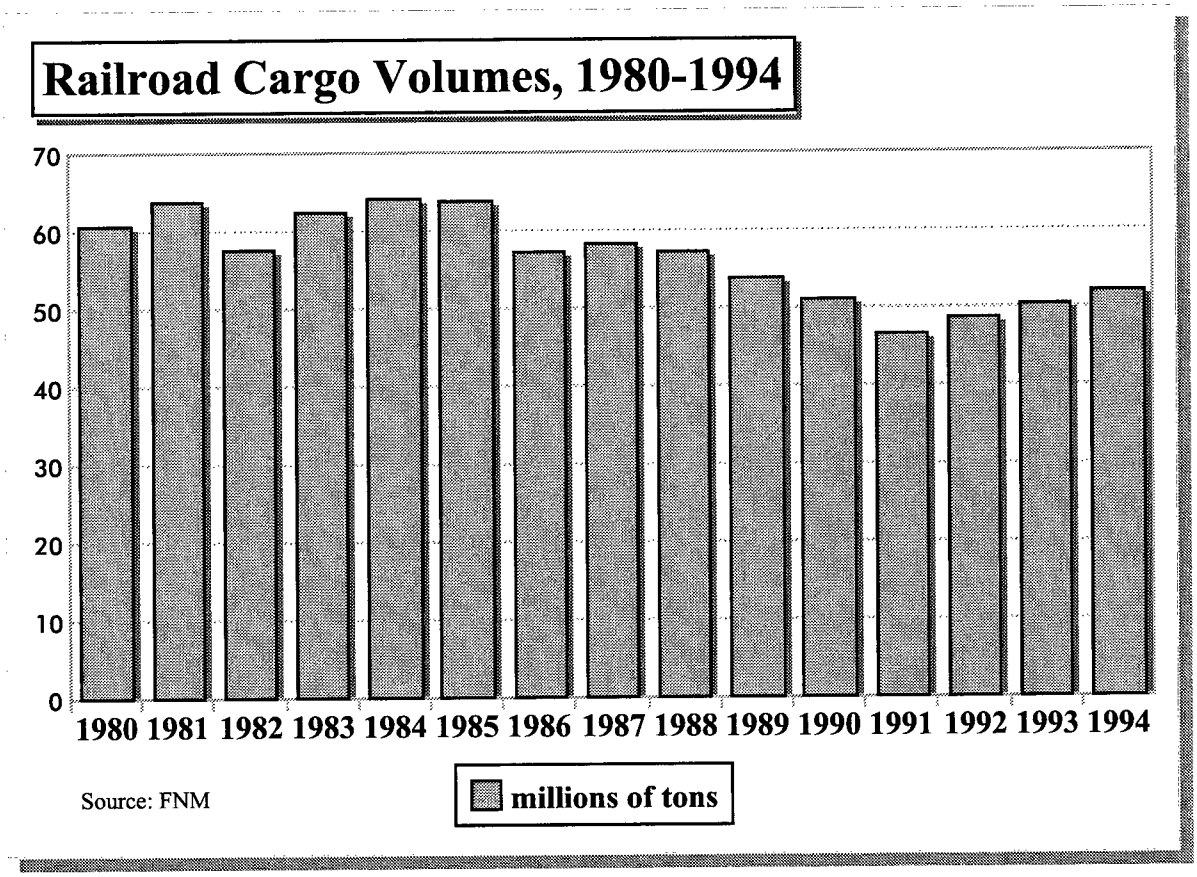
Source: FNM

Canac estimated that the total value of locomotives, rolling stock, machinery, track, and other facilities is approximately US$1.4 billion.

Cargo and Passenger Traffic

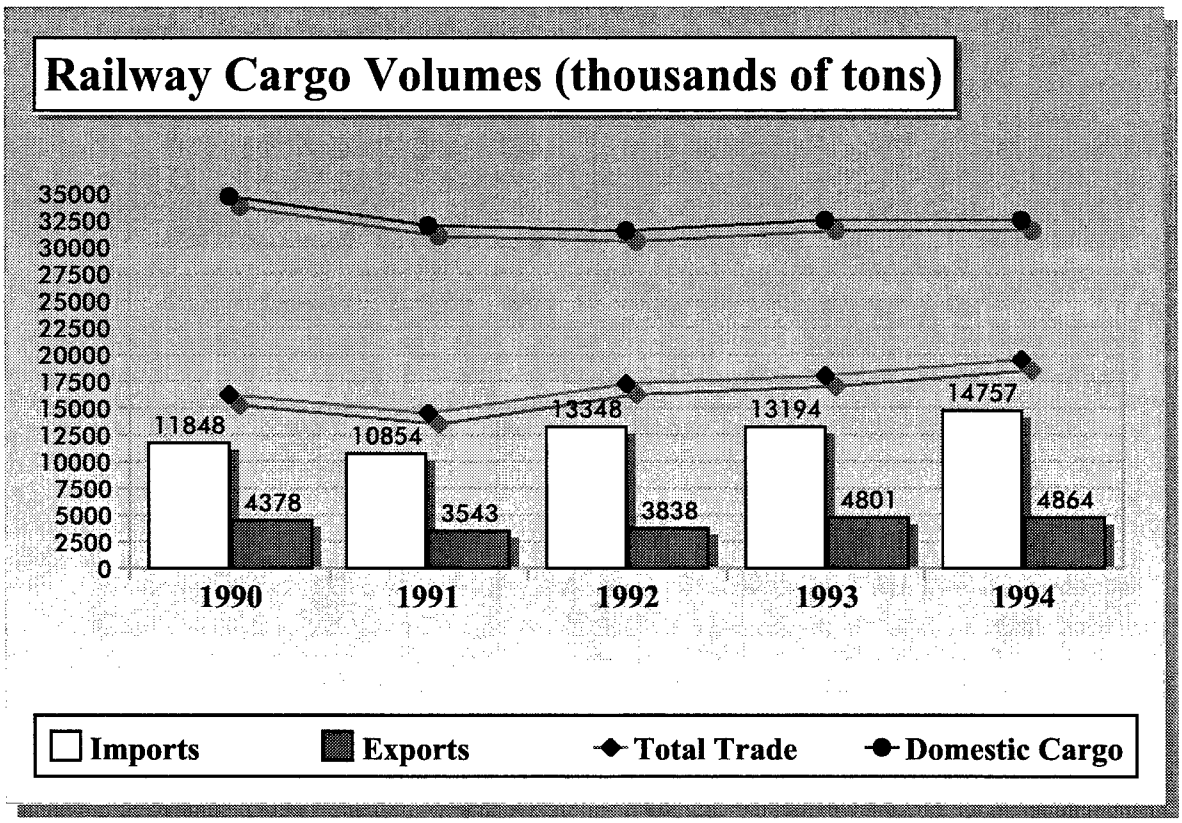
Under the modernization program of the Salinas Administration and the dramatically increased trade flows under NAFTA, the amount of cargo shipped since 1991 on Mexican railroads increased significantly.

In 1994, FNM handled shipments amounting to 52 million tons, generating revenues of approximately US$770 million. Due to the economic crisis, cargo shipped in 1995 was expected to increase only slightly to 52.7 million tons. Despite the increase since 1991, this is still approximately 12 million tons below the amount of cargo shipped at the peak of 1984. (Please see graph below.)

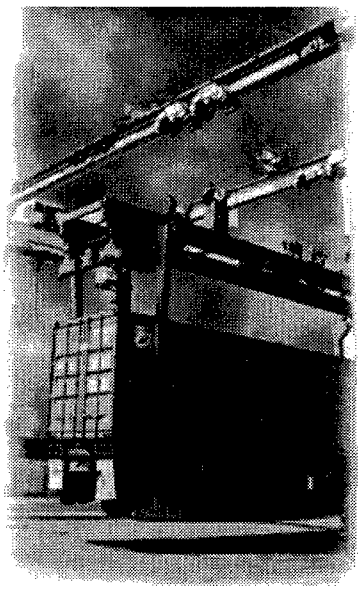


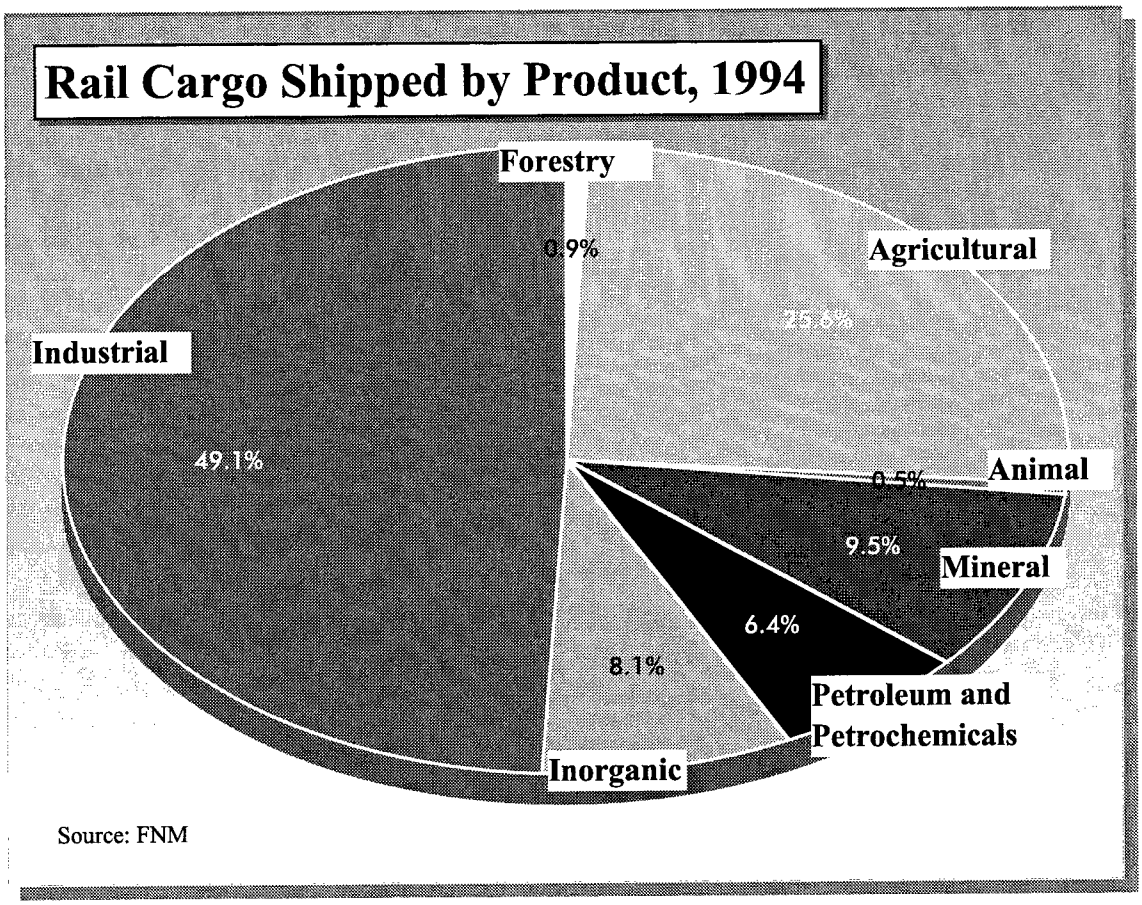
The importance of foreign trade in generating demand for railroad cargo services is demonstrated by the graph below. While domestic traffic remained largely stagnant, cargo resulting from international

trade increased by 21 percent from 1990 to 1994. A dip is expected in 1995, while the growth in rail cargo is expected to continue in 1996.

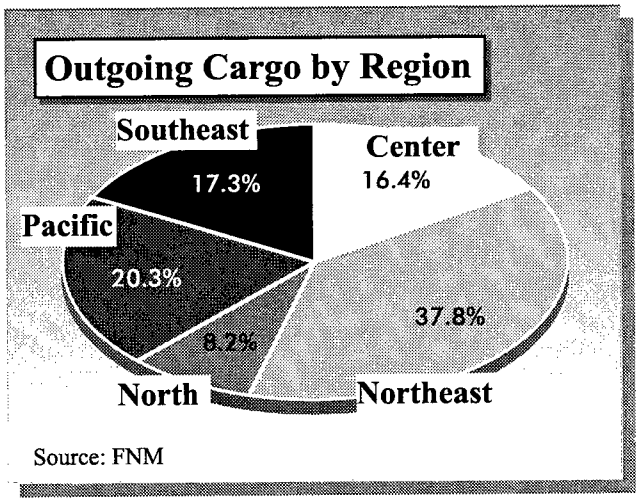


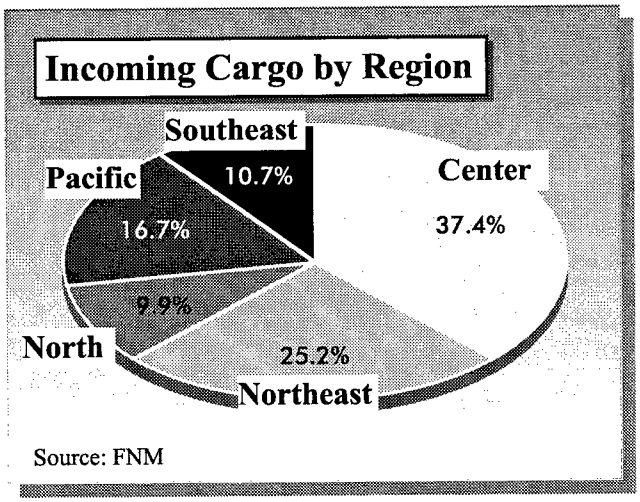
In 1994, the industrial and agricultural sectors accounted for more than 75 percent of all cargo moved. (Please see the graph on the next page.) In the industrial sector, the automotive industry plays an important role in cargo traffic. In the first eight months of 1995, the FNM handled 49,000 containers of automotive parts, a 33 percent increase over the same period in 1994. The number of automobiles it handled also increased by 19 percent in the same period.





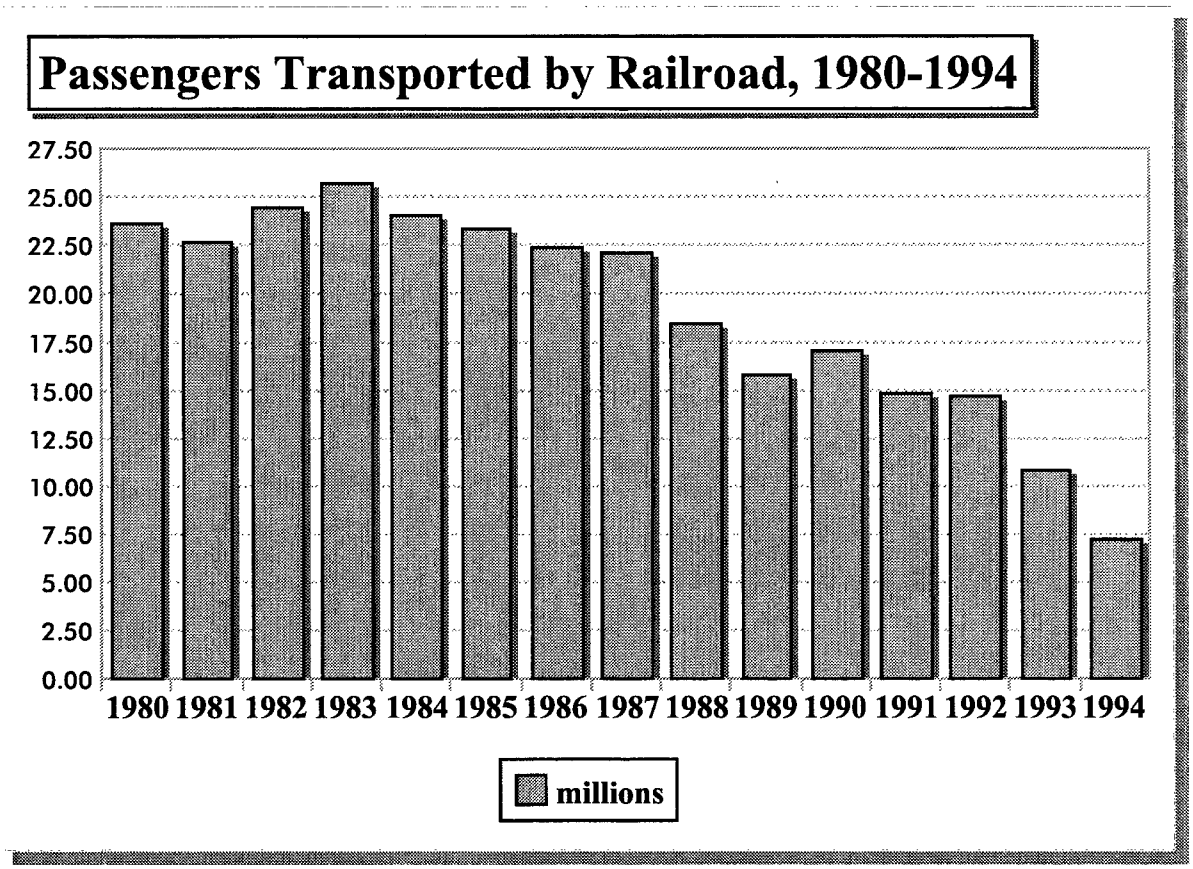
While in 1994, 37.7 percent of all cargo was shipped out of the Northeast, it received only 25.2 percent. In the case of the central region of the country, the situation is the opposite. In 1994, it received 37.5 percent of all cargo while it shipped out only16.4 percent. (Please see the graphs below.)





Underinvestment in Mexico's railroad has imposed serious limitations on growth. For example, there is a dearth of refrigerated rail cars, forcing many agricultural producers to turn to the more expensive alternative of truck transportation. The multi-modal capabilities of the railroad are also deficient, reducing the railroad's competitiveness as a complement to maritime transportation.

When the restructuring and investment program was undertaken during the Salinas Administration, it focused on cargo rail. Consequently, passenger rail traffic has continued to decline, as illustrated in the graph below. For example, the Chihuahua-Pacific Line transported up to 800,000 passengers per year in the 1980s. Today it transports approximately 300,000 passengers per year.



Required Investment

In the years 1992-1994, private investment in the railroads increased dramatically through the Salinas government's outsourcing of certain services to the private sector. A total of 1.1 billion pesos (approximately US$300 million) was invested during that time. This investment was directed towards track maintenance, modernizations, and signaling systems maintenance, among other priorities. These improvements, combined with a growing realization that investment on a larger scale was needed, prompted the Mexican government to initiate the railroad concessions program.

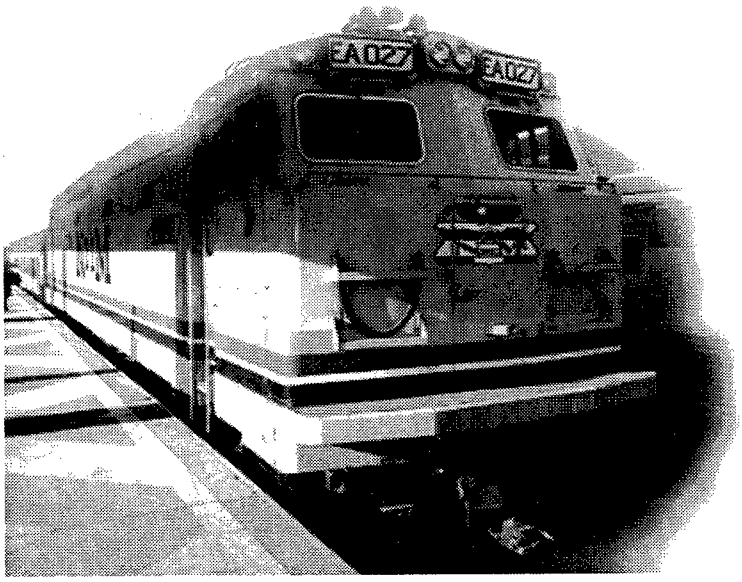
The level of investment needed to make the current railroad system profitable and competitive is considerable. FNM has estimated that to reactivate the system, investments worth approximately US$2 billion are required. The one needing the most resources, according to FNM, is the Southeast Line, which requires US$800 million in track renewal, signaling and communications systems, as well as rolling stock and maintenance facilities. The Pacific-North Line is estimated to require US$500 million, whereas the Northeastern Line is estimated to require only US$200 million.

In order to improve the Mexico City cargo terminal, the FNM estimates that investments worth US$350 million are necessary and the more than 7,000 kilometers of Short Lines will require an additional US$350 million.

Final Considerations

In order to allay concerns about possible monopolistic practices and the loss of socially beneficial service, the Government of Mexico has promised to provide subsidies in some cases, in addition to enforcing new laws and regulations.

Considering that almost 90 percent of Mexican cargo in 1994 was transported by truck, and that trade has maintained positive growth despite the recent recession, the railway sector offers significant opportunities for expansion, particularly cargo shipping. Although less profitable, there is also ample room for expansion of passenger traffic to rebound back to mid-1980s levels and relieve highway congestion.



AIRPORT SECTOR

The Government of Mexico decided to privatize the country's airports in January 1995, in response to increasing demands on airport infrastructure and scarce public resources. The new Airport Law was passed in December 1995. Despite some delays, it is expected that the regulations stemming from the new law will come out in the last quarter of 1996 followed by the first bid of a medium-sized airport in December 1996. Although the concession program is still under definition by the SCT, the ground rules were laid down by the new Airport Law.

The movement to a full-blown concession program came after a successful effort to forge public-private partnerships. Under coinvestment programs, private investment was channeled into the airport sector, but it was not sufficient to meet the increasing demands for extensive modernizations and expansions.

In order to move forward with the concession program, the SCT is expecting to resolve a number of issues by the end of 1996. The largest events will be the construction of a second airport for Mexico City, for which a site still has to be selected. Moreover, the SCT announced a US$22 million remodeling program in August 1996 to prepare the country's airports for privatization.

There are numerous opportunities for both Mexican and U.S. firms in the airport sector. An estimated US$2.5 billion will have to be invested to develop the airport system to meet current and predicted demand and international standards. In addition, once a concession is awarded there will be considerable demand for secondary services and equipment.

Past Performance

Mexico has 61 airports: 42 for international and 16 for domestic flights. Three airports serve only as maintenance and fuel stations. The largest airport in Mexico is the Benito Juarez International Airport in Mexico City (AICM). In 1994, the Mexican airport system handled 483,888 landings and take-offs and processed 50 million passengers.

The traffic flow experienced by Mexico's airport sector has been closely associated with fluctuations in the economic cycle. The sector experienced considerable growth from the mid-1960s until the early 1980s; passenger traffic increased five times between 1970 and 1981 while cargo increased threefold in the same period. The debt-crisis which began in 1981 and the resulting economic downturn led to stagnation in passenger traffic between 1981 and 1989, while cargo traffic showed negative growth.

The economic boom following reforms and the passage of NAFTA led to dramatic increases between 1989 and 1994: passenger traffic increased by 51 percent, reaching 50 million. Cargo traffic increased by 47 percent in the same period. The economic crisis of December 1994 caused a setback, but the sector is now showing signs of recovery along with the rest of the economy.

As in many other areas, Mexico City is severely overloaded, as its airport handles approximately 65 percent of the country's airport activities. The demands are expected to increase by 5-10 percent per year, leading to a complete saturation of the Mexico City airport by the year 2003 despite efforts to reduce pressure on the airport. In 1991, the Airports and Auxiliary Services (ASA) introduced measures to reduce congestion at AICM and prolong its functional life. ASA established the Metropolitan Airport System which relocated civil aviation and air freight services to airports in Cuernavaca, Puebla, and Toluca. In fact, the services taken over by Toluca were so considerable that the airport moved from being virtually abandoned to be upgraded to an international airport. This measure reduced demand on AICM by approximately 30 percent. Nevertheless, the Mexico City airport is expected to reach full capacity by the year 2003.

Coinvestment Program

Although Mexico's last airport development plan ended in 1982, ASA has not been passive in the face of the dramatic increase in airport traffic since 1989. In the 1989-1994 National Development Plan, ASA was authorized to promote private investment in airports and auxiliary services, but only through a public-private partnership called "coinvestment," not through concessions.

Under the coinvestment program, ASA leases a piece of land to a private sector company for the purpose of constructing a specific building or facility. The private company also gains the right to commercialize the facility it built. The land and the building revert to ASA after the lease ends.

Initially, many private sector companies were concerned that agreements would not be kept beyond a single presidential term. These doubts were overcome and the coinvestment program channeled US$350 million into 14 different Mexican airports, which generated additional private investment worth US$650 million. Examples of coinvestment projects include the following:

- Tijuana Airport
  - Parking Garage
  - Maintenance Hangar
- San José del Cabo
  - Terminal Expansion
- Chihuahua and Culiacán
  - Two New Terminals (handling 150,000 and 100,000 passengers respectively)
- Puerto Vallarta
  - Terminal Expansion and Remodeling

- Mérida
  - Modern Cargo Handling Facility
  - Hangar and Ramp Area

- Cancún
  - Installation of Telescopic Ramps
  - New Terminal
  - New Hangar

- Mexico City
  - Rehabilitation of 11 Mobile Lounges

- Toluca
  - New General Aviation Facilities
  - Expected Cargo Handling Facility

In the face of continuing demand, the Government of Mexico moved from the coinvestment program to a full-fledged concession program. However, existing coinvestment agreements remain in force.

Airport Concession Program

The structure of the airport concession program is expected to be determined by the end of 1996. Using funds from the World Bank, the Secretariat of Communications and Transportation has hired an international consulting firm to assist in defining an airport concession timetable and the structure of the individual concessions. This study will serve as the basis for regulations governing the execution of the new Airport Law. Nevertheless, the Airport Law of 1995 made airport concessions possible and laid down some of the ground rules which determine the outlines of the concession program.

The objective of the new Airport Law of December 1995 is to modernize, upgrade and expand Mexico's airport system. It made the SCT Mexico's central airport authority with responsibility to plan the system, establish basic security standards, and interpret and enforce the law. It also made the SCT into the entity authorized to grant concessions for the construction, operations and development of airports in Mexico. Nevertheless, the Government of Mexico, through SENEAM (see Infrastructure Profile TRA-01), will continue to be responsible for and provide air traffic control services (ATC), navigation aides, telecommunications and other aeronautical services (Article 9).

The concessions granted by the SCT are expected to be of the build operate transfer (BOT) type for a maximum of 50 years, renewable for an additional 50 years (Article 15). Nevertheless, since the structure of the concession program is yet to be determined, the actual concession period may be less than the maximum, as has been the case with railroad concessions.

There are three types of concessions. Operational concessions make the concessionaire the landlord

responsible for operating runways, taxiways, aprons, terminals, and security. Auxiliary concessions manage services such as aircraft servicing and maintenance. Non-airport business services concessions manage restaurants and parking lots. The operational concessionaire can perform all three services or let the auxiliary and non-airport business services to other private entities.

In special cases, the SCT can grant concessions without public tender. These cases are limited to the creation of a complementary airport or the upgrading of a small airport to full airport status.

Foreign investors are limited to 49 percent ownership of a company or consortium that is the concessionaire or permit holder which operates public airports. However, an exception to this rule may be granted by the Foreign Investment Commission allowing wholly or majority owned consortia to bid on and operate airport concessions (Article 19).

The concessionaire must also present an investment program for the airport that is open to international bidders. Article 38 states:

> The concessionaire must develop a master development program, revised every five years, that is authorized by the SCT and contains input from the Secretariat of Defense. The program must be based on the established policies of the national airport system and its relation to other modes of transport. This program will be an integral part of the concession. (Unofficial translation by the U.S. & Foreign Commercial Service, Mexico City.)

Although this is yet to be determined, we expect that all of Mexico's 58 airports, (excluding the three maintenance and fuel supply airports) will be privatized. Mexico City is expected to be let as one concession which will include the second airport of Mexico City. There will be a block of the seven next largest airports which will be concessioned individually, possibly paired with loss-producing smaller airports. The remaining 50 airports make up the third group of airports to be privatized and may be let in groups.

Timing of Concession Program

Studies to determine the structure of the concession program were contracted in July 1996. Initial guidelines are expected to be released by September while full-fledged regulations are not expected until the end of 1996. The first concession, for which bids are slated to open at the very end of 1996, will most likely be a mid-sized airport in order to test both the process and the market.

Opportunities and Future Issues

Opportunities in the sector are numerous and include not only the actual concession program but also the secondary services and equipment needs which will be bid by individual concessionaires. The Government of Mexico also initiated a US$22 million remodeling program in August 1996, preparing

for the full concession program.

Until the studies are finished and the concession program is drafted, the SCT and ASA are very reluctant to release any information so as not to prejudice the market once the concessions are released. However, industry sources estimate that the sector as a whole will require approximately US$1.5 billion in investment. Approximately US$850 million is expected to be required for the following airports:

- Mexico City (AICM) US$350 million
- Cancún US$100 million
- Tijuana US$100 million
- San José del Cabo US$50 million
- Zihuatanejo US$50 million
- Bajío US$50 million
- Hermosillo US$50 million
- Cozumel US$50 million
- Culiacán US$50 million

The hottest issue in the Mexican airport sector is where the new second airport in Mexico City will be located. After considering a number of sites, the choice in mid-1996 was narrowed down to Texcoco-Caracol in the State of Mexico and Tizayuca in the State of Hidalgo.

Texcoco is backed by the Mexican construction giant Grupo ICA and has a number of advantages. It is relatively close to Mexico City and promises easy access to both the capital and the old airport. On the other hand, it would absorb large tracts of an ecological reserve. This has brought Mexican environmental groups out in force against the Texcoco alternative.

The Tizayuca alternative offers more space, enough to satisfy expected market demand. There are limited environmental concerns. The project has been publicly backed by Koll International and Lockheed Air and tacitly supported by numerous others. An airport in Tizayuca also holds the promise of becoming a multimodal cargo terminal as it is connected to the port of Tuxpan via highway. A short railway line runs by the site, although it is in need of restoration. The disadvantage of the Tizayuca alternative is that it is located approximately 30 miles from both the center of Mexico City and the existing airport (AICM). The developers are proposing to deal with this problem through a light rail link between the two airports and to Mexico City.

Hidalgo state officials estimate that it would cost a total of US$3 billion to fully develop an airport with four independent runways, the largest able to accommodate fully loaded B-747 aircraft.

The Government of Mexico is expected to make a decision on where to locate the new airport by the end of 1996. However, industry observers are leaning in favor of the Tizayuca location.

In preparation for the concession program the Mexican airport authority, ASA, announced a US$22 million remodeling and rehabilitation program of 12 airports in August 1996. The largest beneficiary

of this program will be the airport in Cancún where national arrival and documentation areas will be modernized and expanded. Water storage tanks with a capacity of 1 million liters and pumping systems will also be installed. This remodeling program demonstrates the government's dedication to promoting the airport concessions program.

The airports of Mérida, Puerto Vallarta, Loreto in Baja California, Uruapan in western Mexico and Ciudad Obregón will all implement runway rehabilitation programs. The airports of Aguascalientes, Mexicali, and Mérida will also remodel their terminal buildings. A new terminal will be constructed in Chetumal. The airport in Mexico City (AICM) will get a new taxiway, built parallel to one of the principal runways, as well as runway drainage pumping systems and interior roadways for internal traffic. Construction for these projects is scheduled to begin on September 30, 1996.

In addition to the opportunities offered by the concession program itself, it is important to bear in mind the second wave of demand for airport related equipment and services which will come once airports have been concessioned. Concessionaires will have to purchase computer systems, baggage handling systems, runway rehabilitation systems, lighting equipment, pumps, tanks, transport conveyor belts etc.

There are additional opportunities in the non-airport services sector. Hotels, restaurants and shops will be developed. In addition, there are various airport services which may require U.S. technology and equipment.

HIGHWAY SECTOR

The Salinas Administration let concessions for what it termed the largest private toll road program in the world. However, the structure of these concessions contained several problems that led to over-sized highways charging very high toll rates, causing long-term financing problems.

The SCT has undertaken an effort to restructure the highway concession program, including changing the selection criteria. Moreover, the system of control over public roads has been simplified.

Mexico has a road network 302,614 kilometers long. The Secretariat of Communication and Transportation is responsible for 117,000 kilometers, administered through local centers of the SCT. The road network is divided according to the table below:

National Network of Roads

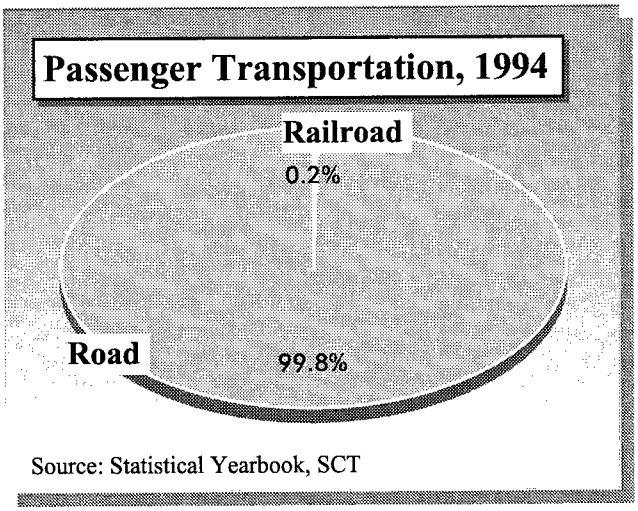
Type of Network	Paved (km)	Unpaved (km)	Total (km)
Federal	42,613	74,279	116,892
Federal Roads Operated by CAPUFE	1,360	--	1,360
Concessioned	4,893	--	4,893
State	44,459	38,730	83,189
Rural Roads Operated by Other Agencies	555	95,725	96,280
Total	93,880	208,734	302,614

Source: SCT

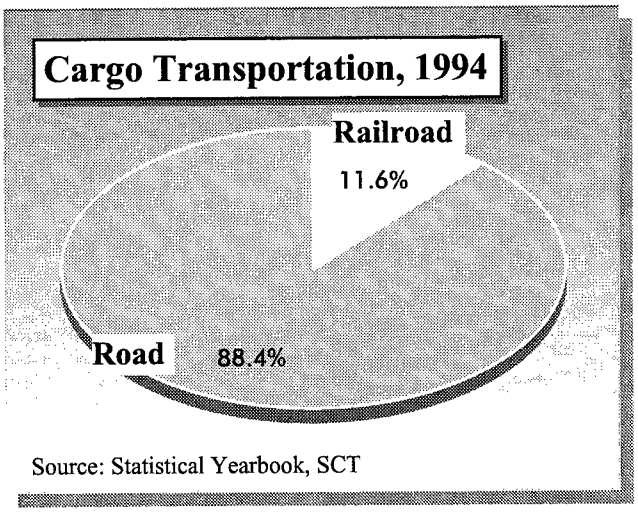
The highway network requires substantial improvement. Fifty-three percent of all highways in the federal network have been in service more than 30 years; only 15 percent are less than 15 years old.

The Pressure to Modernize

Mexican highways handle the majority of surface transportation for both cargo and passengers. Only a fraction of passenger traffic is handled by Mexico's railways and almost 90 percent of cargo is shipped via highways. (Please see the graph on the following page.)



Source: Statistical Yearbook, SCT



Source: Statistical Yearbook, SCT

The dominance of the highway sector grew in the last 20 years, largely at the expense of the railway sector.

However, Mexico's road network struggles under the current traffic volumes, and will encounter difficulties facing projected increases. Heavy traffic, deteriorating paving, and congestion are all problems on Mexican highways. The increase in traffic over the last 20 years has led to a situation in which 25 percent of the network handles over 5,000 vehicles per day, a considerable strain on existing highways. (Please see the table below.)

Vehicles on the Federal Highway System

Average Daily Traffic (vehicles)	Kilometers of Federal Highway at this capacity	% of Federal Highway
fewer than 1,000	9,121	21.40%
1000-2000	8,693	20.40%
2000-3000	6,562	15.40%
4000-5000	3,068	11.00%
more than 5000	10,483	7.20%
Total	42,613	24.60%

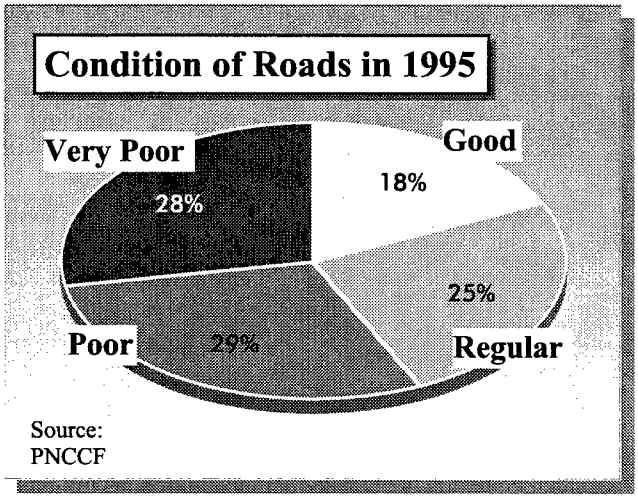
Source: SCT

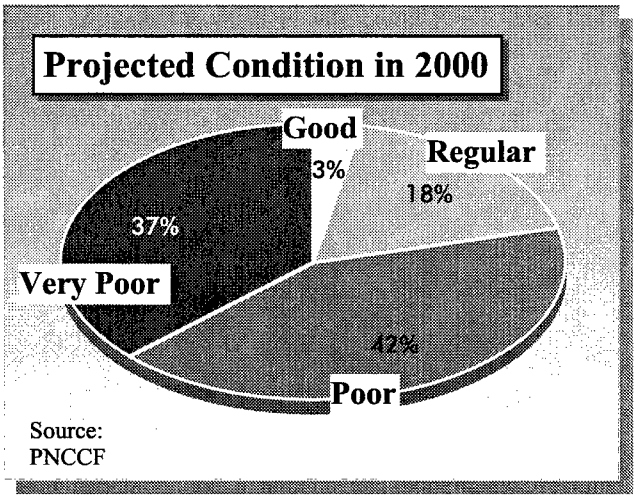
Moreover, while the maximum weight allowed in the 1960s was 10 tons, today it is 66.5 tons. However, as noted, most of the network is over 30 years old.

As a consequence of neglect and increased traffic, 90 percent of the federal network is unable to handle the heaviest and longest trucks, connections between highways and smaller roads and cities are very inefficient, and over 25 percent of the network suffers from congestion as its capacity levels have

already been reached.

The SCT is attaching increasing urgency to halting the deterioration of the highways. It has calculated a worst case scenario that if nothing is done in terms of maintenance and modernization between 1995-2000, only three percent of the highway network will be in good condition by the year 2000. (Please see charts below.)





The deterioration of the highway network has already had a direct negative impact on transportation costs. The Mexican Institute of Transportation calculates that approximately 20 percent of the cost of highway transportation can be attributed to the poor condition of the highway network. This is equivalent to approximately 0.5 percent of the country's GDP.

Spurred by the SCT's pessimistic projections, the Zedillo government is planning to emphasize reconstruction and maintenance. Consequently, the government has announced that in 1996, in addition to new construction, it will finance the extension and modernization of 298 kilometers in 22 states, reconstruct 1,500 kilometers of highway and 138 bridges, perform maintenance work on 3,700 additional kilometers and continue its upkeep of the rest of the system.

1988-1994 Concession Program

Mexico's highway concession program took off under the Salinas Administration. From 1988 to 1995, the SCT reports that 53 highways were concessioned for a total of 4,900 kilometers. By the end of November 1995, 4,222 kilometers were in operation under concessions ranging from 7.5 to 30 years in length.

During Salinas's term 1988-1994, state-owned entities received concessions for 400 kilometers, the states received concessions for 1,300 kilometers, and 3,500 kilometers were let to the private sector. In

the Salinas Administration program, the government frequently took up to 30 percent equity and provided geological surveys and information on expected traffic usage. However, there were some problems with the program that undermined the whole effort. The main problems with this program were its selection criteria and its overestimates of initial traffic usage on some roads. Concessions were awarded largely on the basis of the length of the concession period. The winner was the bidder who offered to return the highway to the government within the shortest amount of time.

The result was that some concessions lacked long-term financing because the concession period was very short. This resulting in high tolls which discouraged usage and created cash-flow problems. Further complicating factors were right-of-way difficulties that created delays and increased costs.

The concessions program was suspended in late 1993 when a moratorium on new concessions was introduced in order to revamp the highway concessions program. Since then, there has been only one attempt to let a highway concession, the La Gloria - Colombia Highway in Nuevo León. Four groups submitted proposals, but none were approved. Moreover, the economic crisis of December 1994 created further potholes in the concession program's progress.

Plans for the Future

The effort to revamp the concessions program continued until 1996. Under new rules and regulations, the first highway is scheduled to be let in September 1996. Moreover, the priorities of highway development have changed since the Salinas Administration.

The Secretariat of Communications and Transportation (SCT) reordered its priorities, reducing the importance of concessions for new construction. The SCT now wants to reduce the cost of operation of vehicles, increase security on the nation's highways, and expand coverage. Consequently, officials at the SCT report that the highest priority is to modernize and maintain the existing system through the widening and straightening of current roads. The second priority is the construction of new federal roads. The third priority is the construction of new roads through public-private partnerships, i.e. concessions.

In order to achieve its goals, the SCT has reassigned jurisdiction over Mexico's highways. The system has been divided into two parts, a national network and a state network. The national network consists of the major communication axes connecting parts of Mexico which have the highest levels of traffic. The state network consists of highways and roads that were previously part of the federal network which are of regional and state importance. In the future, the federal government, through the SCT, will be responsible for the national network while the state network will be administered by the state governments.

In terms of the concessions, the SCT has restructured the program and selection criteria in order to avoid the problems of the past. In order to prevent radical cost overruns and surprises in terms of traffic flow, the SCT now undertakes a series of studies to put together a comprehensive package for the bid.

It carries out economic and financial evaluations, traffic studies, environmental impact assessments and the conceptual design, followed by detailed engineering studies. Hence, once a project goes to bid it is presented as a comprehensive package. The cost of the studies is later charged to the winner of the concession.

The selection criteria which created such problems in past concessions have also been altered. After a series of economic, financial and technical prequalification procedures, the winner of a concession is the one offering to charge the lowest toll. This toll is then readjusted annually according to inflation. The concession period is fixed and in most cases is for 30 years.

Planned Concessions

As noted, the bulk of transportation uses highways. The country still requires substantial investment in highway modernization and also in new construction. The highway privatization and construction program is estimated to absorb US$7 billion in the period 1995-2000.

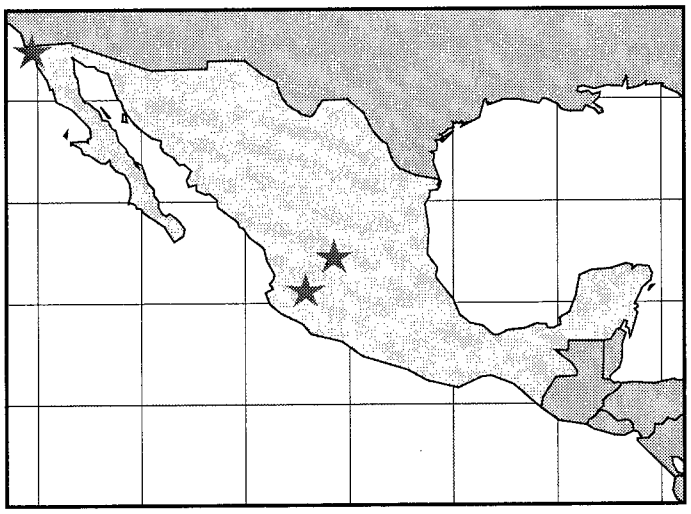
The SCT has planned three large highway concessions for 1996-1997. The first is a concession for a highway between Lagos de Moreno and San Luis Potosí that is scheduled to be released in September 1996. The other two are profiled in this book, the Mexico City Access Highway: Atizapan-Atlacomulco (Infrastructure Project Profile TRA-02) and the Libramiento Norte Highway (Infrastructure Project Profile TRA-03).

The Lagos de Moreno-San Luis Potosí Highway consists of 33 kilometers of modernization and 105 kilometers of new construction. Total investment is expected to be approximately US$100 million. The Government of Mexico is expected to invest approximately US$12-15 million in the stretch between Lagos de Moreno and Las Amarillas.

There are also a number of bridges on the border with the United States which are slated to be concessioned in 1996-1997. These include Laredo III, Tomates, and Piedras Negras II. In most cases the relevant state governments will be in charge of letting the concessions, with assistance from the federal SCT. For example, the State of Tamaulipas is expected to open bids for the Laredo III Bridge in September 1996. In addition to these bridges, in August 1996, the Governor of Nuevo León approved funding for a highway linking the Monterrey-Nuevo Laredo toll road with the U.S.-Mexico border crossing at the Colombia Bridge. The Colombia Bridge was intended to relieve congestion at the Laredo-Nuevo Laredo crossing, but in order for it to be fully utilized, more investment will be required on the access highways.

Transportation/ Air

SENEAM Radar Procurement



Project Summary

Project No:	**TRA-01**
Subsector:	**Air**
State/Region:	**Aguascalientes, Baja California Norte, Jalisco**
Project Cost:	**$13 million**
Export Potential:	**$13 million**
Owner:	**SENEAM**

The Navigation Services in Mexican Air Space Agency (Servicios a la Navegación en el Espacio Aereo Méxicano, SENEAM) is an independent agency, under the Secretariat of Communications and Transportation (SCT), in charge of the country's civil air traffic control and communications systems, including meteorological systems and radio navigation aids. Although the SCT is planning to privatize Mexico's airports, the air traffic control system will remain in the hands of SENEAM. One of SENEAM's measures to improve air traffic safety and efficiency in Mexico is a six-year radar purchasing program, which began in 1995.

Technical & Site Description

SENEAM is executing a plan to buy three radar systems annually in order to replace a total of 14 systems; it will also purchase three new radar systems for previously uncovered areas. Each system is expected to cost approximately US$2-5 million. The program does not include the existing airports in Mexico City and Cancún, as their radar systems were recently replaced.

The radar replacement program was intended to begin in 1995, but due to the economic crisis no radars were purchased then. SENEAM planned to purchase only one radar in July 1996 for the same reason. The system will be sited in Monterrey.

Full-scale purchases are expected to begin in 1997 with two radar systems worth approximately US$2

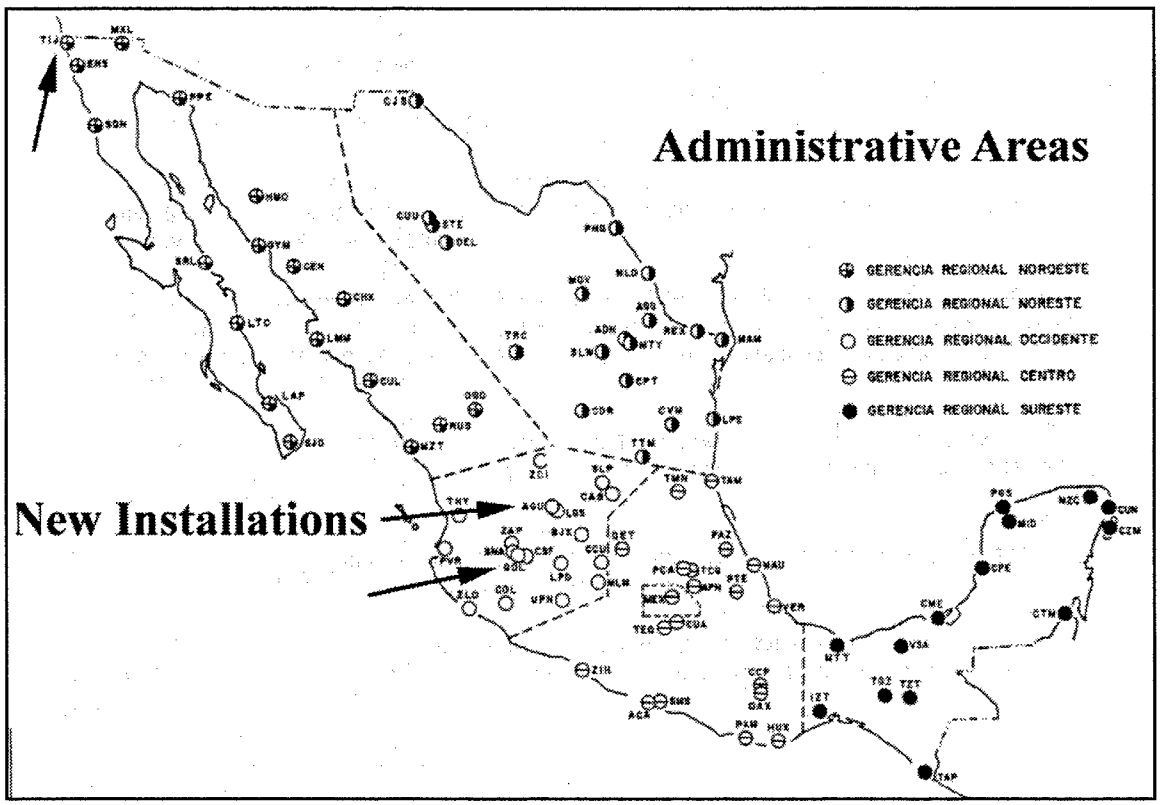
million each and one system worth US$5 million. The cities to be served and the respective values of the systems are as follows:

1997 Radar Procurement

City	Symbol	Value (US$ millions)
Guadalajara	GDL	5
Tijuana	TIJ	2
Aguascalientes	AGU	2

Source: SENEAM

Please see the map below for the location of these radar systems.

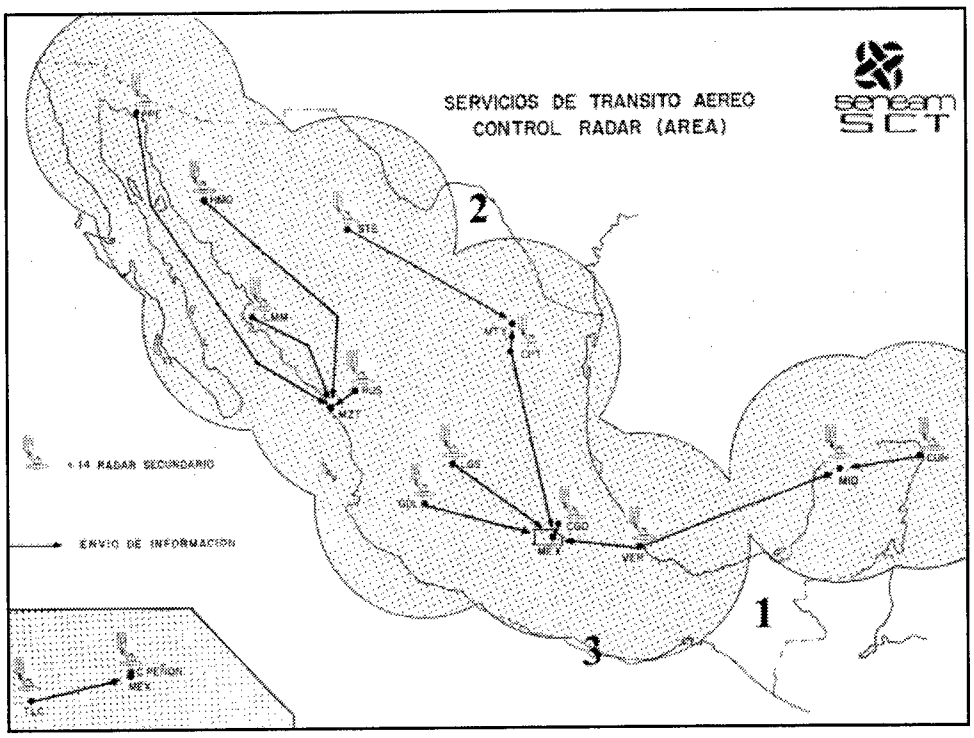


In addition to basic air traffic control capabilities, radar for Guadalajara will also have meteorological and other advanced service capabilities. In order to harmonize the system and ensure compatibility

with existing equipment and software, SENEAM will specify input and output parameters at the time of bidding.

In 1998, SENEAM will purchase an additional two systems for US$2 million each. Their locations have not yet been determined as sites are decided upon annually after revising the requirements of each system and after priorities are set. After 1998, SENEAM is expected to continue its radar system procurement program, purchasing radar systems worth US$4 million - US$9 million every year until all 17 radar systems are in place.

In regards to the purchase of three systems for the areas of airspace not yet covered by SENEAM's network, the exact time has not yet been determined. However, SENEAM has selected the locations. The first new system will be located in the south of Mexico covering the State of Chiapas (No.1 on the map below). The second system will cover the northern part of the State of Coahuila (No.2 on the map below). The third and last new system will extend coverage to a thin slice of the coastline in the State of Oaxaca and Guerrero (No.3 on the map below).



Project Status

Bids for the radar systems for Guadalajara, Tijuana, and Aguascalientes are expected to open in the third quarter of 1997, most probably in July. Subsequent bids are expected to be held in the same quarter each year for the duration of the program.

Equipment & Services Demand

SENEAM is planning to purchase hardware for its radar systems that is compatible with existing software and hardware systems. The majority of this radar capacity will be dedicated to air traffic control, except for systems in the US$5 million range which are also expected to offer meteorological and other advanced capabilities.

Purchases in 1997-1998 are expected to amount to US$13 million. All of these may be imported. In order to complete the full program of replacements, SENEAM will have to purchase radar systems worth at least an additional US$22-25 million.

Nature of Demand

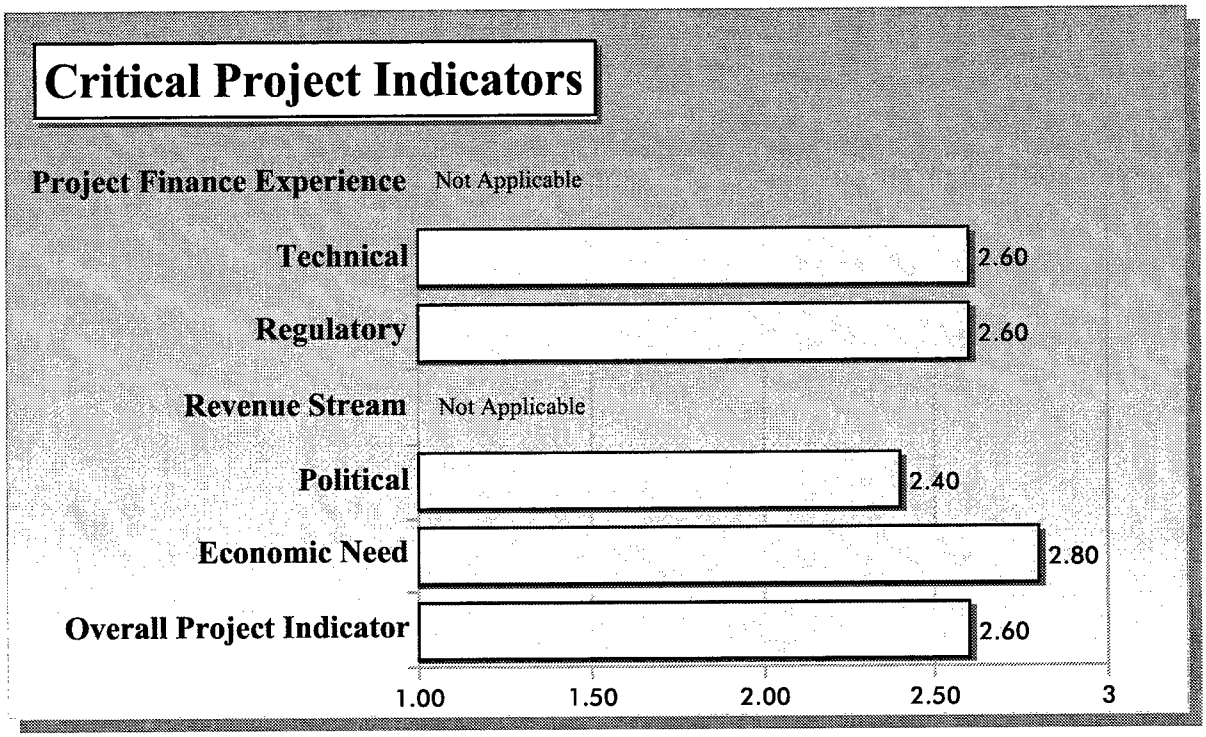
The radar procurement program is a direct result of the increased emphasis the Mexican Government is placing on air traffic safety. NAFTA and an increasingly open economy have led to increased flows of both air cargo and passengers in and out of Mexico. After a decade of zero growth in passenger traffic and negative growth in cargo, during the period from 1989 to 1995 passenger traffic increased by 51 percent and cargo traffic increased by 47 percent.

Mexico is also integrating its air traffic system with the United States and striving to comply with international aviation standards. For example, in July 1996, Mexico and the United States signed an agreement integrating Mexico into the U.S. Global Positioning System for navigational radio aids. SENEAM's radar procurement program promises to eliminate the obstacles posed by outdated air traffic control systems, in combination with other modernization measures involving telecommunications and other navigational aids.

Project Assessment

This is a straight procurement project highly dependent on annual budget allocations. There is considerable economic need for new air traffic control radar systems as passenger traffic and cargo are expected to continue to grow with the expansion of the economy.

Critical Project Indicators



Key Decision Makers

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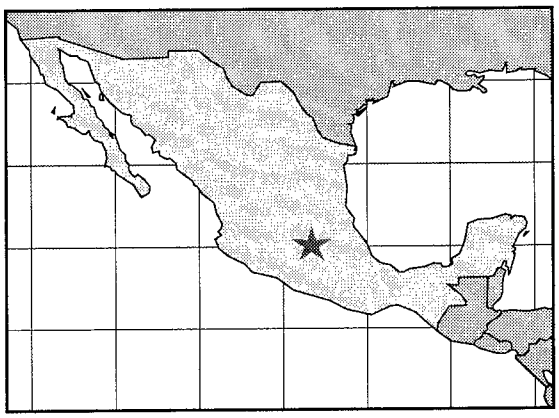
Transportation/ Highway

Mexico City Access Highway



Project Summary

Project No:	**TRA-02**
Subsector:	**Highway**
State/Region:	**State of Mexico**
Project Cost:	**$80 million**
Export Potential:	**$15 million**
Owner:	**SCT**

Under the restructured Toll Road Concession Program, the Secretariat of Communications and Transportation (SCT) will grant a concession to build and operate a new 80-kilometer stretch of highway, the last portion of the Mexico City- Guadalajara highway. This portion of the highway, officially called the Atizapán-Atlacomulco Highway, will give motorists direct access to Mexico City and bypass the Toluca Metropolitan Area.

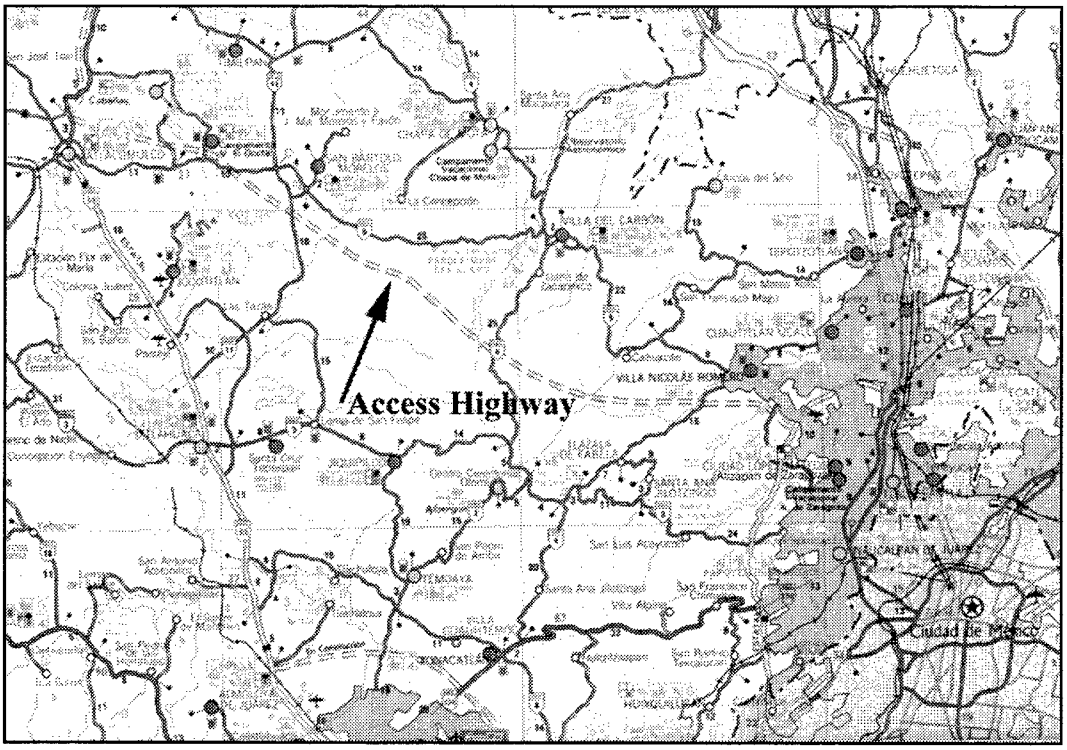
Technical Description

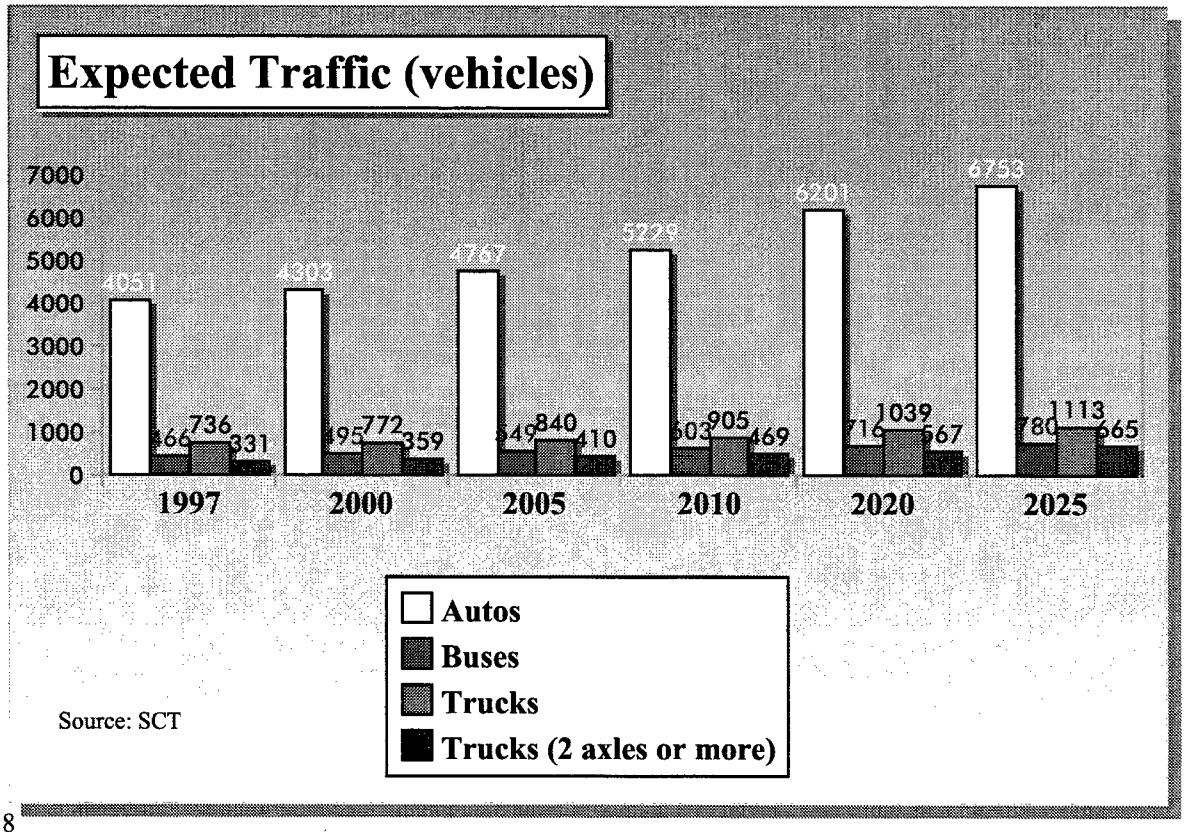
The Mexico City Access Highway will be concessioned to the private sector for a 30-year period under the new Toll Road Concession Program. It will cover 80 kilometers of 2S-type highway (2 lane) with a 60-meter right of way and an 11-meter road diameter. The highway will occupy a total of 598,800 square meters of land and include 39 bridges of varying sizes.

With a toll rate of 0.38 pesos per kilometer (approximately US$ .05), the project is estimated to start operating with a daily traffic flow of 5,584 vehicles. The average annual traffic growth rate is estimated to be 2.09 percent.

Site

The highway will start in the Municipality of Atizapán, located northwest of Mexico City and end in the City of Atlacomulco, located in western part of the State of Mexico, near the Michoacán border.


Access Highway


Expected Traffic (vehicles)
7000
6000
5000
4000
3000
2000
1000
0
4051
466
736
331
4303
495
772
359
4767
549
840
410
5229
603
905
469
6201
716
1039
667
6753
780
1113
665
1997
2000
2005
2010
2020
2025
Autos
Buses
Trucks
Trucks (2 axles or more)

Source: SCT

Project Status

Through private consultants, the SCT has conducted first stage feasibility studies, including:

- Traffic Flow Studies: Both Mexican methodology and American Association of State Highway and Transportation Officers (AASHTO) methodology.
- Economic and Financial Feasibility Studies: World Bank methodology.
- Environmental Impact Assessment: Mexican Environmental Institute.

The feasibility studies presented favorable results in all cases, although the environmental impact study has yet to be authorized by the National Ecology Institute (INE).

Bids to obtain the concession to build and operate the highway are expected to open in the first semester of 1997. Additionally, the project presents the possibility of expanding the highway to a four-lane thoroughfare.

Equipment & Services Demand

The project offers opportunities to provide financing, engineering and technical services and equipment including:

- Toll Road Collection Systems
- Communication Systems
- Construction Equipment

Nature of Demand

The Mexico City Access Highway will permit trucks and cars to bypass the Toluca Metropolitan Area and will significantly shorten the distance between Mexico City and Guadalajara. This stretch of highway is needed to gain direct access to Mexico City from the Central and Central-Western regions of Mexico, which account for the bulk of Mexico's economy. The route between Mexico City and Guadalajara leads to other important cities including: Morelia, Salamanca, La Piedad, Maravatio and Irapuato. Additionally, the highway will create direct access to the growing industrial region of the Atlacomulco Valley.

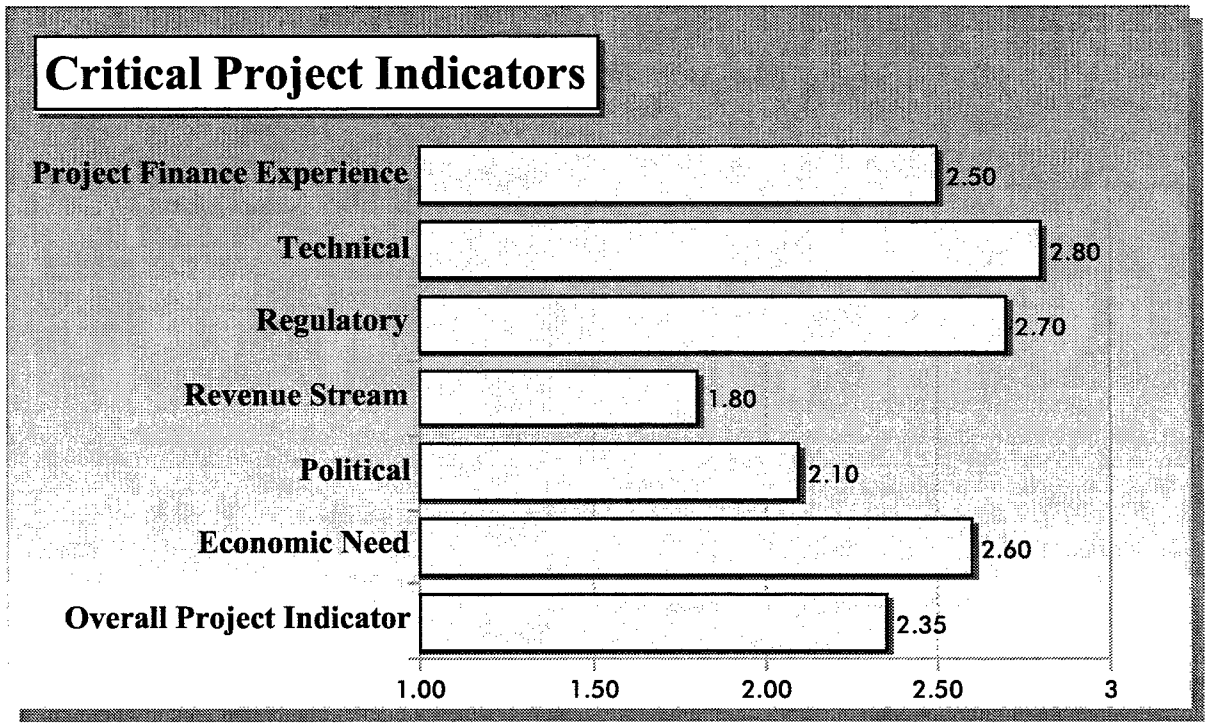
Project Assessment

The Toll Road Concession Program was recently restructured in order to provide sufficient time for private investors to obtain the projected return on their investment. Concessions to build and operate new highways will be granted under this new program, in accordance with the National Development Program. The first concession to be awarded under the new program will be the Lagos de Moreno-San Luis Highway. The existing part of the Mexico City-Guadalajara Highway was built and is currently operated by private investors. It is one of the most important in Mexico and connects its two largest cities.

The proposed financial structure for the Mexico City Access Highway Project calls for 40 percent from private investors, 6.5 percent from the government, and 53.5 percent from financial institutions. The financial feasibility study determined that a 15-year loan period is needed. The highway is expected to generate a 28.9 percent Internal Rate of Return during the concession period of this project.

The project still requires authorization from the National Ecology Institute (INE) and there are still some land expropriation activities that must be finalized before granting the concession. These matters are expected to be resolved by the end of 1996.

Critical Project Indicators



Key Decision Makers

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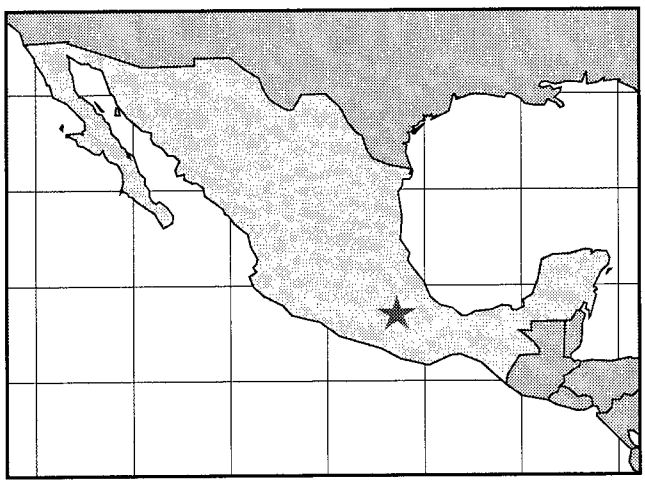
Fax	(52-5) 538-1724

Transportation/ Highway

Libramiento Norte Highway



Project Summary

Project No:	**TRA-03**
Subsector:	**Highway**
State/Region:	**Central Mexico**
Project Cost:	**$120 million**
Export Potential:	**$22 million**
Owner:	**SCT**

The Secretariat of Communications and Transportation (SCT) will grant a concession to build and operate this 135.7 kilometer road connecting the existing Mexico-Querétaro and Mexico-Puebla highways, enabling traffic flow to avoid Mexico City's congestion. The highway will also service the integrated development project north of Mexico City, Pro-Oriente.

Technical Description

The Mexico City Libramiento Norte will be concessioned for a 25-year period to the private sector under the new Toll Road Concession Program. It will extend 135.7 kilometers of 2S type highway (2 lane) with a 60-meter right of way and 12-meter road diameter and will occupy a total of 814.2 hectares of land.

The four main stretches of highway include: Tlaxcala-Calpulapan, Calpulapan-Tulancingo, Tulancingo-Pachuca and Pachuca-Querétaro.

With a 0.40 peso per kilometer toll rate (approximately US$.05) the project is estimated to start operating with a daily traffic flow of 2,138 vehicles and average yearly growth rates of 2.63 percent. This growth will permit it to capture 33.02 percent of the potential market and maximize total income.

Site

The highway will be located north of Mexico City. It will pass through the states of Mexico, Hidalgo, Tlaxcala and Puebla in the central region of Mexico.

Project Status

Through private consultants, the Secretariat of Communications and Transportation has conducted all necessary first-stage feasibility studies, including:

- Traffic studies: Mexican methodology and American Association of State Highway and Transportation Officers (AASHTO) methodology.
- Economic and financial feasibility studies: World Bank methology.
- Environmental impact assessment: Mexican Environment Institute.

These feasibility studies presented favorable results in all cases. The environment impact assessment determined a need to elaborate specific programs to protect the environment. These programs must be submitted to the environmental authorities before construction begins.

Bids are expected in the summer of 1997, though this process may be accelerated if authorities decide to locate the second Mexico City International Airport in Tizayuca, Hidalgo.

Equipment & Services Demand

The project offers U.S. firms important opportunities to provide financing, engineering and technical services and equipment including:

- Toll road collection systems
- Communication systems
- Construction equipment

Nature of Demand

The Libramiento will connect northern and southern Mexico without passing through Mexico City, which will permit traffic moving in either direction to reduce transit times. The highway will also enjoy direct access to the second Mexico City International Airport if authorities decide to locate it in Tizayuca, Hidalgo. The decision to locate the airport in Tizayuca or Texcoco will be announced sometime in September or October 1996.

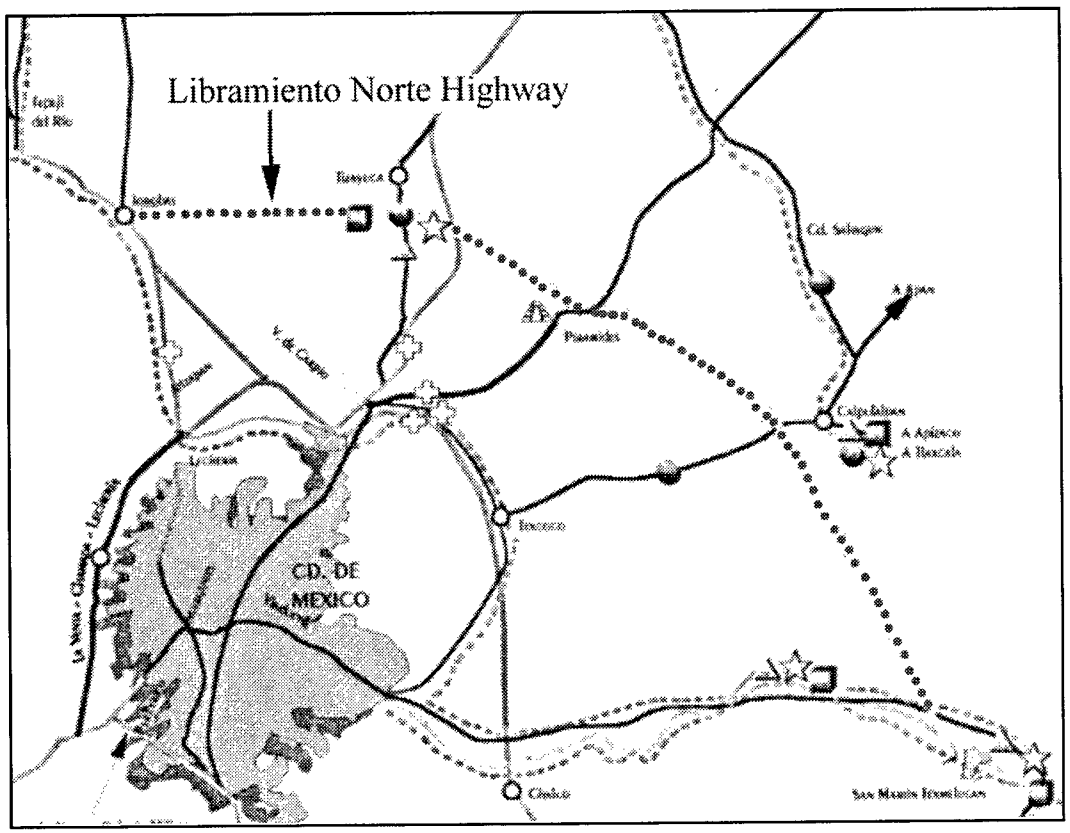
The highway will play an important role in connecting regional destinations and the integrated urban development project of Pro-Oriente.

Project Assessment

The Mexican Concession Program was recently restructured in order to provide sufficient time for private investors to obtain the estimated return on their investment. Under this new program and in accordance with the National Development Program, concessions to build and operate new highways will be granted. The first concession to be awarded will be the Lagos de Moreno- San Luis Highway.

The proposed financial structure for the Libramiento Norte consists of 22.33 percent private investment, 38.55 percent government investment and 39.12 percent from financial institutions. From this investment mix, the project is expected to generate operating profits starting the second year of operations and net profits starting in year eight.

The financial feasibility study determined that a 17-year loan period is needed, including a two-year grace period with growing amortizations. The highway is expected to obtain a 32.79 percent Internal Rate of Return for the concession period of the project.



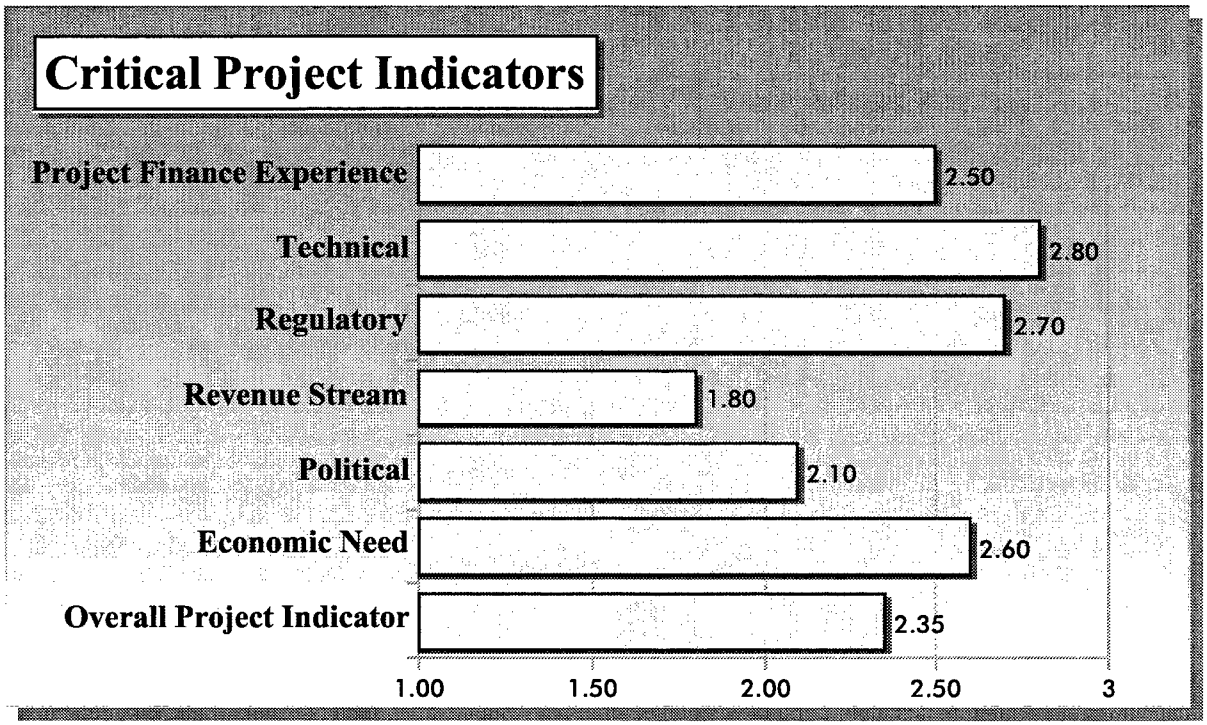
Total Projected Traffic Flows (vehicles per day)

Year	Autos	Buses	CU *	C5-C6 *	C7 or more*	Total	Growth Rate
1995	1461	77	273	310	310	2138	
2000	1733	91	323	1733	366	2533	3.45
2005	2005	104	373	2005	422	2927	2.93
2010	2276	118	423	2276	478	3319	2.55
2015	2545	131	472	2545	532	3710	2.25
2020	2853	147	528	2853	595	4155	2.29
2025	3201	164	592	3201	665	4658	2.32

Source: SCT

*These are price categories for freight vehicles based on the number of wheels

Critical Project Indicators



Key Decision Makers

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Name	Ing. Oscar de Buen Richkarday
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Phone	(52-5) 524-7325
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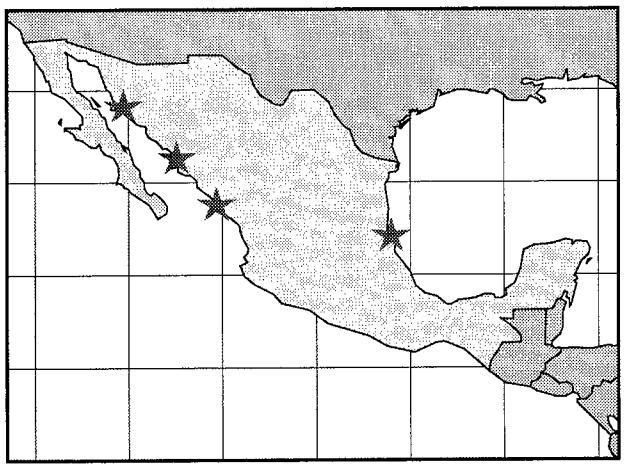
Transportation/ Port

Port Investment Program



Project Summary

Project No:	**TRA-04**
Subsector:	**Port**
State/Region:	**Sinaloa, Sonora, Tamaulipas**
Project Cost:	**$90 million**
Export Potential:	**$30 million**
Owner:	**SCT**

The Secretariat of Communications and Transportation (SCT), continuing its Port Privatization Program, will grant a concession to operate the Ports of Guaymas, Mazatlán, Topolobampo and Tuxpan. The process will consist of selling 100 percent of the Port Authorities' stock in order to allow the private sector to operate as a private port authority.

Under this program, the Port of Acapulco has already been privatized to the Mexican shipping line Transportación Marítima Mexicana (TMM).

Technical Description

Ports will be privatized by selling stock to private investors for 25-year concession periods.

Under its concession contract with the federal government, the port authority will have the right to:

- Use and exploit all federal public domain assets that are located within the area of concession.
- Use and exploit all facilities and installations located inside the area of concession.
- Build terminals, marine facilities, buildings, etc. inside the area of concession.
- Provide port services.

Because the concessionaires will have to respect all previous concessions, permits or authorizations on the Port Authorities' premises, the Port Authorities will continue receiving payment on the rights to use these concessions. Additionally, the Port Authorities will be permitted to grant new concessions to third parties in order to provide different port services.

The Port Authorities will be responsible for designing and submitting to the SCT a five-year Master Plan for the development of the port, including construction, modernization, maintenance, equipping programs, and an annual operating plan. Concessions will be granted via a bidding process. Additionally, the winners of concessions will have to pay fees to the Federal Government regularly, based on the level of port services provided to users.

Guaymas, Sonora

Guaymas is one of the busiest ports in Mexico because of its role in handling agricultural, mineral and fluid bulk cargo, and general cargo. It ranks fifth overall amongst Mexican ports and accounts for seven percent of total cargo tonnage.

Cargo Handled by the Port of Guaymas

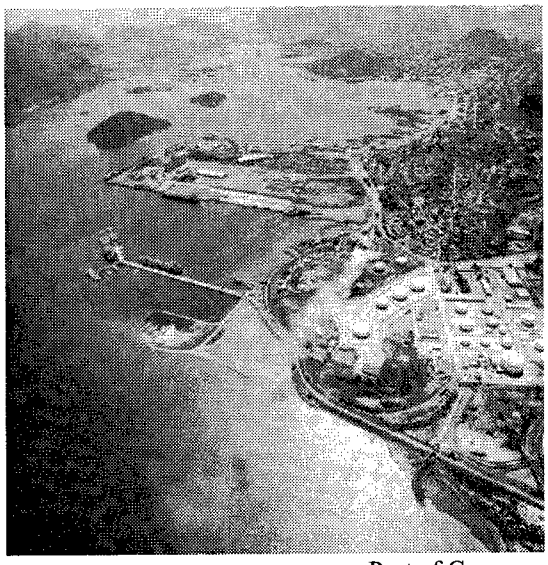
Type of Cargo (tons)	1994	1995	May 1996
General Bulk	102,394	135,147	43,866
Containers	0	0	0
Agricultural Bulk	601,408	731,513	288,054
Mineral Bulk	959,631	1,246,483	729,630
Liquids	462,321	448,543	245,910
Total	2,125,754	2,661,686	1,307,460

Source: Puertos Mexicanos

The berthing capacity of the port is 40,000 DWT, with 250 meters of length and 12 meters of depth. Its access channel has a length of 1,500 meters and depth of 12 meters. The turning basin has an extension of 250 meters and depth of 11 meters. The port's infrastructure includes five docking positions with 965 meters of ocean going, 193 meters of coastal and 1,534 meters of fishing docks. Its storage areas

include 8,614 square meters of sheds, 13,236 square meters of warehouses and 181,000 square meters of yards.

Existing equipment in the port includes one 25 ton crane, 35 clams, 22 chutes, 11 front-end haulers, 25 forklifts of different sizes, trucks and platforms and one 3,000 horsepower tug boat.



Port of Guaymas

Mazatlán, Sinaloa

Mazatlán is a commercial, tourism and fishing port. It ranks fourteenth overall among Mexican ports and accounts for one percent of Mexico's total cargo tonnage. The port also places fifth in cruise ship arrivals, accounting for more than ten percent of the market, and has a well developed industrial zone for fishing just outside its premises.

Cargo Handled by the Port of Mazatlán

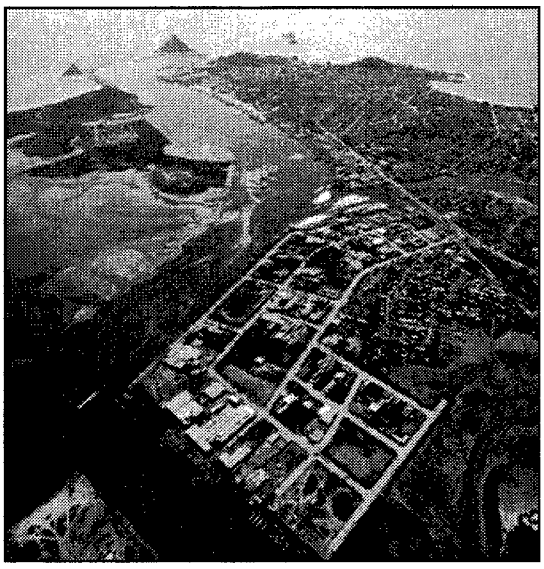
Type of Cargo (tons)	1994	1995	May 1996
General Bulk	86,850	83,603	31,983
Containers	50,664	101,212	65,324
Agricultural Bulk	0	0	0
Mineral Bulk	7,500	0	0
Liquids	0	0	0
Total	145,014	184,815	97,307

Source: Puertos Mexicanos

Mazatlán's berthing capacity is 40,000 DWT, with 250 meters of length and 10 meters of depth. Its entry channel has a length of 1,500 meters and depth of 11 meters, and the turning basin has a diameter of 450 meters and depth of ten meters. The port's infrastructure includes five docking positions with 1,138 meters of ocean going and cabotage, 120 meters of tourism and 1,788 meters of fishing docks. Its

storage areas include 2,300 square meters of sheds, 14,868 square meters of warehouses and 67,564 square meters of yards.

The port's existing equipment includes one 80,000 and one 25,000 pound cranes, 30 clams, 19 chutes, 13 front end haulers, 39 hoists of different sizes, 33 tractors, as well as trucks, platforms, one 3,000 horsepower tug boat and one 9,000 horsepower locomotive.



Port of Mazatlán

Topolobampo, Sinaloa

The modern port of Topolobampo was inaugurated in 1991 and was designed to support the development of the region's industrial base. It also provides services to the agricultural, livestock and fishing activities in southern Sonora, central and northern Sinaloa, and the State of Chihuahua.

Cargo Handled by the Port of Topolobampo

Type of Cargo (tons)	1994	1995	May 1996
General Bulk	57,453	1,911	1,001
Containers	1,262	189	0
Agricultural Bulk	45,020	42,500	0
Mineral Bulk	268,225	84,719	47,697
Liquids	0	0	0
Total	371,960	129,319	48,698

Source: Puertos Mexicanos

The berthing capacity of the port is 50,000 DWT, with 240 meters of length and 12 meters of depth. Its access channel has a length of 22.22 kilometers and depth of 14 meters. It has two turning basins with extensions of 450 and 300 meters and depths of 14 and 10 meters respectively.

The port's infrastructure includes two docking positions with 240 meters of ocean going dock, 99 meters of cabotage and 680 meters of fishing docks. Its storage areas include 2,240 square meters of sheds, 3,860 square meters of warehouses and 144,800 square meters of yards. Existing equipment in the port includes two 16,000 and 36,000 pound hydraulic cranes, 20 clams, 11 chutes, ten hoists of different sizes, five 5,000 pound tractors, two 25,000 pound tractor trucks and platforms.

Port of Topolobampo

The port is well connected to the rest of the country and U.S. by rail through the Chihuahua- Pacific Railroad and the Pacific North Railway. The port also has access to Mexico's highway network.

Tuxpan, Tamaulipas

Cargo Handled by the Port of Tuxpan

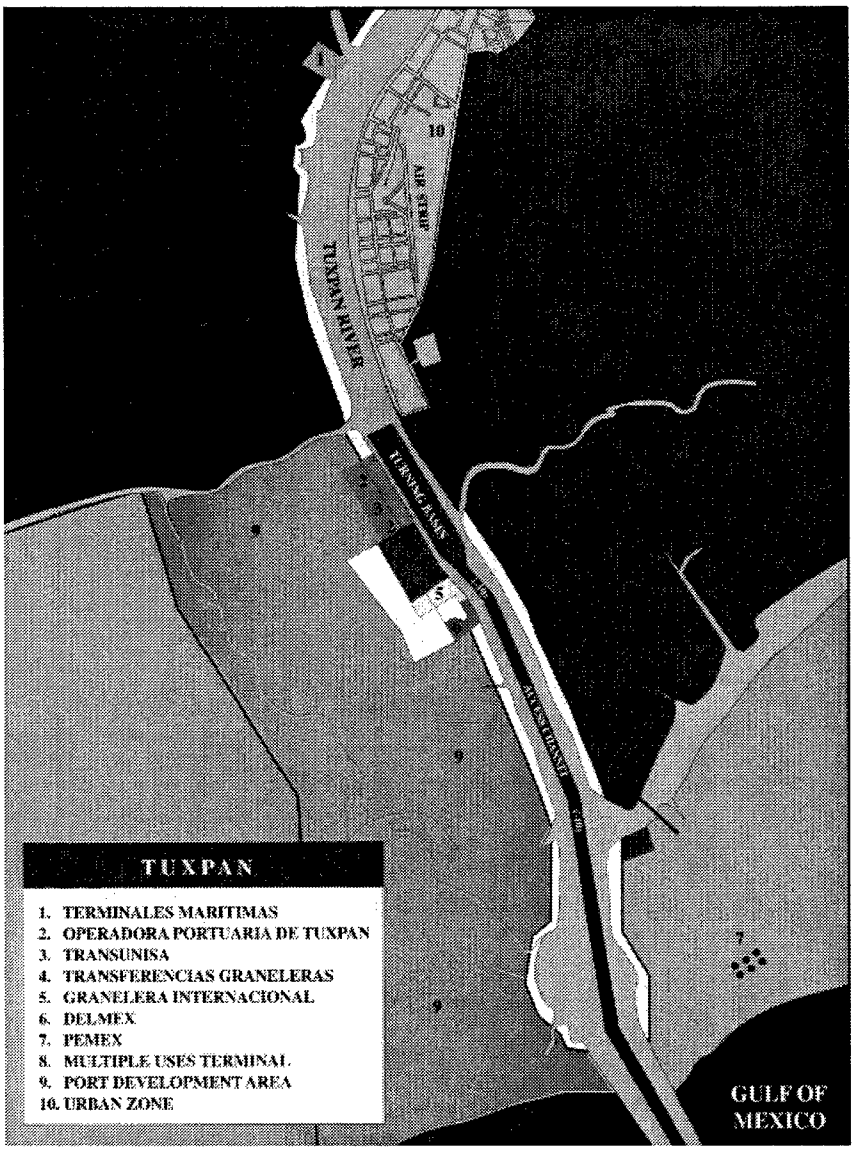
Type of Cargo (tons)	1994	1995	May 1996
General Bulk	149,359	77,045	29,745
Containers	3,517	34,783	195
Agricultural Bulk	164,756	97,702	133,775
Mineral Bulk	213,134	0	0
Liquids	72,807	61,669	31,604
Total	603,573	271,199	195,320

Source: Puertos Mexicanos

Tuxpan is the closest port to Mexico City. It ranks thirteen overall amongst Mexican ports and accounts for one percent of total cargo tonnage. The port's new organizational structure, based on the operation of private terminals, has resulted in higher levels of productivity. Of the five private terminals operating in Tuxpan, two handle agricultural bulk, one handles fluids and the remaining two focus on general and container cargo.

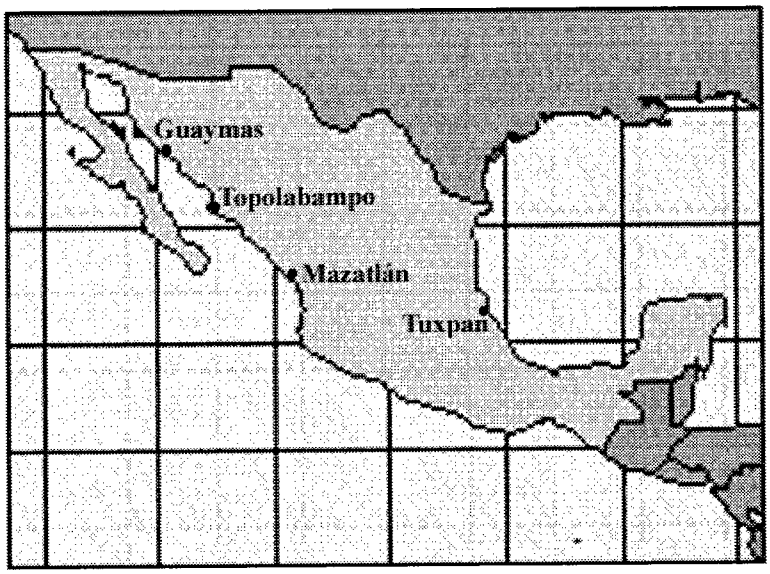
The port's berthing capacity is 24,000 DWT, with 185 meters of length and 19.5 meters of depth. Its access channel has a length of seven kilometers and depth of seven meters, and the turning basin has an extension of 240 meters and a depth of ten meters.

The port's infrastructure includes one 460-meter ocean going dock and 138 meters of fishing docks. Its storage areas include 24,300 square meters of warehouses and silos, 90,000 square meters of yards, and 28 hectares of port reserves. Existing equipment in the port is owned by five different concessionaires that rent this equipment to the port authority.



Site

The Port of Guaymas is located along the north pacific coastline of Mexico, inside the Gulf of California, in the northern State of Sonora. It is 120 kilometers from the state capital Culiacan.



The Port of Mazatlán is located along the central Pacific coastline of Mexico in the southern region of the State of Sinaloa. The Port of Topolobampo is located on the north Pacific coastline of Mexico on the eastern shore of the Gulf of California, in the northern end of the State of Sinaloa. The Port of Tuxpan is located on the shores of the Tuxpan River. It is located in the center of the Gulf of Mexico in the northern portion of the State of Veracruz.

Project Status

The Secretariat of Communications and Transportation (SCT) started its Privatization Program in 1991 with the objective of building a modern port system that would substantially increase Mexico's potential for foreign trade.

The SCT through Mexican Ports began this privatization process by granting concessions to provide specific port services such as stevedoring services, terminal concessions, etc. The most important concessions already granted include the container terminal of Veracruz to ICA and ICTS and the container terminal of Manzanillo to TMM and Stevedoring Services of America.

The second stage of privatization consisted in decentralizing control over the port facilities, which led to the creation of Integrated Port Authorities (API). After creating the APIs, the government com-

menced privatization. Acapulco was the first concession awarded under this process to Transportación Marítima Mexicana (TMM), which paid close to US$12.5 million.

In July, SCT announced its intention to privatize the ports of Guaymas, Mazatlán, Topolobampo and Tuxpan. Bids are expected to open in October, though there is still no definition as to the order of the ports to be concessioned.

Equipment & Services Demand

Although most of these ports have a good infrastructure base, there is a clear need for further modernization. Most of these ports require equipment for container handling and intermodal connection. Under the multiple master plans, the ports will require from their investors resources sufficient to maintain all signaling, communications and overall infrastructure. Additionally, the new authorities will have to invest in EDIFAC or other technologies to control operations for the port. Specific needs for these ports include:

The Port of Guaymas requires the refurbishing of existing docks and cargo patios. The Port of Tuxpan currently does not have equipment for its operation. The port will require investment in equipment and also services, such as dredging.

Nature of Demand

Guaymas, Sonora

The Port of Guaymas is a natural trade link between the northern states of Mexico, the Pacific Rim countries and the States of Arizona and New Mexico. It is well connected by road and rail to southern Sinaloa and the U.S. and it also plays an important role in supplying goods to the Baja California Peninsula.

Mazatlán, Sinaloa

The Port of Mazatlán serves the States of Nayarit, Durango, Jalisco and Sinaloa and also plays an important role in supplying goods to the Baja California Peninsula. In-bound cargo arrives primarily from Pacific Rim countries and through cabotage shipping from the western coast of the U.S.

Topolobampo, Sinaloa

The Port of Topolobampo will consolidate economic opportunities in the northwestern region of Mexico by connecting it with the Pacific Rim countries, the western U.S., Canada and Central and South America. For U.S. exports which normally pass through ports in California, Topolobampo's strategic location can reduce by as much as 30 percent the distance to the Pacific.

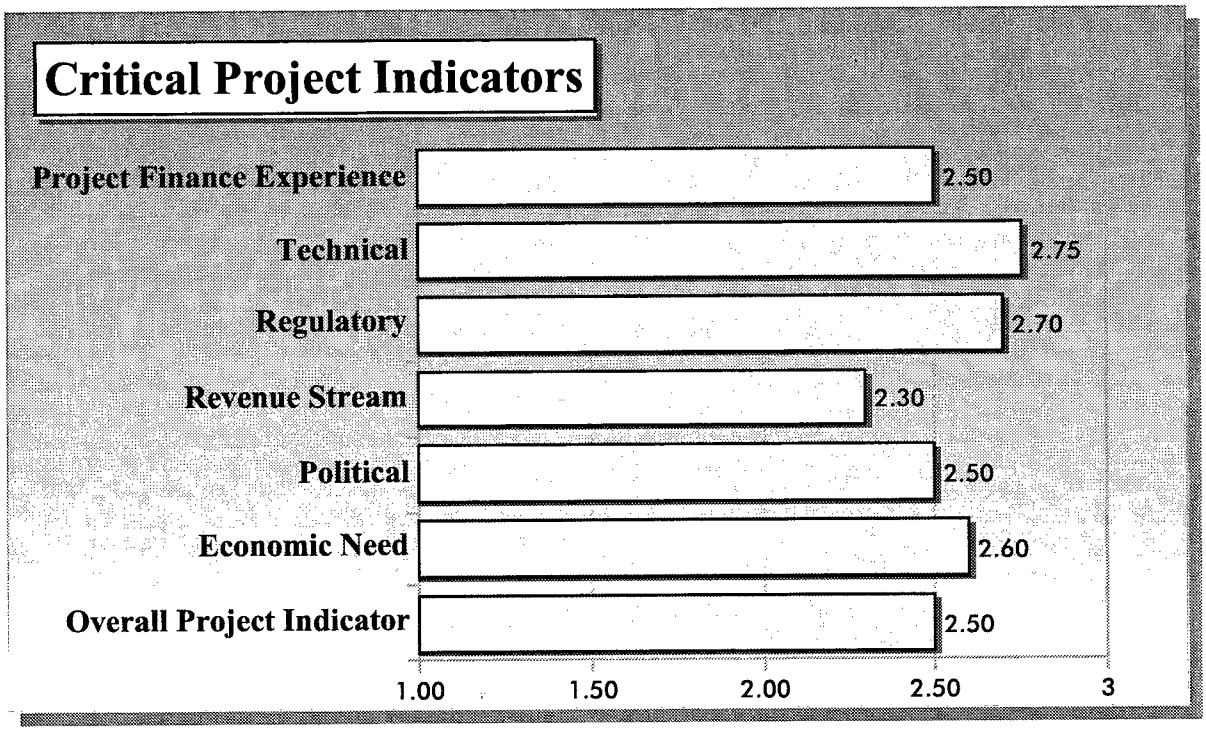
Tuxpan, Tamaulipas

With the new Tuxpan-Poza Rica Highway connecting to Mexico City, Tuxpan presents great opportunities to develop new facilities to service the central regions of Mexico and Mexico City. Most of the cargo handled in the port arrives from the eastern U.S., Canada, Europe and Central and South America.

Project Assessment

Port privatization in Mexico has proven that ports can be upgraded into fully profitable operations. Concessionaires for the most part have reported profits in their first year of operations, and Mexican port productivity has improved dramatically.

Critical Project Indicators



Key Decision Makers

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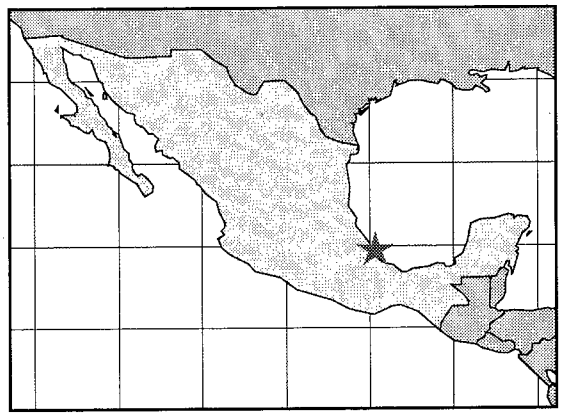
Transportation/ Port

Veracruz Multiple Use Terminal



Project Summary

Project No:	**TRA-05**
Subsector:	**Port**
State/Region:	**Veracruz**
Project Cost:	**$13 million**
Export Potential:	**$8 million**
Owner:	**Terminales de Cargas Especializadas, S.A. de C.V.**

Terminales de Cargas Especializadas, S.A. de C.V. (TCE) is a privately owned company formed by Veracruz businesses involved in the transportation sector. The company was established with the objective of obtaining a concession for the Port of Veracruz Multiple Use Terminal.

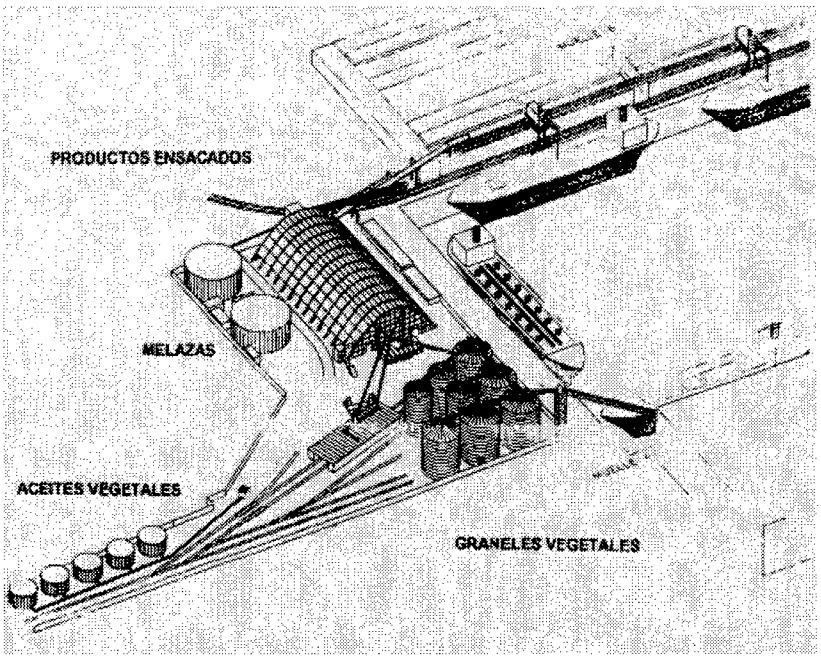
Veracruz is the most important port in Mexico, especially in agricultural bulk handling. It also occupies first place in container movement and accounts for 17 percent of the total port market.

Technical Description

The Secretariat of Communications and Transportation (SCT) through the Integrated Port Authority (API) of Veracruz granted a 15 year concession to TCE to operate and modernize the port's Multiple Use Terminal. This terminal is authorized to handle agricultural bulk, sugar, cargo in sacks, molasses, vegetable oils and refrigerated cargos. This type of cargo currently represents 30 percent of the total cargo volume of the port.

The total area of the terminal is 33,363 square meters and includes the preferential use of the southern portion of Dock 6, which has an extension of 300 meters and a depth of 9.75 meters. The terminal also includes a main 5,000 square meter warehouse as well as rail and truck reception areas with a capacity for 50 train cars.

The project to renovate and modernize the terminal consists of equipping the southern portion of Dock 6 with two elevated transportation belts with a individual capacity of 500 tons per hour. The belts will



service two pneumatic high efficiency towers to unload imported grains at a rate of 300 tons per hour and one mechanical tower for exports operating at a speed of 600 tons per hour. Such facilities will be equipped with weighing systems to guarantee cargo control.

Storage for dry agricultural bulk will take place in the main 5,000 square meter warehouse and in a series of silos that will be constructed in the south end of the facility. The total storage capacity will be 60,000 tons.

For the storage of molasses, the concessionaires will build two storage tanks with a combined capacity of 30,000 tons. The tanks will have a pumping system that will enable loading product to vessels at a 400 ton per hour rate.

On the southeast portion of the terminal, the project calls for the construction of a group of five storage tanks with integrated piping systems to the docking area, which will have a combined capacity of 15,000 tons and will be used primarily to store vegetable oil.

The refurbished terminal will be equipped with the latest technology for security, dust control, weighing systems, and quality control of products. Finally the existing rail and truck loading zones will be renovated in order to provide an average loading rate of 400 tons per hour.

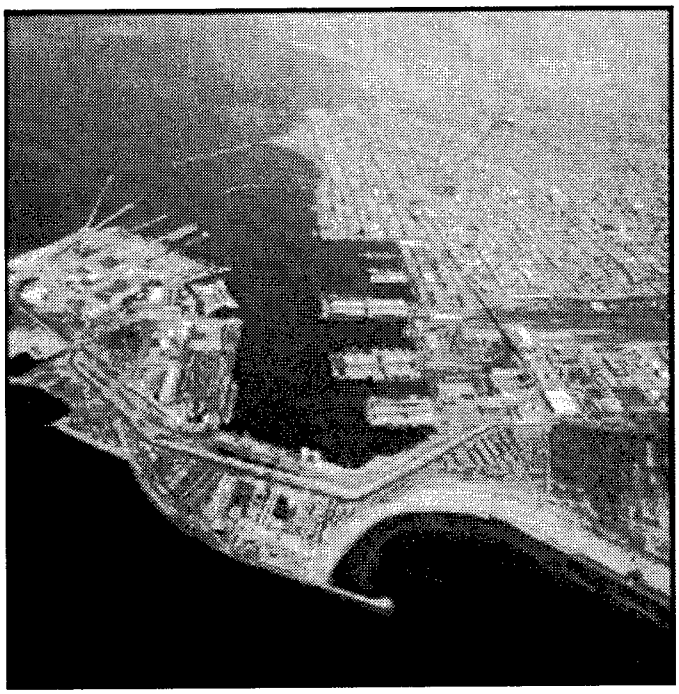
Site

The Multiple Use Terminal is located inside the Port of Veracruz, which is located in the central portion of the Gulf of Mexico in the State of Veracruz. Veracruz is the busiest port in Mexico.

Project Status

The Multiple Use Terminal, formerly known as the Veracruz Sugar Plant, was built in 1966 for sugar export purposes. This facility operated for several years until it closed down. The facility was taken over by the government in 1992.

Under the Port Privatization Program, the federal government opened the tender process in August 1995 to concession the Veracruz Multiple Use Terminal. Two months later TCE was formally estab-



Port of Veracruz

lished, and by December 1995 it obtained the concession to operate and modernize the terminal.

The port began operations in August 1996, but it lacks the modern equipment to run efficiently. The rehabilitation of the existing storage facilities is under way.

It is expected that by 1999 the terminal will be fully operational at estimated productivity rates. TCE will begin construction on the grain terminal first, followed by the molasses terminal, and finally the vegetable oil facilities.

Equipment & Services Demand

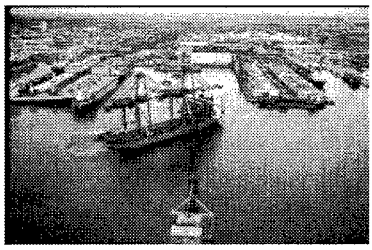
The project seeks financing and significant amounts of equipment that are currently manufactured in the United States. Total investment in equipment is estimated at US$8 million dollars. The major procurements are described below:

System	Capacity (tons/hour)	Estimated Value (US$ m)
Transportation Bands	500	2
Pneumatic Towers	300	2
Mechanical Tower	600	1

Other major systems include the following:

- Pumping Equipment
- Weighing Equipment
- Security Equipment

- Dust Control Equipment
- Quality Control Equipment
- Computer Systems
- Transportation Equipment


Port of Veracruz

Nature of Demand

The Port of Veracruz is the most important port in agricultural bulk cargo such as wheat, sugar and rice. In 1995 it moved 2.19 million tons of products, mainly imported from the United States.

The Port of Veracruz serves the heavily populated Central Region including Mexico City. The port's strategic location and the large population its serves, demand the establishment of a modern and productive distribution center.

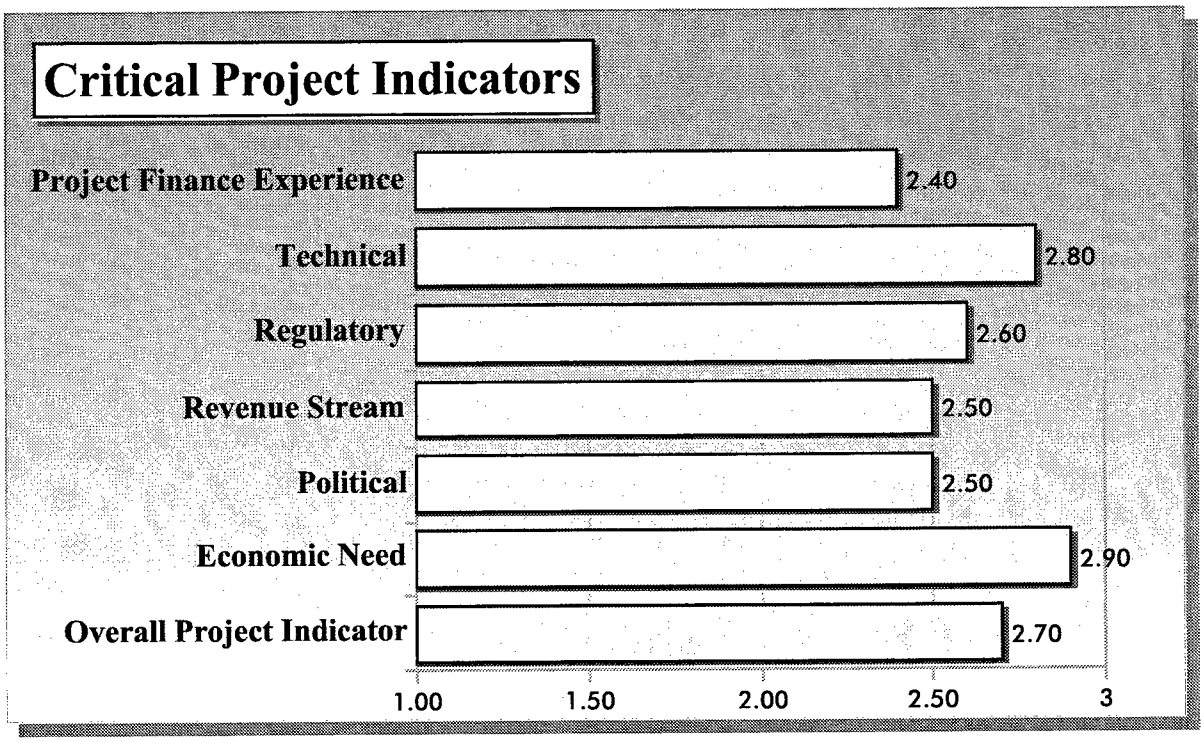
The terminal is expected to capture 18 percent of the Port of Veracruz grain market in 1996, and by 2000 handle 50 percent of the market.

Project Assessment

Although TCE is a start-up company, its members have years of experience in the port industry in shipping, stevedoring, and customs. TCE has executed feasibility and market studies which prove the soundness of the project. Based on feasibility and market studies, TCE has calculated an Internal Rate of Return of 20.8 percent.

Veracruz is the main point of entry for the import of grain, and is likely to maintain its dominance in grain movements. The only threat could come from recent modernizations at the Gulf Coast ports of Tuxpan and Tampico.

Critical Project Indicators



Key Decision Makers

Company	**Terminales de Cargas Especializadas, S.A. de C.V.**
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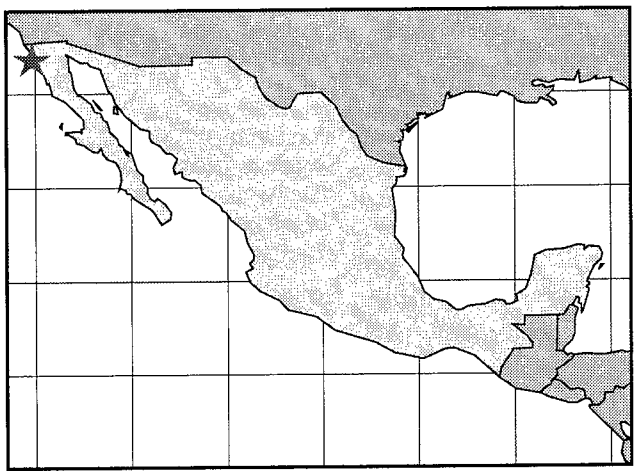
Transportation/ Port-Rail

Ensenada Port/ Tijuana-Tecate Railroad



Project Summary

Project No:	**TRA-06**
Subsector:	**Rail/Port**
State/Region:	**Baja California Norte**
Project Cost:	**$263 million**
Export Potential:	**$115-$135 million**
Owner:	**SCT**

Mexico has already concessioned a number of its port terminals. In 1996, it began privatizing port authorities as well as the remaining port terminals. The Secretariat of Communications and Transportation (SCT) is planning to develop the transportation infrastructure from Tijuana to Ensenada by offering a package to the private sector consisting of the Ensenada Port Authority, the multiple use terminal and connecting railroads.

Technical Description

The SCT will open bids for privatization of the Integated Port Authority (API) of Ensenada, the concession for multiple use terminal, as well as a railroad portion consisting of the construction and operation of a railroad between Ensenada and Tecate and operation and rehabilitation of the railroad between Tecate and Tijuana. Bids can be entered for any or all of the three parts.

Port of Ensenada

The berthing capacity at the Port of Ensenada for ocean-going vessels is 525 meters. The entry channel is 900 meters long and 9.7 to 10 meters deep. The turning basin has a diameter of 330 meters and is ten meters deep.

The port's infrastructure consists of three cargo docking positions, one 120 meter tourism dock and 444 meters of fishing docks. Storage areas contain 8,250 square meters of warehousing space and 43,600 square meters of cargo patios.

Existing equipment in the port includes seven cranes of different sizes (36, 20,15,14 and 12 tons), 32 forklifts of various size, tractors, trucks, platforms and one tug boat.

Port of Ensenada

The specific investment program will be determined by the winner of this concession. The major share of new investment is expected to be directed towards expanding the port's container handling capacity.

Existing equipment can only handle relatively small volumes of containers. An expansion is expected toinclude building new berths, installing new Gantry-cranes, and laying new railroad tracks to connect to the future Ensenada-Tecate railroad, as well as signaling and communications equipment to handle the increased flow of ships in the port. According to the API of Ensenada, the full-scale expansion and modernization will require new investment of US$88 million.

Ensenada-Tecate Railroad

Construction of the Ensenada-Tecate Railroad is estimated to cost US$175 million. Its 96 kilometers of U.S. standard rail will connect the Port of Ensenada with the existing Tecate-Tijuana Railroad. This will connect Ensenada and the region with U.S. railroads and ports.

Tecate- Tijuana Railroad

The existing 70 kilometer Tecate-Tijuana railroad connects the maquiladora industry of Baja California with the ports of San Diego, Long Beach and Los Angeles through the U.S. Southern Pacific Railroad and the Atchison Topeka and Santa Fe Railroad. Through this network the Tecate-Tijuana railroad, currently operated by San Diego and Arizona Eastern, also has access to Mexico's Pacific North Railroad. The railroad will be bid together with the Ensenada-Tecate railroad.

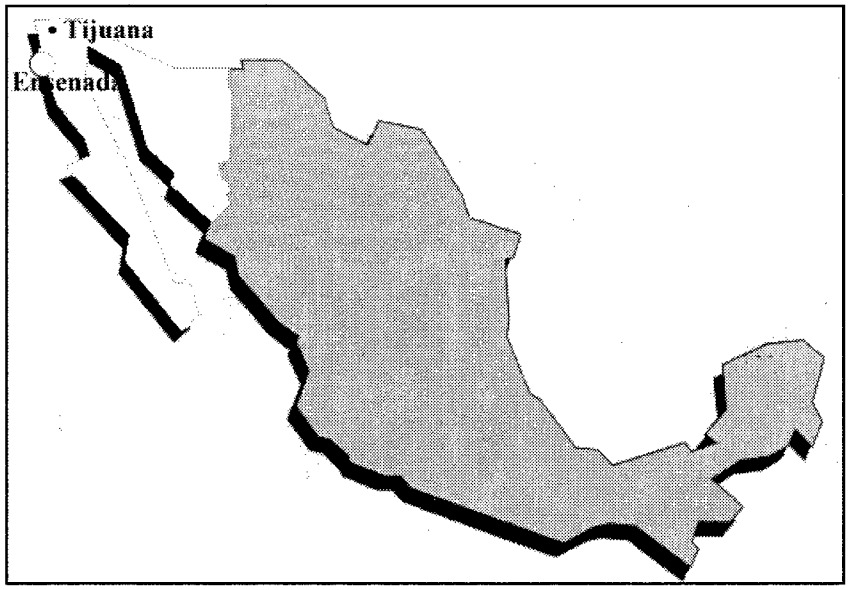
Privatization Process

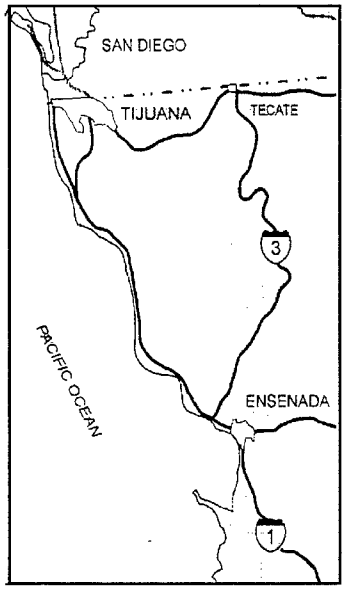
SCT opened a registration process in March 1996 which will continue until the tenders are released. The purpose of this registration process is to identify interested firms, establish their interests, as well as further investigate the private sector's views on transportation development in the State of Baja California Norte.

The package being planned will consist of three parts: the Port Authority, the multi-use terminal, and the two railway lines. Interested parties can enter bids for any or all of these three pieces.

Site

The Port of Ensenada is located on the northern Pacific coast of the Peninsula of Baja California, just 112 kilometers from the U.S. border and ten navigation hours from the Ports of Los Angeles and Long Beach. The railroad is planned to run from the Port of Ensenada to the border city of Tecate and from there to the City of Tijuana.





Project Status

In March 1996 the SCT announced its intention to concession the Port of Ensenada and the nearby railroads and opened the above mentioned process to identify and register interest among prospective concessionaires.

Feasibility studies and environmental impact studies have not yet been completed but are expected to be carried out before the actual bidding process starts. The API expects that bids will open in the first quarter of 1997.

Equipment & Services Demand

Specific investments in the port will be identified by the winning concessionaire in a plan to be presented to the SCT. The plan is expected to include investment in container handling capacity as well as purchases of Gantry-cranes, signaling, dredging, breakwater reinforcement, and communications equipment, including EDIFAC technology, and construction of additional storage space.

Construction of the Ensenada-Tecate railroad is expected to require an investment of US$175 million dollars with US$150 million dollars for railroad infrastructure and US$25 million dollars for rolling stock. The project will require significant financing, specialized engineering services and equipment including:

- Construction Equipment
- Railroad Track

- Railroad Ties
- Signaling and Communications Equipment and Signs
- Rolling Stock
- Bridge Materials

The export potential for both port expansion and construction of the new railroad is estimated at US$100-120 million.

Nature of Demand

The Port of Ensenada serves the Northwest Region of Mexico as well as the southwestern states of the U.S. The main business of the Port of Ensenada is cruise ship operations. It is the second most important tourism port in Mexico after Cozumel, but only tenth in terms of cargo handling, accounting for two percent of total cargo tonnage handled by ports in Mexico.

With construction of the Ensenada-Tecate railroad, the Port of Ensenada will become an attractive alternative for U.S. exporters to the Pacific Rim. In addition it will receive cargo from the developing maquiladora industry resulting from U.S., Japanese and Korean investment in the State of Baja California, especially in the Tecate-Tijuana corridor. The maquiladora industry is currently served by ports in California.

Ports in California are already heavily congested and are facing increasing demand from both the local economy and from the maquiladora industry in Mexico. Consequently, Ensenada, with its accompanying railroads, is well placed to complement these congested U.S.-based ports after an expansion of Ensenada's container handling facilities.

In fact, the Port of Ensenada currently has excess capacity as a result of the economic downturn, which means that it can expand its container handling with minimal adjustments. Please see the following table:

Cargo Handled by the Port of Ensenada

Type of Cargo (tons)	1994	1995	May 1996
General Bulk	85,230	109,522	34,607
Containers	18,257	7,178	1,063
Agricultural Bulk	16,741	0	17,971
Mineral Bulk	782,433	709,564	261,050
Liquids	0	0	0
Total	902,671	826,264	314,691

Source: Puertos Mexicanos

Project Assessment

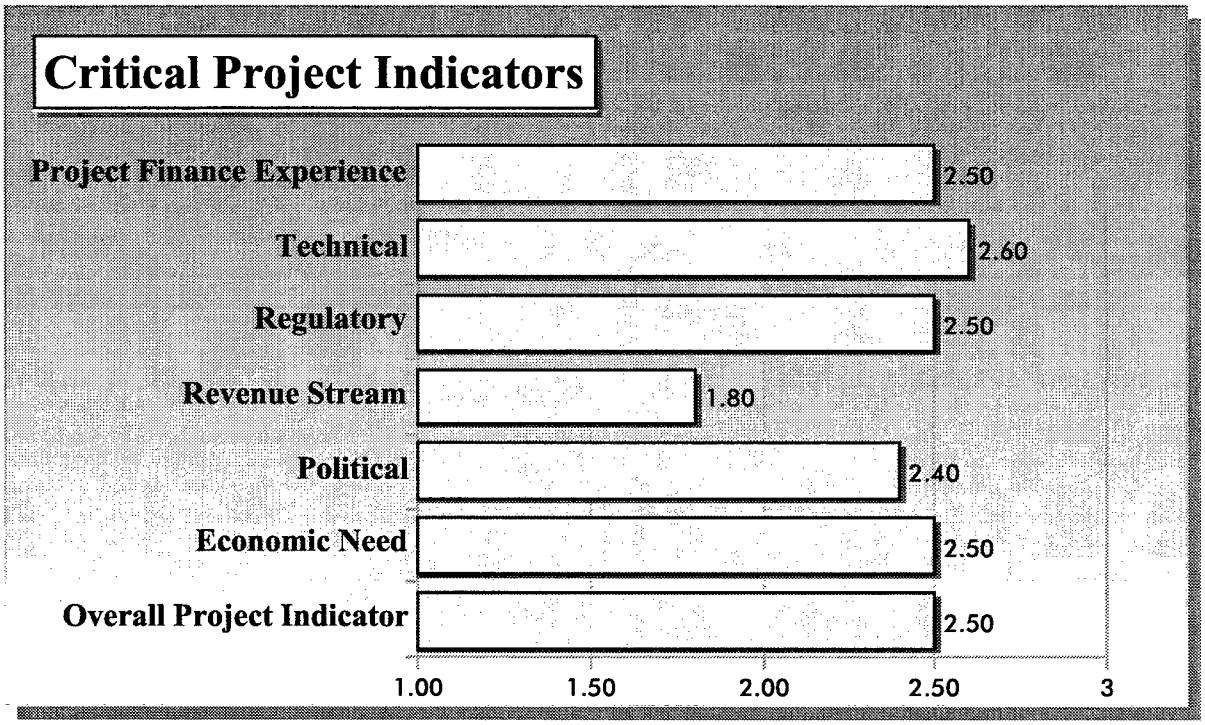
Port privatization in Mexico has proven that existing infrastructure can be turned into a modern and profitable operation. Concessionaires for the most part have reported profits in their first year of operations, while Mexico's overall port productivity has improved dramatically.

Offering the port and the railroad together in a package not only ensures continued development of this region but also offers the concessionaire an opportunity to market integrated multi-modal transportation services to industries throughout the region.

Consequently, on the basis of Mexico's track record and the existing level of trade intensive industry in the region, the potential revenue flow looks favorable.

Further economic and technical feasibility studies remain to be completed in order to confirm the viability of the package as a whole, particularly the railroad. In fact, the key issues to keep an eye on in this concession are its estimated market and the actual cost of building the new railroad.

Critical Project Indicators



Key Decision Makers

Company	**Integrated Port Authority of Ensenada**
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Title	General Coordinator of Ports and Merchant Marine
Location	México, D.F.
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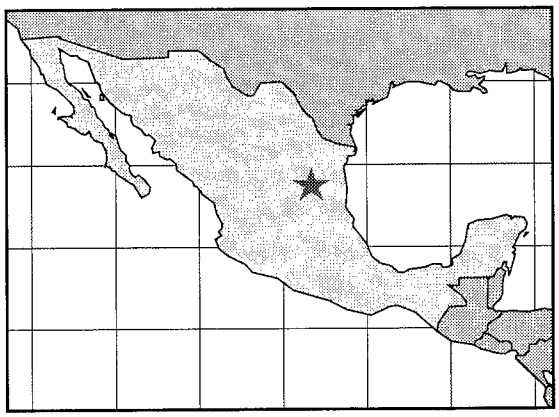
Fax	(52-5) 688-4874

Company	**SCT - Structural Change Unit**
Name	Lic. Cecilia Amero Coutigno
Title	General Director of Planning and Structural Operations
Location	México, D.F.
Phone	(52-5) 530-3060, ext. 5307
Fax	(52-5) 530-1190

Transportation/ Rail

Northeast Railway



Project Summary

Project No:	**TRA-07**
Subsector:	**Rail**
State/Region:	**Northeast Mexico**
Project Cost:	**$200 million**
Export Potential:	**$120 million**
Owner:	**FNM**

The Secretariat of Communications and Transportation (SCT) is in the process of privatizing short and regional lines of state-owned Mexican National Railways (FNM). The Mexican railroad system will be privatized on a regional basis connecting all portions of the nation, in which the main lines for concession will be the Northeast Railway, the Pacific-North Railway and the Southeast Railway. Short lines such as the Chihuahua-Pacific Railway will also be concessioned.

The objectives of privatization are: a) to provide the country with safe, competitive and efficient rail service, and b) to spur the use of multimodal transportation.

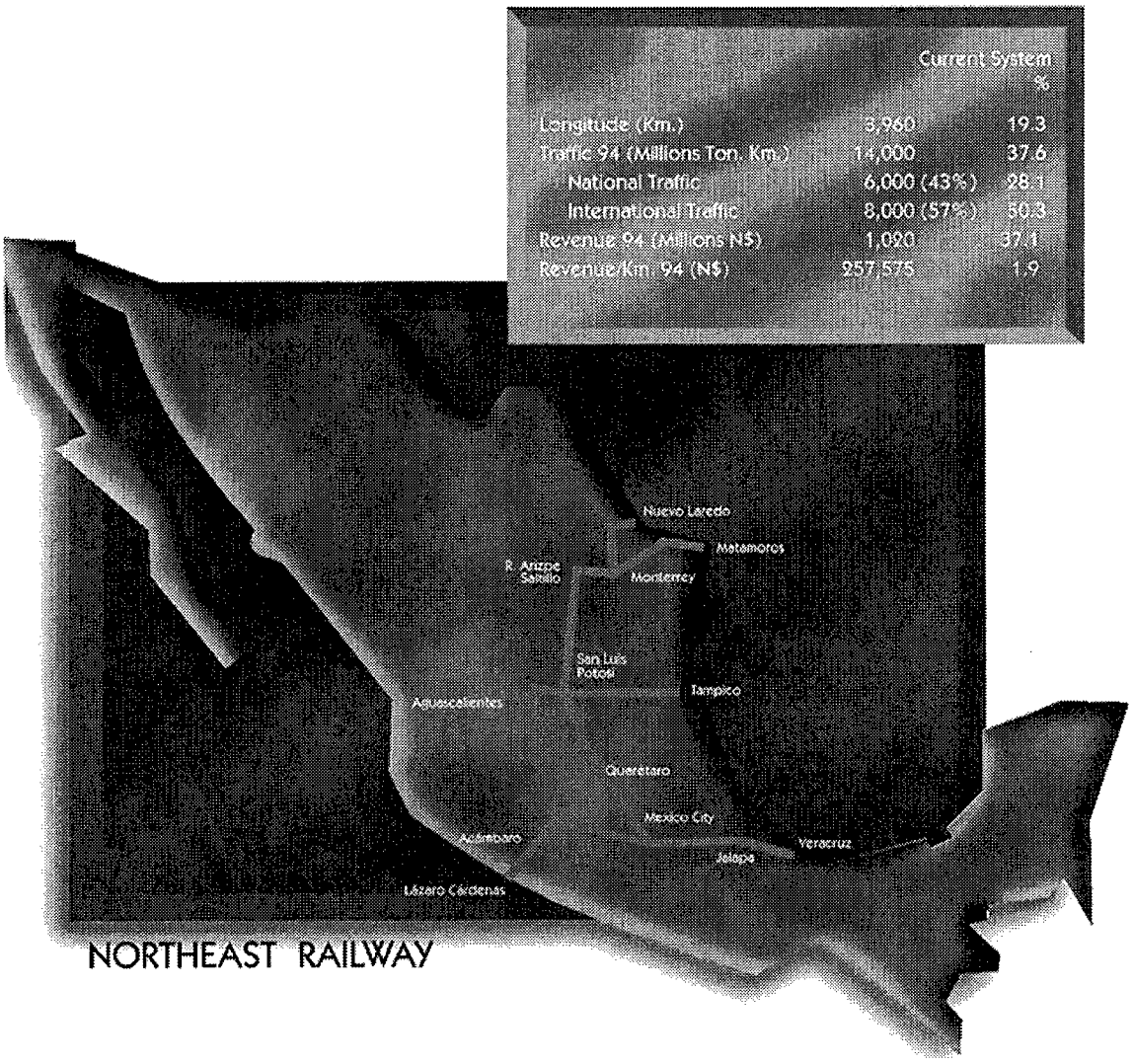
Technical & Site Description

The SCT is planning to sell 80 percent of the shares in FNM's Northeast Railway. The winner of the bidding -- to be announced in December 1996 -- will be awarded a 50-year management concession and all the existing property, as well as the Northeast Railway's existing debt. The winner will also receive a 25 percent stake in the Mexico City rail terminal. The Northeast will require significant investments for the upgrade of equipment and railroad infrastructure.

The Northeast Railway accounts for 38 percent of total rail cargo in Mexico. Its 3,960 kilometer track (19 percent of the market) connects the northeastern and eastern regions of Mexico with the two largest industrial zones of Mexico: Mexico City and Monterrey. The railroad also links Mexico with the United States border and with ports on the Pacific and Gulf coastlines. Most of its major routes connect with Mexico City. These routes include:

- Querétaro-Nuevo Laredo
- Monterrey-Matamoros
- Aguascalientes-Tampico
- Mexico City-Veracruz
- Mexico City-Lázaro Cárdenas
- Acambaro-Escobedo

The Northeastern Railway serves the multimodal terminals of Mexico City, Ramos Arizpe and Monterrey and connects with the Pacific port of Lázaro Cárdenas in Michoacán and the Gulf ports of Tampico and Veracruz, the most important in the country.



	Current System	%
Longitude (Km.)	3,960	19.3
Traffic 94 (Millions Ton. Km.)	14,000	37.6
National Traffic	6,000 (43%)	98.1
International Traffic	8,000 (57%)	50.3
Revenue 94 (Millions N$)	1,020	37.1
Revenue/Km. 94 (N$)	257,575	1.9

Source: FNM

The total length of Mexico's railway system is 26,477 kilometers, of which 77 percent are primary lines and the rest are short or private lines. This network includes 10,335 kilometers of welded rail, of which 7,689 kilometers are on concrete railroad ties. Additional infrastructure includes 17 cargo terminals, 10,800 bridges, and 300 tunnels.

The SCT is reluctant to make an estimate of the railway's assets or modernization needs, so as not to prejudice the market. In regards to modernization of the railway, industry sources estimate that US$200 million in new investment will be needed to upgrade the Northeast Railway.

Project Status

In May 1995, the Federal Government published the new "Law Regulating Railway Services." This law outlines and regulates opportunities for the private sector to provide public rail transportation and related services. This new Law enables private companies to obtain concessions and permits to operate rail systems and services for a maximum of 50 years. This period may be extended for an additional 50-year term. Foreign investors can acquire up to 49 percent of total equity and may invest more with the permission of the National Commission for Foreign Investment.

Once the concession is granted, the concessionaire will be able to set its tariffs freely and solicit authorization from the SCT to install non-rail infrastructure within the right of way, including electric power lines and fiber optics.

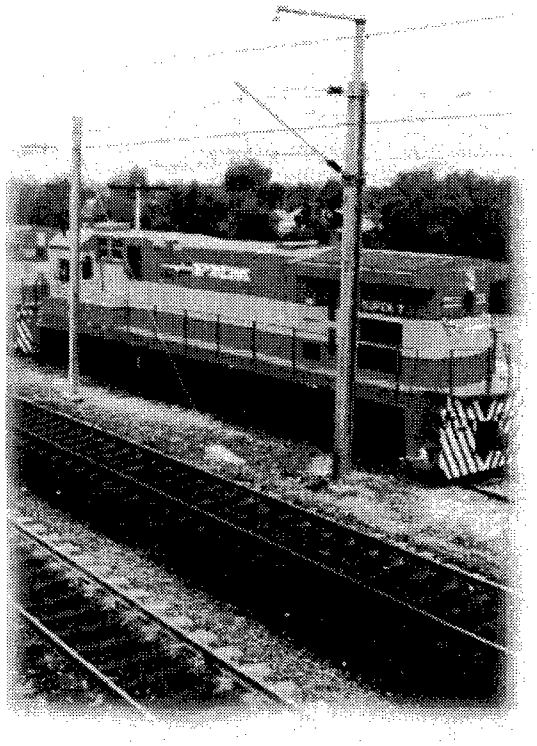
On June 10, 1996, the SCT announced the opening of bids for the first Mexican railroad privatization. It is expected that the Chihuahua-Pacific Railroad will be awarded by the end of September. Tenders for the Northeast Railway registration were released on August 9, 1996. Prequalification registration for interested companies closed on August 26. After evaluating the registration materials, the SCT will then invite the prequalified consortia to submit technical and financial proposals. Technical proposals will be evaluated by November 29, 1996. Financial proposals, to be judged separately, will be evaluated by December 10. The winner will be named no later than December 16, 1996.

Equipment & Services Demand

Concessionaires will be required to invest in the rehabilitation of tracks and terminals to maintain and improve the existing infrastructure. Opportunities exist for investment, providing financing, maintenance and new equipment. Specifically, the railroad modernization will need:

- Signaling Equipment
- Telecommunications Equipment
- Cargo Handling Equipment for Terminals
- Specialized Rolling Stock
- Control Systems

Additionally there is a plan to build a rail terminal in Monterrey's international airport, which will enable regional industries to access foreign markets through multimodal transportation.



Nature of Demand

The Mexican railway system is estimated to account for 20 percent of total freight transported by land. In 1994 it handled 52 million metric tons of cargo, equivalent to 37.3 billion ton-kilometers, which generated revenues of 2.7 billion pesos, approximately US$770 million at 1994 exchange rates.

Cargo distribution in 1994 was dominated primarily by industrial and agricultural products, which accounted for more than 76 percent of total cargo.

In 1994 the Northeast Railway traffic was 14 billion ton-kilometers, composed of 43 percent domestic and 57 percent international traffic. This generated revenues of US$136 million representing 17.6 percent of total revenues for the Mexican railroad system.

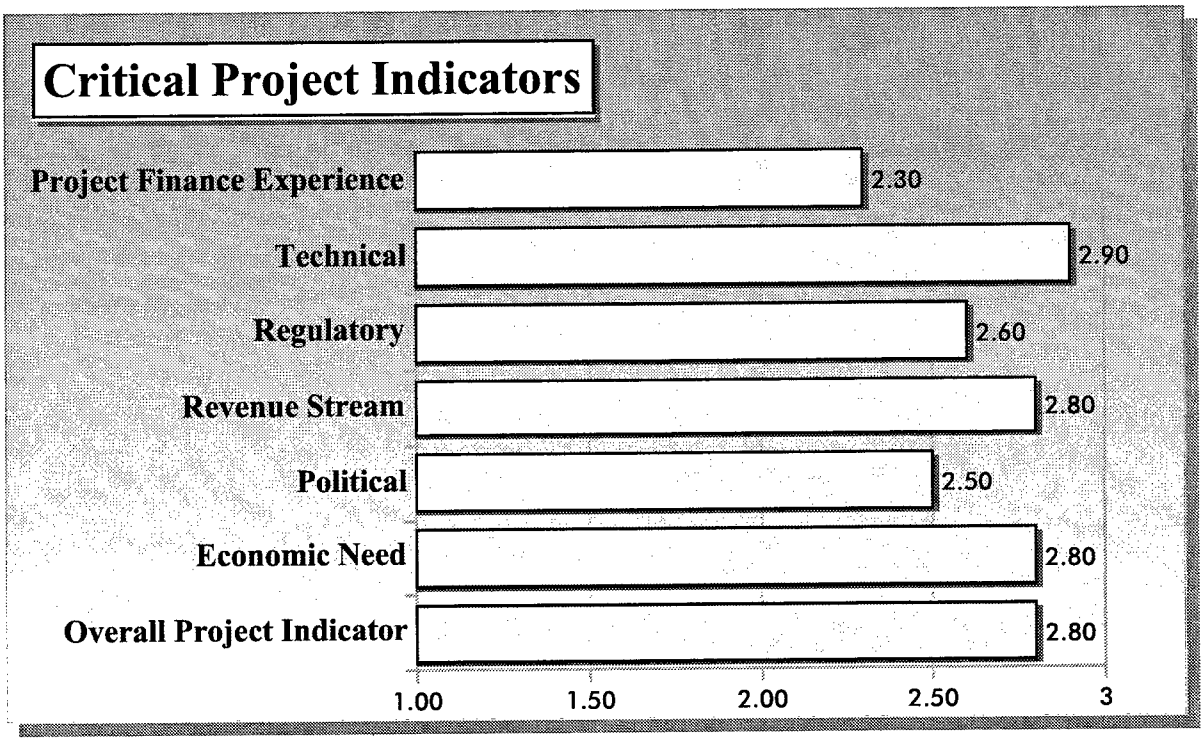
The Northeast Railway handles the majority of border crossing traffic through Nuevo Laredo, and it enjoys direct access to the State of Texas, making it a very attractive investment option for companies involved in the transportation sector.

In this railroad corridor one concession has already been granted to operate a unitary non-stop train from Laredo to Mexico City. This service has proved to be an efficient one under the privatization program.

Project Assessment

The government is strongly committed to the privatization of the Mexican railroad system and it has carefully begun the process. There are more than 80 parties interested in participating in the privatization. Major U.S., Mexican, Canadian and European groups have already registered to obtain further information to better assess their investment strategies.

Critical Project Indicators



Key Decision Makers

The SCT's Structural Change Unit is directing the railway privatization process. The Unit is being advised by Grupo Financiero Serfín.

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Company	**Grupo Financiero Serfín**
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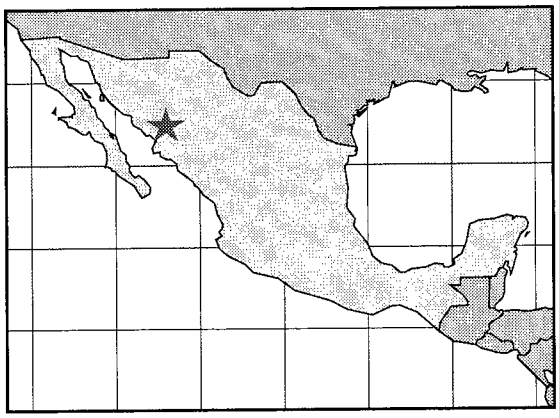
Transportation/ Rail

Pacific-North Railway



Project Summary

Project No:	**TRA-08**
Subsector:	**Rail**
State/Region:	**Pacific Coast**
Project Cost:	**$500 million**
Export Potential:	**$300 million**
Owner:	**FNM**

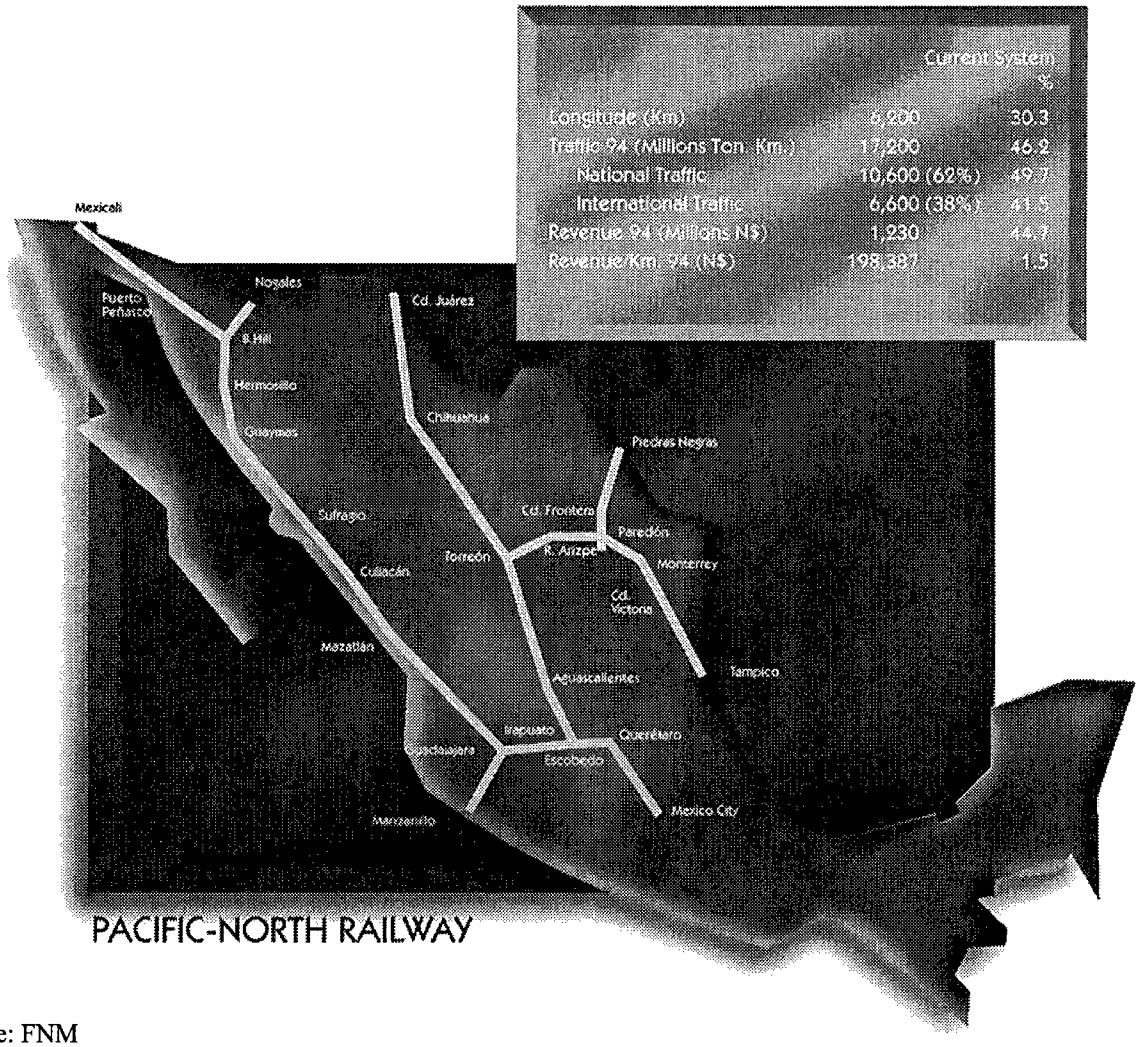
The Secretariat of Communications and Transportation (SCT) is in the process of privatizing the regional and short lines of the state-owned Mexican National Railways (FNM). The Mexican railroad system will be privatized on a regional basis. The main lines for concession will be the Pacific-North Railway, the Northeast Railway and the Southeast Railway. Shorter regional lines such as the Chihuahua-Pacific Railway will also be concessioned.

The objective of such privatization is to provide the country with safe, competitive, and efficient rail transportation service. The privatization program will also promote the use of multimodal transportation.

Technical & Site Description

The Pacific-North Railway accounts for 46 percent of total rail cargo in Mexico. Its 6,200 kilometer track connects the major industrial regions of Mexico City, Monterrey and Guadalajara with ports on both coasts and with the United States border. Its main routes which connect with Mexico City are:

- Querétaro- Guadalajara- Manzanillo
- Benjamin Gil- Mexicali
- Irapuato- Ciudad Juárez
- Guadalajara- Nogales
- Tampico- Monterrey- Torreón
- Saltillo- Piedras Negras



Source: FNM

The Pacific-North Railway serves the multimodal terminals of Mexico City, Saltillo, Ramos Arizpe, Guadalajara, Aguascalientes and Querétaro. It also has direct access to automobile manufacturing plants in Ramos Arizpe, Hermosillo, La Encantada and Silao and connects with the Pacific ports of Guaymas, Manzanillo and Mazatlan and the Gulf port of Tampico.

The total extension of Mexico's railway system is 26,477 kilometers, of which 77 percent is of primary lines and the rest are short or private lines. This extension includes 10,335 kilometers of welded rail, of which 7,689 kilometers are on concrete railroad ties. Additional infrastructure includes 17 cargo terminals, 10,800 bridges, and 300 tunnels.

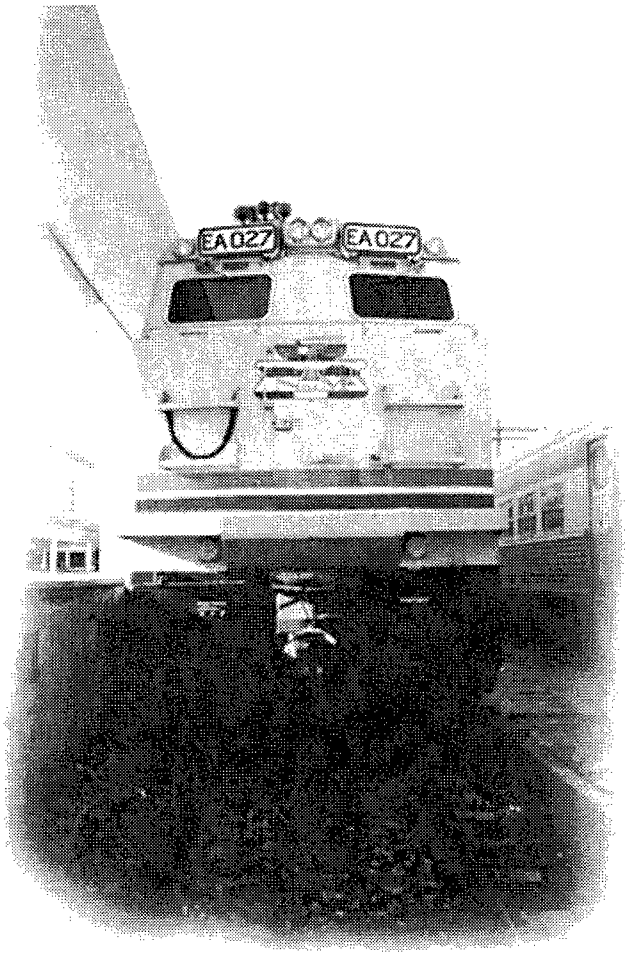
The SCT is reluctant to make an estimate of the railway's assets or modernization needs, so as not to prejudice the market. In regards to modernization of the railway, industry sources estimate that US$500 million in new investment will be needed to upgrade the Pacific-North Railway.

Project Status

In May 1995, the Federal Government published the new "Law Regulating Railway Services," outlining the opportunities for the private sector to provide public rail transportation and related services. This new Law enables private companies to obtain concessions and permits to operate rail systems and services for a maximum of 50 years. This period may be extended for an additional 50-year term. Foreign investors can acquire up to 49 percent of the total equity and may invest more with permission of the National Commission for Foreign Investment.

Once a concession is granted, the concessionaire will be able to set its tariffs freely and solicit authorization from the SCT to install non-rail infrastructure within the right of way, including electric power lines and fiber optics.

On June 10, 1996, SCT announced the opening of bids for the first Mexican railroad privatization. It is expected that the Chihuahua-Pacific Railway will be awarded by the end of September. On August 9, 1996, the SCT opened bids for the Northeast Railway, in which the government will maintain 20 percent ownership with the intention of placing these shares on the stock market at a future date. This concession is expected to be awarded no later than December 16, 1996.



Bids to concession the Pacific-North Railway are likely to open in the last quarter of 1996. The process will proceed in three stages:

1. Registration of interested parties: This phase will consist of applying for and obtaining registration from the SCT.

2. Technical- Financial Appraisal: In this stage SCT will conduct all technical and financial studies to determine the most viable terms on price, opportunity, etc. to concession the railroad.

3. Bidding: To participate in this process, interested parties will have to meet all necessary requirements, obtain authorization from SCT to participate in the bidding, establish a good-faith deposit, and submit first a technical proposal and later a financial proposal.

Equipment & Services Demand

Concessionaires will be required to invest in the rehabilitation of tracks and terminals to maintain and improve the existing infrastructure. Opportunities exist for investment, providing financing, maintenance and new equipment. The railroad modernization will need:

- Signaling Equipment
- Telecommunications Equipment
- Cargo Handling Equipment for Terminals
- Specialized Rolling Stock
- Control Systems

Nature of Demand

The Mexican railway system is estimated to account for 20 percent of total freight transported by land. In 1994 it handled 52 million metric tons of cargo, equivalent to 37.3 billion ton-kilometers, which generated revenues of 2.7 billion pesos, approximately US$770 million at 1994 exchange rates.

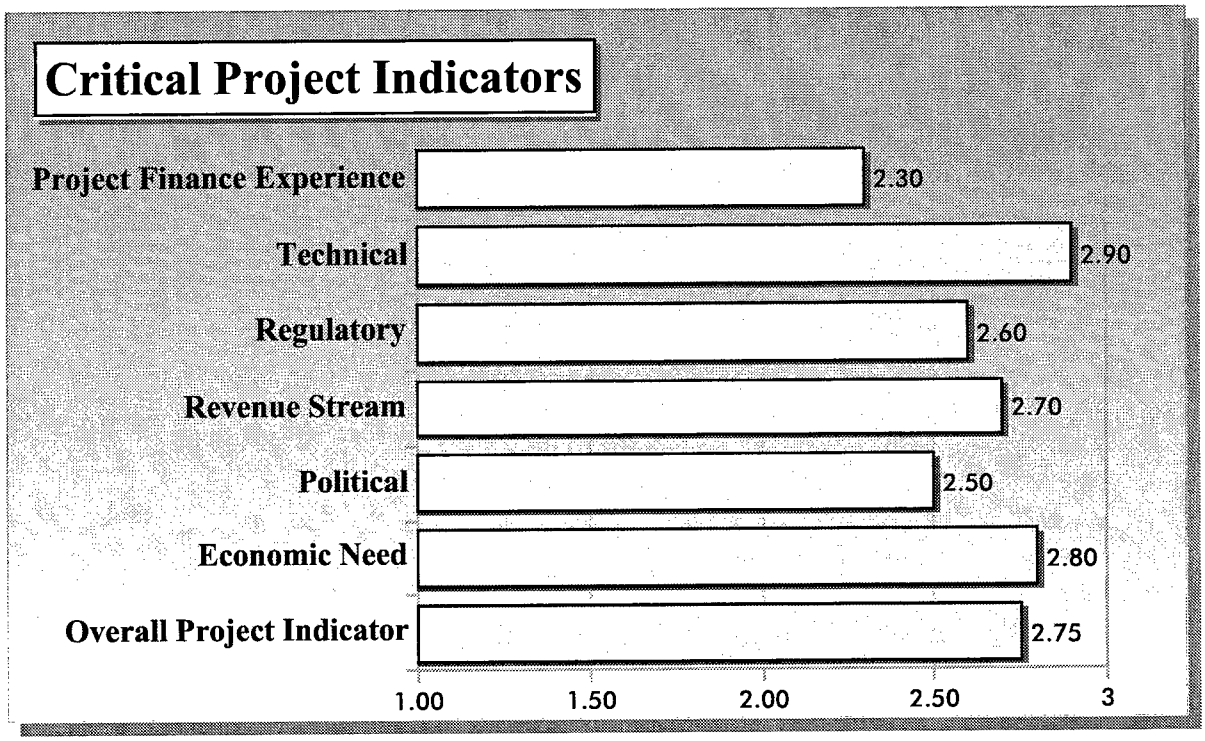
Cargo distribution in 1994 was dominated primarily by industrial and agricultural products that accounted for more than 76 percent. In 1994, the Pacific-North Railway transported 17.2 billion ton-kilometers; 62 percent domestic cargo and 38 percent international. Revenues were US$164 million, representing 21.3 percent of the Mexican railroad system's total revenues.

The Pacific-North Railway handles a significant amount of border crossing traffic that has been triggered by NAFTA and it enjoys direct access to the States of Arizona, California, New Mexico and Texas, making it a very attractive investment option for companies involved in the transportation sector.

Project Assessment

The government is highly committed to privatize the Mexican railroad system and it has carefully begun the process. There are more than 80 parties interested in participating in the privatization. Major U.S., Mexican, Canadian and European groups have already registered to obtain further information to better assess their investment strategies.

Critical Project Indicators



Key Decision Makers

The SCT's Structural Change Unit is directing the railway privatization process. The Unit is being advised by Grupo Financiero Serfín.

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Company	**Grupo Financiero Serfín**
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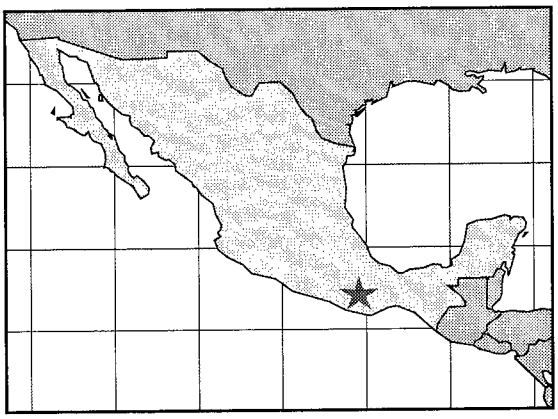
Transportation/ Rail

Southeast Railway Modernization



Project Summary

Project No:	**TRA-09**
Subsector:	**Rail**
State/Region:	**Southeast Mexico**
Project Cost:	**$800 million**
Export Potential:	**$360 million**
Owner:	**SCT**

The Secretariat of Communications and Transportation (SCT) is in the process of privatizing the regional and short lines of the Mexican railway system, which is currently operated by the state-owned Mexican National Railways (FNM). The main lines to be put up for concession are the Southeast Railway, the Northeast Railway and the Pacific-North Railway. Additionally, there will be shorter regional lines such as the Chihuahua-Pacific Railway, for which bids opened in July 1996.

The objective of privatization is to provide the country with safe, efficient, competitive rail service as part of a national network of multimodal transportation.

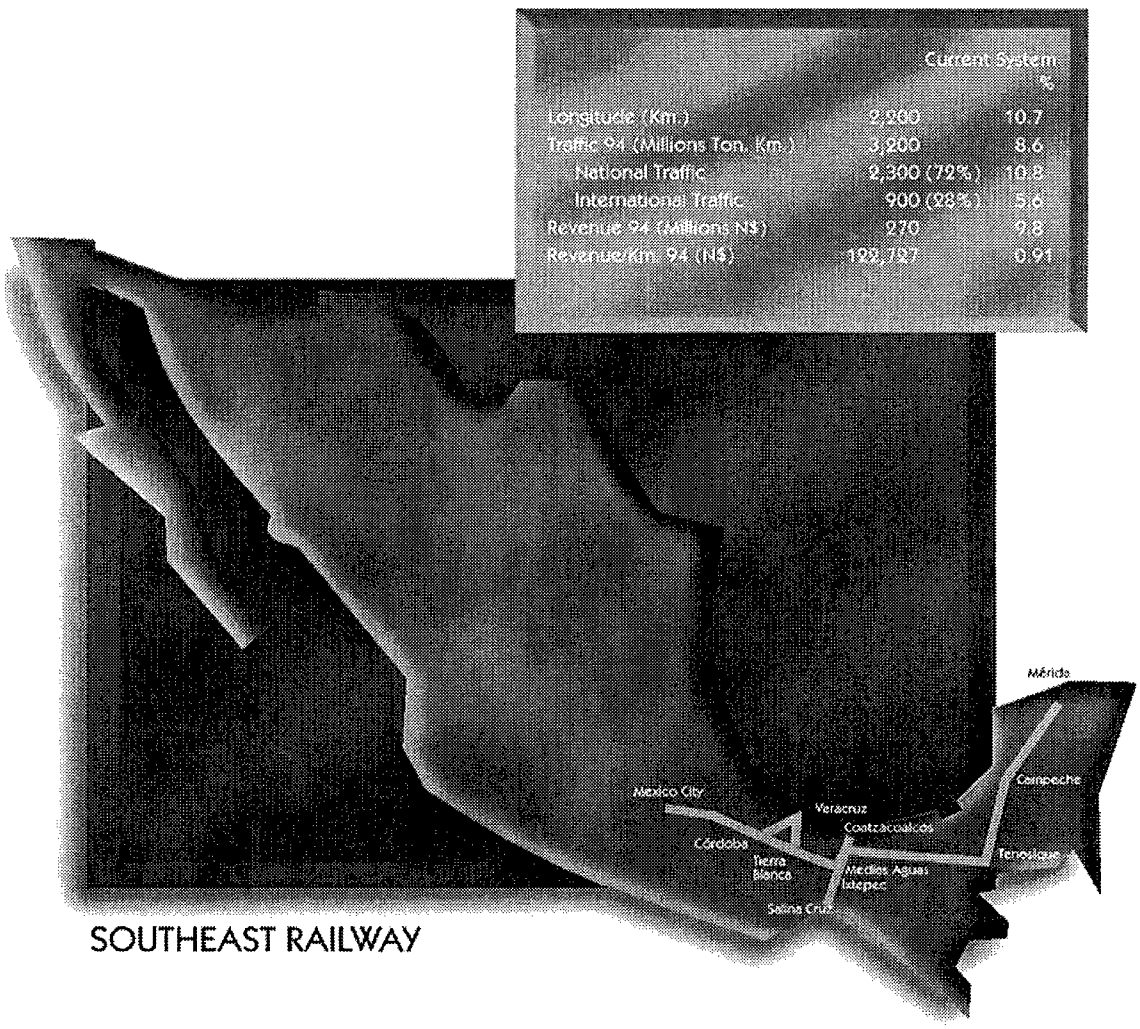
The main assets of the Southeast Railway are the stretch between the Port of Veracruz and Mexico City and the connection between the Coatzacoalcos, in the Gulf of Mexico, and Salina Cruz, on the Pacific Coast crossing the Isthmus of Tehuantepec.

Technical & Site Description

The new Law Regulating Railway Services of May 1995 allows letting concessions to private companies for operation of the rail systems for a maximum of 50 years, with the possibility of a 50-year extension. Due to the Southeast Railway's strategic location in the Isthmus of Tehuantepec, the Mexican government has decided to limit foreign ownership in this railway to 49 percent, a restriction which does not apply to the other railway concessions. Once a concession has been granted, the concessionaire will be able to set tariffs freely but must solicit authorization from the SCT to install non-rail infrastructure such as electric power lines and fiber optics inside the right of way.

The Southeast Railway will require significant investment in rehabilitation of track and terminals, signaling and communications systems as well as maintenance and purchases of new rolling stock. The SCT is reluctant to make estimates of the cost of modernization or the value of the railroad's assets, so as not to prejudice the market. However, industry sources estimate that US$800 million will be needed to modernize the railroad system. Half of that is expected to be invested in the route connecting the ports of Coatzacoalcos and Salina Cruz.

The Southeast Railway has 2,200 kilometers of track and connects the southeastern portion of Mexico, including the Yucatán Peninsula, with Mexico City. It also connects to the rest of the country via the Pacific-North and the Northeast Railways. The railroad also links to the ports of Veracruz and Coatzacoalcos in the Gulf of Mexico with the port of Salina Cruz on the Pacific Coast. The connection between Coatzacoalcos and Salina Cruz runs across the Isthmus of Tehuantepec. Using these ports and the rail link for trans-shipment cuts maritime transit times from Asia to Europe significantly. Please see the following map:



The main routes of the Southeast Railway are:

- Mexico City-Veracruz
- Coatzacoalcos-Salina Cruz
- Córdoba-Medias Aguas
- Veracruz-Tierra Blanca
- Coatzacoalcos-Mérida
- Apizaco-Puebla
- Tehuacán-Esperanza

The total length of Mexico's railway system is 26,477 kilometers. Seventy-seven percent of the network is primary lines and the remainder consists of short or private lines. This system counts on 10,335 kilometers of welded rail out of which 7,689 kilometers run on concrete railroad ties. Additional infrastructure includes 17 cargo terminals, 10,800 bridges and 300 tunnels.

Existing rolling stock will be assigned proportionately among the rail concessions. The Southeast Railway has 11 percent of all track and approximately nine percent of the cargo market. However, the SCT has still to determine the exact division of rolling stock among the different lines.

Project Status

In May 1995, the Federal Government published the Law Regulating Railway Services. This law outlines regulations for private sector involvement in providing cargo and passenger rail transportation and related services.

On June 10, 1996, the SCT opened bids for the first railroad privatization, the Chihuahua-Pacific Railway. It is expected that this concession will be awarded by the end of September 1996.

On August 9, 1996, the SCT opened bids for the Northeast Railway, in which the government will maintain 20 percent ownership with the intention of placing these shares on the stock market at a future date. This concession is expected to be awarded no later than December 16, 1996.

It is expected that bids for the Southeast Railway will open in the last quarter of 1996 or first quarter of 1997. The bidding process will proceed in three stages:

1. Registration of interested parties: This phase will consist of applying for and obtaining registration from the SCT.

2. Technical- Financial Appraisal: In this stage SCT will conduct all technical and financial studies to determine the most viable terms on price, opportunity, etc. to concession the railroad.

3. Bidding: To participate in this process, interested parties will have to meet all necessary requirements, obtain authorization from SCT to participate in the bidding, establish a good-faith deposit, and submit first a technical proposal and later a financial proposal.

After privatization of the Chihuahua-Pacific line (a regional short line) and the Northeast Railway, the Pacific-North Railway and the Southeast Railway are expected to follow, in that order.

Equipment & Services Demand

This project offers an opportunity for investors, operators, and equipment suppliers. After the concession has been awarded there will be a need for equipment and services as well as financing. New equipment requirements include:

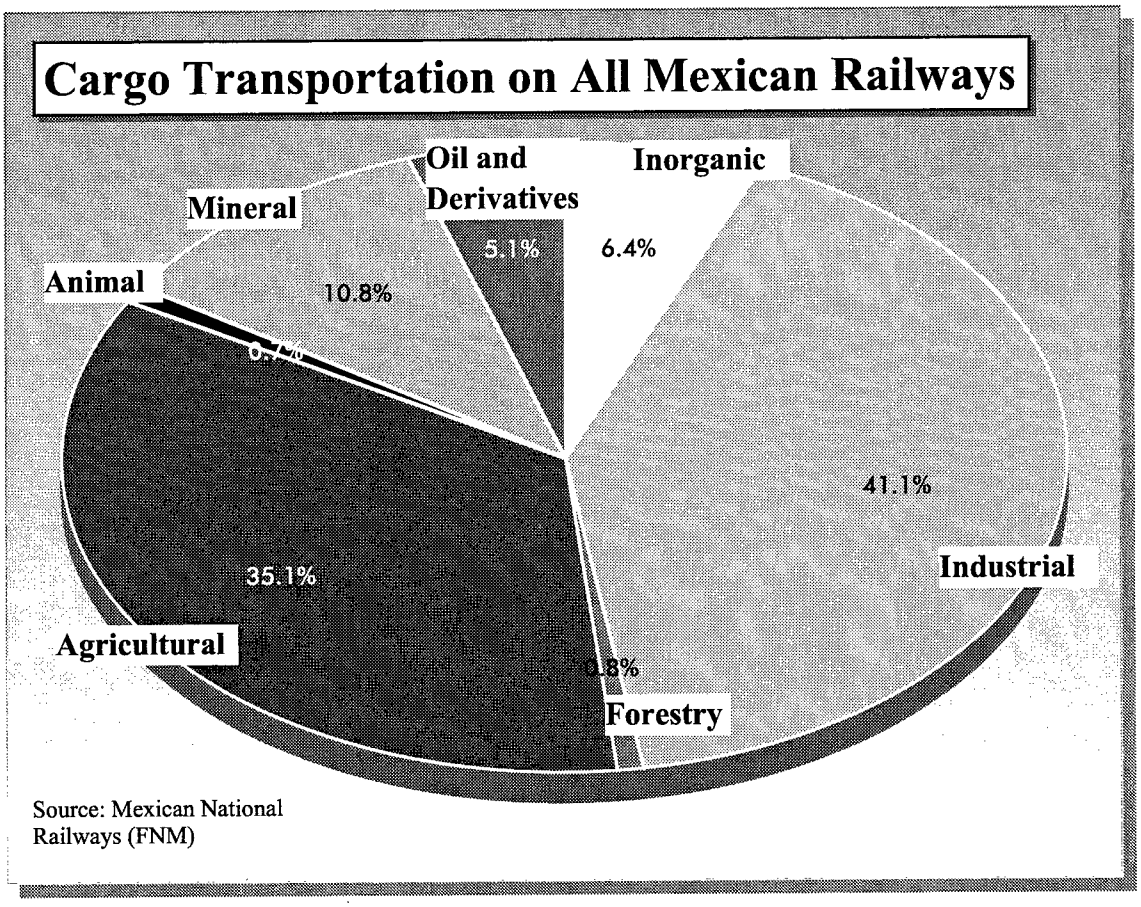
- Signaling Equipment
- Telecommunications Equipment
- Cargo Handling Equipment for Terminals
- Specialized Rolling Stock
- Control Systems
- Track
- Railroad Ties

Exact equipment requirements will be determined by feasibility studies currently under way. Export potential is estimated at US$360 million.

Nature of Demand

The Mexican Railway System handles approximately 20 percent of all freight transported by land in Mexico. In 1994 it handled 52 million metric tons of cargo, equivalent to 37.31 billion ton-kilometers, which generated revenues of 2.7 billion pesos, approximately US$770 million at 1994 exchange rates.

The Southeast Railway connects with the multimodal terminal of Mexico City. It also serves the automobile industry in Puebla, the agricultural zones of Tehuantepec and Veracruz, and the petrochemical regions of Tabasco and Veracruz. In 1994, traffic on the Southeast Railway traffic was 3.2 billion ton-kilometers. Cargo in 1994 was dominated primarily by industrial and agricultural products, which accounted for more than 76 percent.



This traffic generated revenues of US$77 million, equivalent to 10 percent of total revenues for the Mexican railroad system, handling 9 percent of total rail cargo in Mexico. Domestic traffic accounted for 72 percent of total cargo; international traffic accounted for the remaining 28 percent.

The Southeast Railway handles a significant amount of petrochemicals and connects Mexico City with southeastern states such as Tabasco, Campeche and Yucatan. Although devaluation of the peso has reduced the revenues generated by the Southeast Railway, both measured in U.S. dollars and absolute terms, potential demand on its lines remains high.

The most important existing route is the high-volume line linking Mexico City with the Port of Veracruz, a port which accounts for 25 percent of all maritime cargo in Mexico. Moreover, the link between Coatzacoalcos on the Atlantic and Salina Cruz on the Pacific is a rail bridge between the Atlantic and Pacific Oceans making the two ports into multi-modal trans-shipment centers which can reduce shipping times significantly. The latter line requires significant investment, as mentioned above.

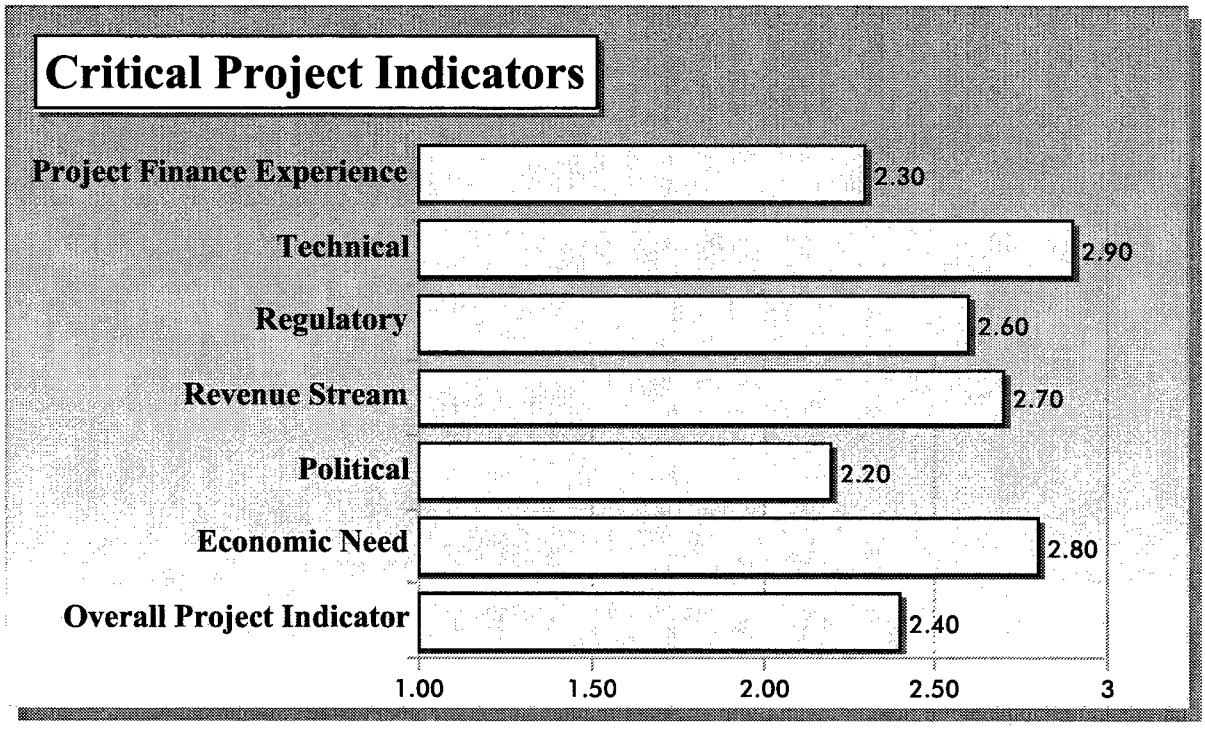
Project Assessment

The government is highly committed to privatize the Mexican railroad system and has already launched the process. More than 80 parties, including major U.S., Mexican, Canadian and European groups, have registered their interest in participating in the privatization and have requested further information.

The Southeast Railway is the smallest of the three large railroad concessions let by the SCT. Nevertheless, the Veracruz-Mexico City line and the potential inter-coastal railroad bridge promises strong revenue streams.

The fact that the Mexican government will maintain ownership of 51 percent of the railway for strategic purposes may be of concern to prospective investors. It would be extremely important for the concessionaire to establish a position of maximum managerial independence in the final concession contract.

Critical Project Indicators



Key Decision Makers

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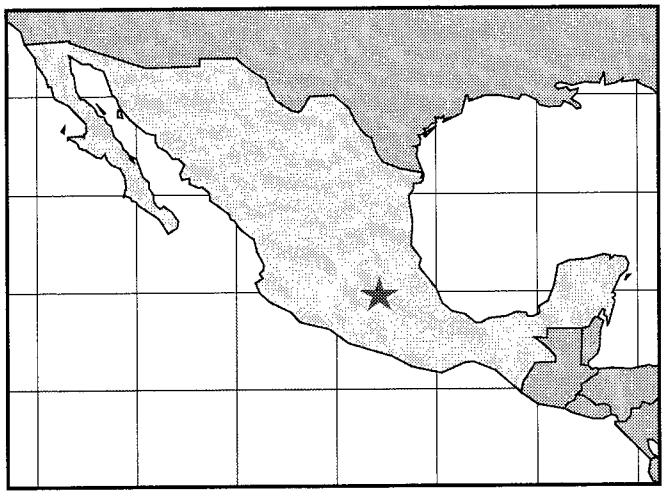
Transportation/ Urban Mass Transit

Mexico City Elevated Train



Project Summary

Project No:	**TRA-10**
Subsector:	**Urban Mass Transit**
State/Region:	**Federal District**
	State of Mexico
Project Cost:	**$1.05 billion**
Export Potential:	**$200 million**
Owner:	**Grupo Concesionario Metropolitano**

Grupo Concesionario Metropolitano, S.A. de C.V. (GCM) is a consortium formed by Grupo Mexicano de Desarrollo, S.A. (GMD), Triturados Basalticos, S.A. de C.V. (Tribasa), the design and engineering firm Rioboo, S.A. and the Canadian train manufacturer Bombardier. In November 1994, GCM won a 25-year concession to build and operate an elevated train in Mexico City, "Line C." The consortium is particularly interested in equipment manufacturers that can also arrange financing.

Technical Description

The Mexico City elevated train will consist of 30.2 kilometers of both elevated and underground track, servicing 20 stations. The Quebec-based company Bombardier, which manufactures in Canada, Mexico, and the U.S., will provide the actual train denominated Mark II, better known as the Sky Train. These trains will use electric engines that do not contribute to air or noise pollution. Energy will be supplied through a third level rail, obviating the use of aerial cables. Although the consortium has a design for the electrical engines, it is open to consider new designs which may be more economical than the current one.

The elevated train line is projected to be fully computerized and automated. It will travel at an average speed of 39 kilometers per hour. Transit time for the whole line is expected to be 33 minutes. The route is designed to connect with lines 2, 3, and 7, enabling users to arrive at any Metro destination in Mexico City.

Construction of the line will be divided into two sections to be built simultaneously: one elevated and one underground.

Elevated Train

In Phase I, a stretch of 21.6 kilometers of elevated track will run above the Periférico beltway from Santa Mónica to Chapultepec Park and will service 13 elevated stations. Phase II will add an additional three stations. The stations for Phase I will be:

- Barrientos
- Santa Mónica
- Satélite
- La Florida
- Echegaray
- Gustavo Baz
- 1° de Mayo
- Cuatro Caminos
- Toreo
- Hipódromo
- Ejército Nacional
- Palmas
- Fuente de Petróleos

Elevated track will be laid during night shifts; most of its elements will be prefabricated. This will facilitate its construction and maintain relatively normal traffic flows on the Periférico beltway. The track will rest on sets of three columns with a diameter of 0.9 meters and heights ranging from 5 to 12 meters, depending on terrain. These columns will be spaced between 12 and 35 meters apart.

It is estimated that construction of the elevated track will advance 150 meters per day. Installation of equipment on the track will take place without interfering with traffic.

Underground Train

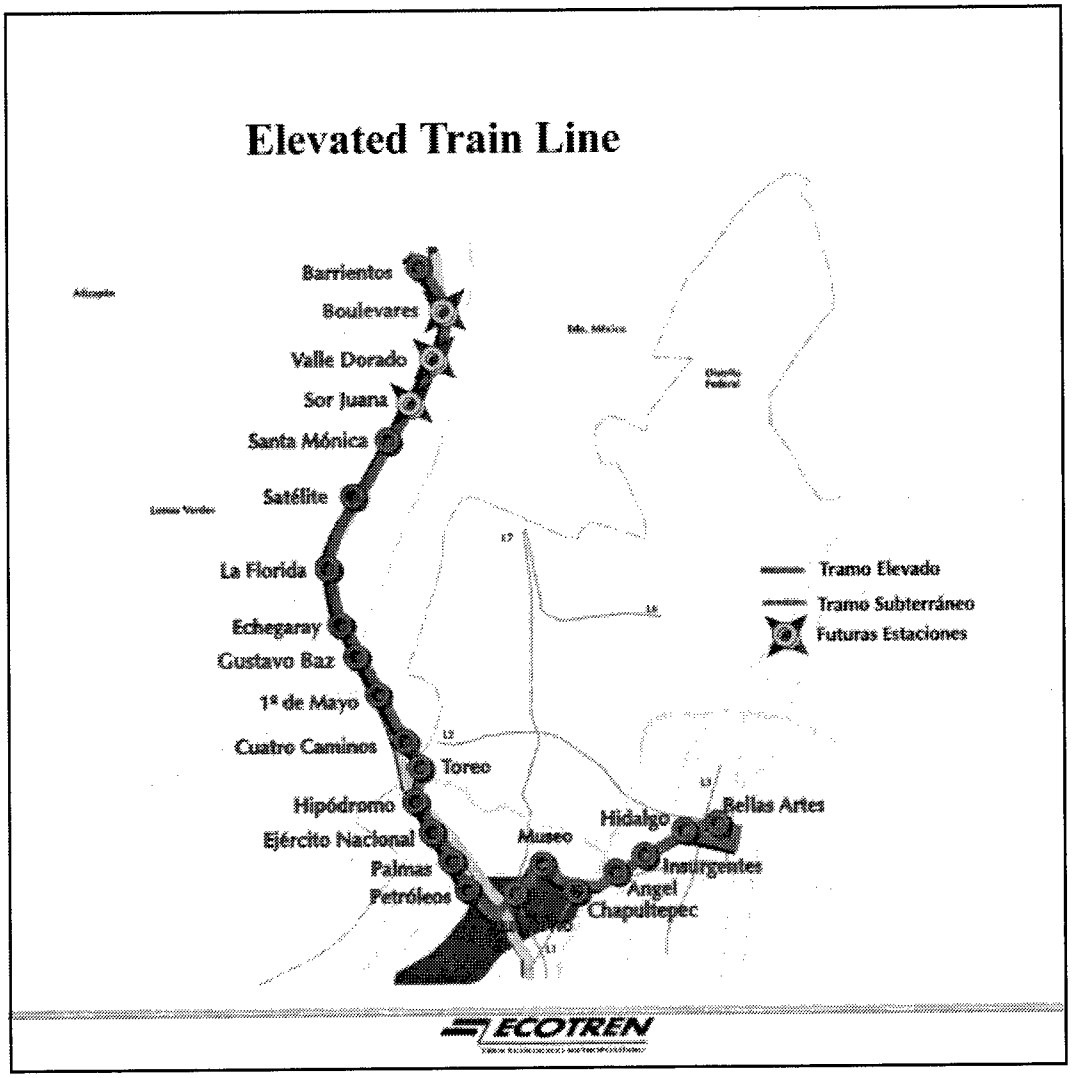
The underground track is 8.6 kilometers long and for the most part will run under Reforma Avenue from Chapultepec Park to Bellas Artes, providing service to seven underground stations, including:

- Auditorium
- Museum
- Chapultepec
- Column of Independence
- Insurgentes
- Hidalgo
- Bellas Artes

Construction of these underground stations is expected to take approximately one year, requiring minimal disturbance of traffic on Reforma during the first six months.

Site

The Mexico City elevated train will be located above the Periférico beltway and below Reforma Avenue, connecting the northern metropolitan area of Mexico City with downtown.



Project Status

In December 1993, the consortium formed by GMD, Tribasa, Rioboo, and Bombardier won the bid to build and operate the elevated train. An environmental impact study was completed in October 1994 by private consultants and approved by the National Ecology Institute (INE). In the fourth quarter of 1994, the governments of Mexico City and the State of Mexico granted a 25-year concession to build and operate the Elevated Train (line "C") of the Metropolitan area subway.

The project has been suspended temporarily due to financial difficulties. Although the consortium has raised over US$800 million, it still requires an additional US$200 million to make up the total investment.

Provided that financing is found, construction is expected to begin in the first quarter of 1997. It will be divided in two parts that will start simultaneously:

1. Elevated Train: Santa Monica to Chapultepec Park (36 months)
2. Underground: Chapultepec Park to Bellas Artes (44 months)

Equipment and Services Demand

Even though the trains will be provided by Bombardier, the magnitude of this project requires substantial additional equipment, including:

- Electrical Substations and Equipment
- Fare Collection Systems
- Equipment for the Operations Center
- Electromechanical Installations
- Telecommunications
- Computer Systems
- Mounting Equipment
- Construction Equipment
- Drilling Equipment

In addition, the consortium is open to suggestions for new electrical engines for the trains that are more economical than existing models, particularly if the new engines also carry a finance package.

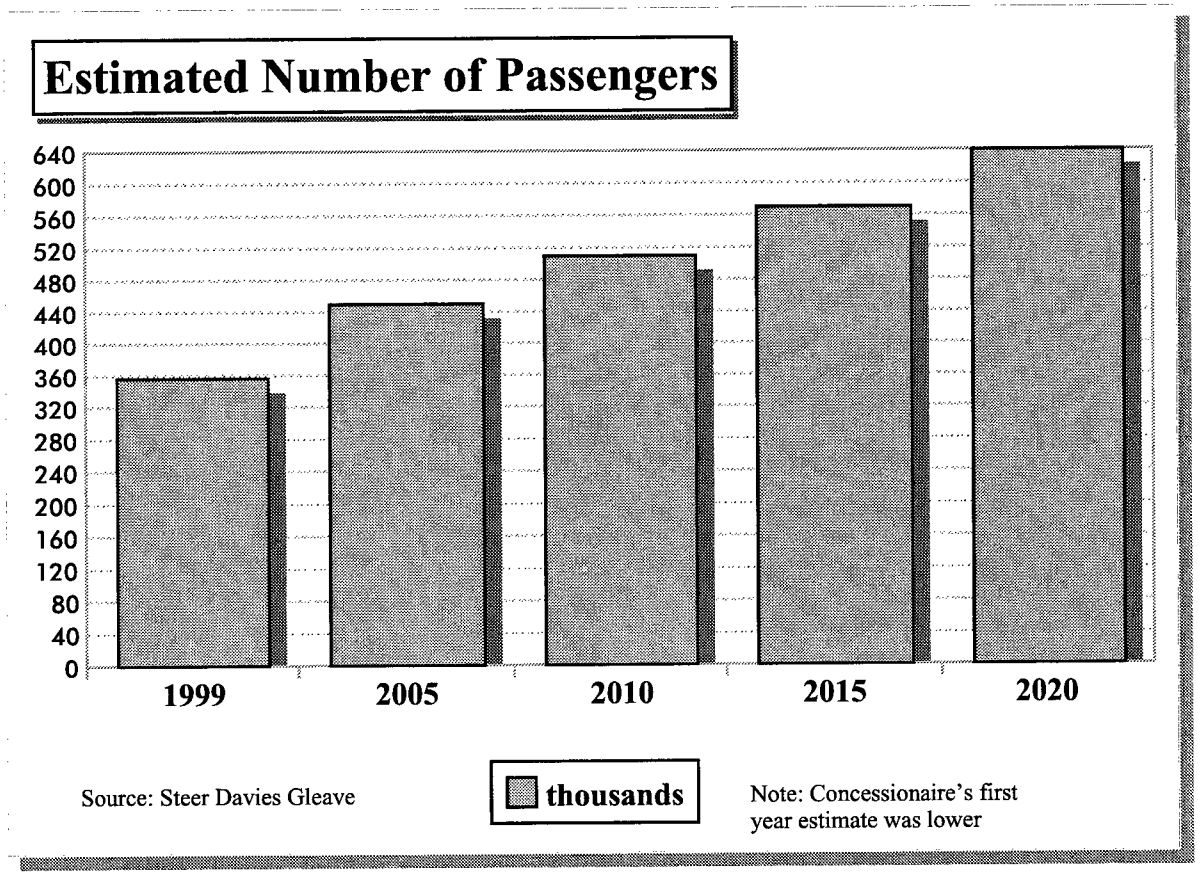
The project requires specialized technical engineering services. As mentioned above, the consortium welcomes both investment and equipment manufacturers who can arrange financing.

Nature of Demand

Mexico City is one of the largest cities in the world as well as one of the most congested and polluted. Moreover, its population continues to grow rapidly, increasing the strain on existing transportation infrastructure.

The elevated train is an environmentally beneficial solution which promises to provide urban mass transit capacity for Mexico's City highly congested and prosperous north and northwestern areas. The five-kilometer strip of the Periférico beltway from Santa Mónica to Toreo is used by more than four million people daily. The elevated train will reduce intra-city transportation time by 330,000 man hours as well as eliminate 57,000 automobiles from circulation and the consumption of 231,000 liters of gas per day.

In 1994 a team of consultant firms including Arthur Andersen and Steer Davies Gleave conducted feasibility and traffic studies generating the following demand estimates:



Source: Steer Davies Gleave

Note: Concessionaire's first year estimate was lower

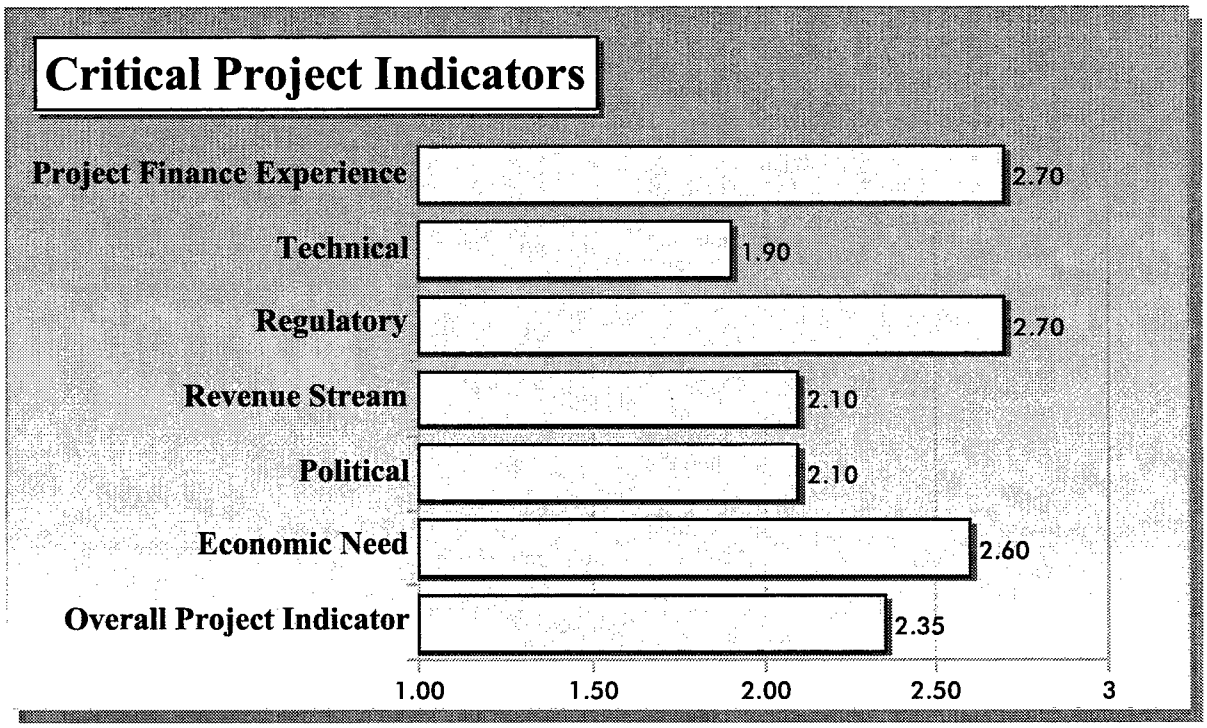
Project Assessment

After the project was halted by protesting Polanco residents and by Mexico's deepening economic crisis, it was redesigned and reapproved by the government.

Mexico City and federal authorities are supporting the project and expect it to commence construction in the first quarter of 1997.

All necessary feasibility and environmental studies are complete and the project is expected to commence as soon as GCM arranges financing for the remaining US$200 million. It is currently negotiating with Japanese, Canadian, French, and Mexican financial institutions. However, it is quite interested in obtaining U.S. direct or equipment-related financing.

Critical Project Indicators



Key Decision Makers

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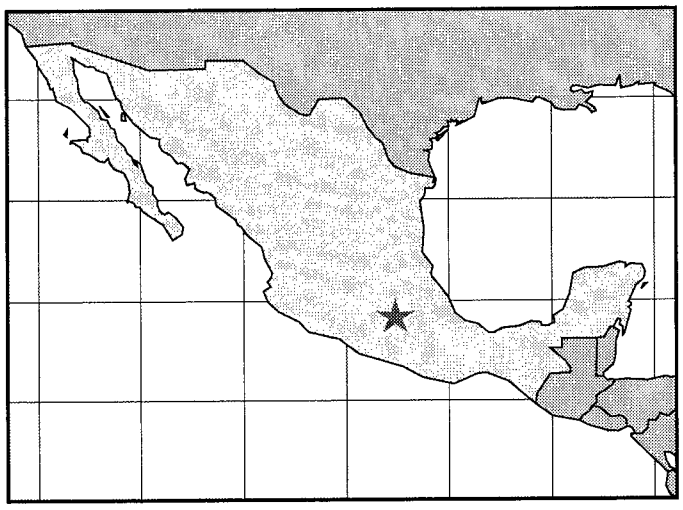
Transportation/ Urban Mass Transit

Modernization of the Metro Fare System



Project Summary

Project No:	**TRA-11**
Subsector:	**Urban Mass Transit**
State/Region:	**Federal District**
Project Cost:	**$80 million**
Export Potential:	**$55 million**
Owner:	**STC-Metro**

Even as Mexico City faces increasing traffic congestion on its roads, existing public transportation remains unable to remedy the situation. Consequently, improving, expanding, and modernizing public transportation is one of the principal priorities of the Government of Mexico City.

An intrinsic part of this process is the modernization of the fare collection system which will enable the metro company to change the fare structure to more accurately reflect usage and payment capacity, and thus to reduce reliance on local government subsidies.

Technical Description

After 26 years of operation, the fare collection system used by Metro is ready to be modernized in order to improve both quality of service and operational capacity. The new system will also enable the Metro company to apply a diversified fare structure that accommodates the purchasing power of different social groups: workers, the disabled, students, youth, regular users, etc.

The current fare structure is one peso per trip anywhere within the system for all travelers. A differentiated fare structure will enable STC-Metro to charge based on distance, so as to generate more revenue. The new fare system will also utilize multi-trip cards reducing the demand on station sales offices.

Due to economic constraints, the STC-Metro will rely on the private sector to provide and arrange

financing for the project, based on the total ticket-sale revenue stream, boosted by greater intake. A new fare structure will enable the Metro company to finance expansion and modernization, based on fares collected, and will enable it to rely less on diminishing local subsidies.

Requirements of the New System

Rather than specifying the exact type of system it requires, STC-Metro will invite private-sector proposals.

The new system should provide the Metro company with information on the traffic-flow, increase operational capacity and processing speed, prevent fare evasion and fraud, and increase efficiency of ticket sales. This entails fulfilling the objectives below.

The system should:

- Offer the user a range of options when choosing a ticket. Variables should include social groups (i.e. student, worker, etc.), time limited passes, and length of trip.
- Improve service to the users with fast ticket vending machines that are simple to operate.
- Facilitate the processing of passengers and improve transfer efficiency at Metro stations.
- Create a precise, automated system for fare collection at station entrances.
- Offer protection against fare evasion, falsification and fraud with a secure system.
- Withstand heavy usage and vandalism.
- Improve security and performance of the equipment, using remote sensing systems that can monitor breakdowns and repairs.
- Facilitate collection of operational statistics in all areas of the Metro network.
- Facilitate expansion in phases--using a modular approach.

Modernization Process

Modernization will proceed in three stages:

1. Modify the farecard turnstiles to process multi-trip tickets and, later on, electronic "smart cards." When introduced to the Mexican market, users will be able to store money on the electronic strip of "smart cards," and use them to pay for purchases at places outside the Metro, such as restaurants, shops, etc.

2. Install computers at Metro stations and a central computer network.
3. Modify single-trip ticket turnstiles to process new tickets and electronic "smart cards."

Phase I will be initiated in 1996. It consists of modernizing 969 turnstiles to accept multi-trip cards and sliding passes. The second phase consists of modernizing 409 turnstiles and installing central mainframe computers and line servers. Phase III will introduce electronic "smart cards."

Phase I alone is expected to cost US$80 million. It will be financed on the basis of increased revenue from the new system.

Type	Actual	Phase I	Phase II	Phase III
Ticket Format	Edmonson Ticket (reduced)	Edmonson Ticket	Edmonson Ticket (Tele-toll cards)	Edmonson Ticket (Tele-toll cards)
Type of Ticket	single fare and two-week ticket	single fare, multi-trip, slide-through card, special cards and timed cards	single fare, multi-trip, slide-through card, special cards and timed cards	single fare, multi-trip, slide-through card, special cards and timed cards
Lines in Operation	10	10	10	
Stations	154	154	154	175
Turnstiles	951 single 402 card	951 single 402 card	951 single 402 card	1581 for all types of cards
Ticket Offices	256	256	256	295
Ticket Distribution Machines	10	165	165	295
Automatic Ticket Machines	10	3	6	6
Terminals in Operation	121	121	121	121
Station Computers	19	19	19	175
On-Line Servers				10
Central Computers				2
Portable Computers		8	8	8
Tele-Toll Card Recodifier			165	165
Duration of the Stages		9 months	10 months	12-18 months

Source: SCT-Metro

Site

The Metro system covers Mexico City and the surrounding metropolitan area.

Project Status

Phase I of this project is expected to start in the last quarter of 1996 and continue for nine months. Phase II will start in the second half of 1997 and last ten months. Phase III is expected to start in 1998 and last 12 to 18 months.

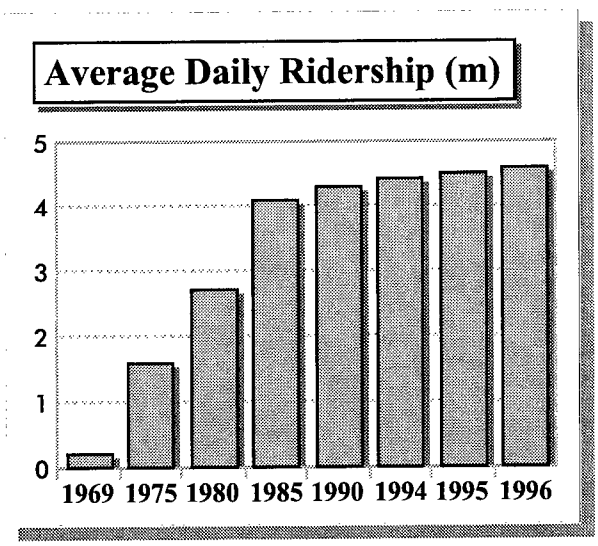
Equipment and Services Demand

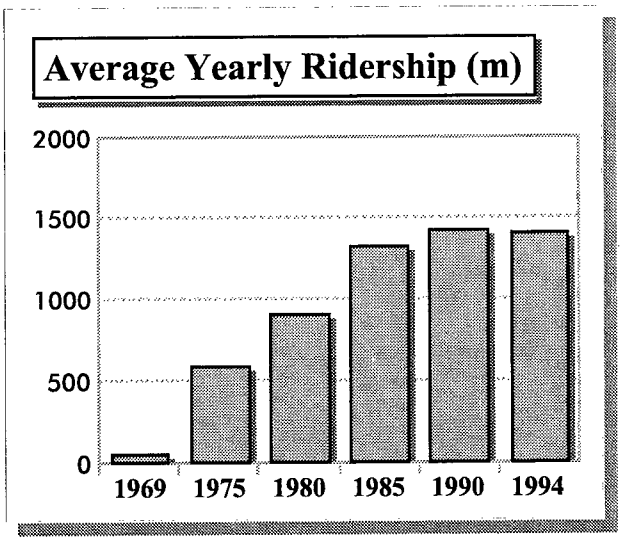
The project will be designed and implemented by the company winning the bid. Equipment needs include:

- Electronic Vending Machines Upgradable to Process "Smart Cards"
- Turnstiles (969 + 409 = 1378 turnstiles)
- Security and Monitoring Systems
- Ticket Processing Software
- Mainframe and Client Computers and Networking Software
- Electronic "Smart Cards"
- Training in the Use and Repair of Equipment

Nature of Demand

The Metro system in Mexico City transports approximately 4.6 million people each workday and has a capacity of 296,000 passengers per hour in each direction. This number is steadily increasing placing additional strain on the processing capabilities of the existing system.





Source: STC-Metro

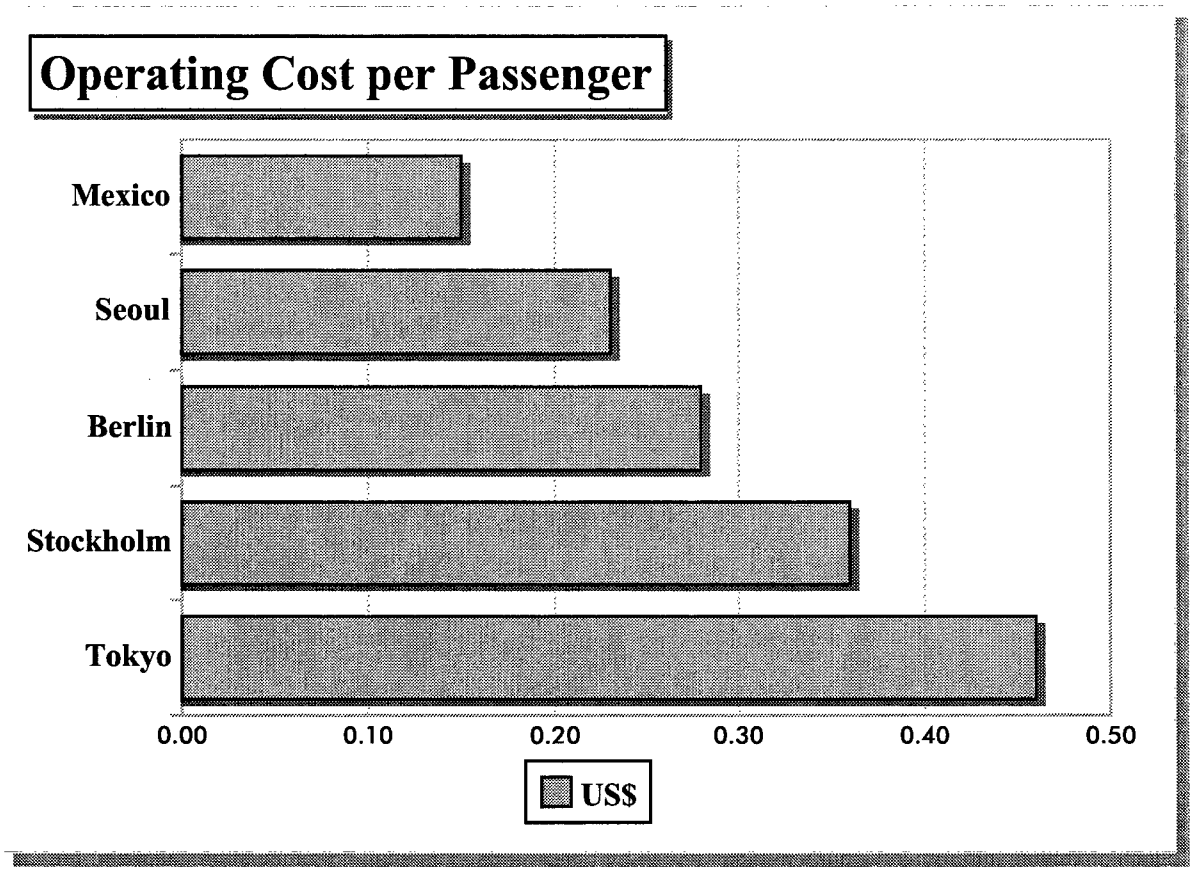
In addition, the existing equipment is antiquated and does not allow for any significant differentiation in pricing. Hence, the metro company is unable to shift more costs on to the passengers who can actually afford to pay more. This problem has become particularly acute as local government resources have dwindled, while the STC-Metro is undertaking a major expansion of its capacity with the construction of the new Line "B" and the Mexico City Elevated Train.

With diminishing resources and increasing passenger levels, the necessity and economic benefits of increased processing efficiency and fare collection are considerable.

Project Assessment

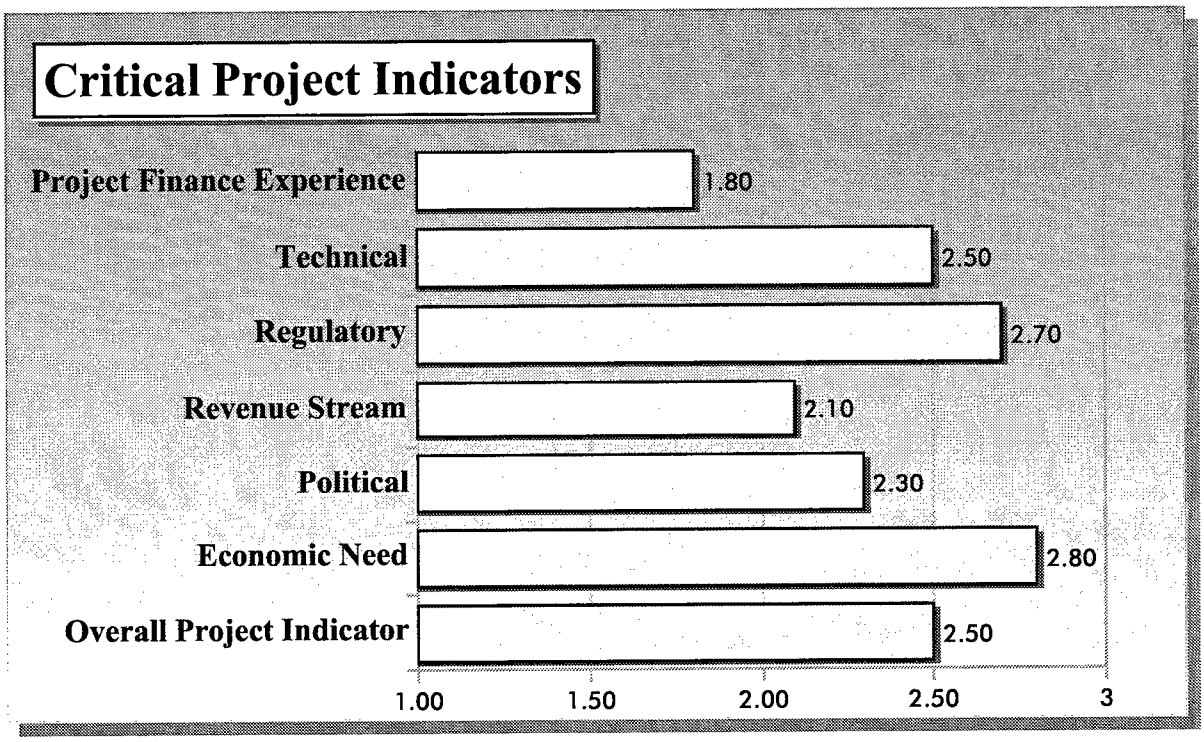
STC-Metro is facing serious economic difficulties with increasing demands on its resources while revenues from different sources are almost static or diminishing. This project offers a way for the company to increase its revenues and its efficiency, contributing to the solution of its economic difficulties.

The STC-Metro is committed to carrying out this project although it is relying on the private sector to provide a financial solution based on a percentage of ticket revenues. In fact, it is considering letting the project to the bidder who demands the lowest percentage of ticket revenues to carry it out after technical and economic prequalification. There are possibilities of government guarantees.



The project offers an opportunity to introduce advanced technology in the Mexico City metro system and has already attracted attention from abroad. European companies have reportedly shown strong interest in the project.

Critical Project Indicators

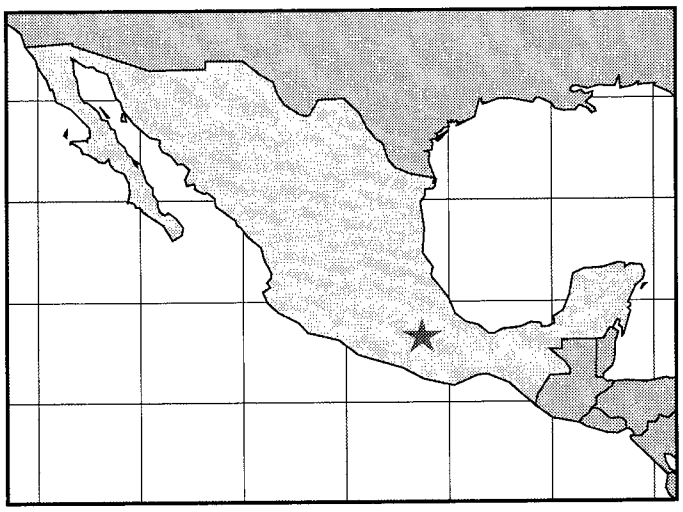


Key Decision Makers

Company	**Collective Transport System (STC-Metro)**
Name	Lic. Andrés Figueroa
Title	Director of Planning and Budget
Location	Mexico, D.F.
Phone	(52-5) 709-0671
Fax	(52-5) 709-0948

Transportation/Urban Mass Transit

Mexico City Train Purchase



Project Summary

Project No:	**TRA-12**
Subsector:	**Urban Mass Transit**
State/Region:	**Federal District**
Project Cost:	**$355.3 million**
Export Potential:	**$300 million**
Owner:	**SCT-Metro**

The first metro line in Mexico City was inaugurated in 1969 and was 13 kilometers long. Today, the Mexico City Metro system consists of ten lines that total 178 kilometers as well as 154 stations which service approximately 4.6 million passengers every work day.

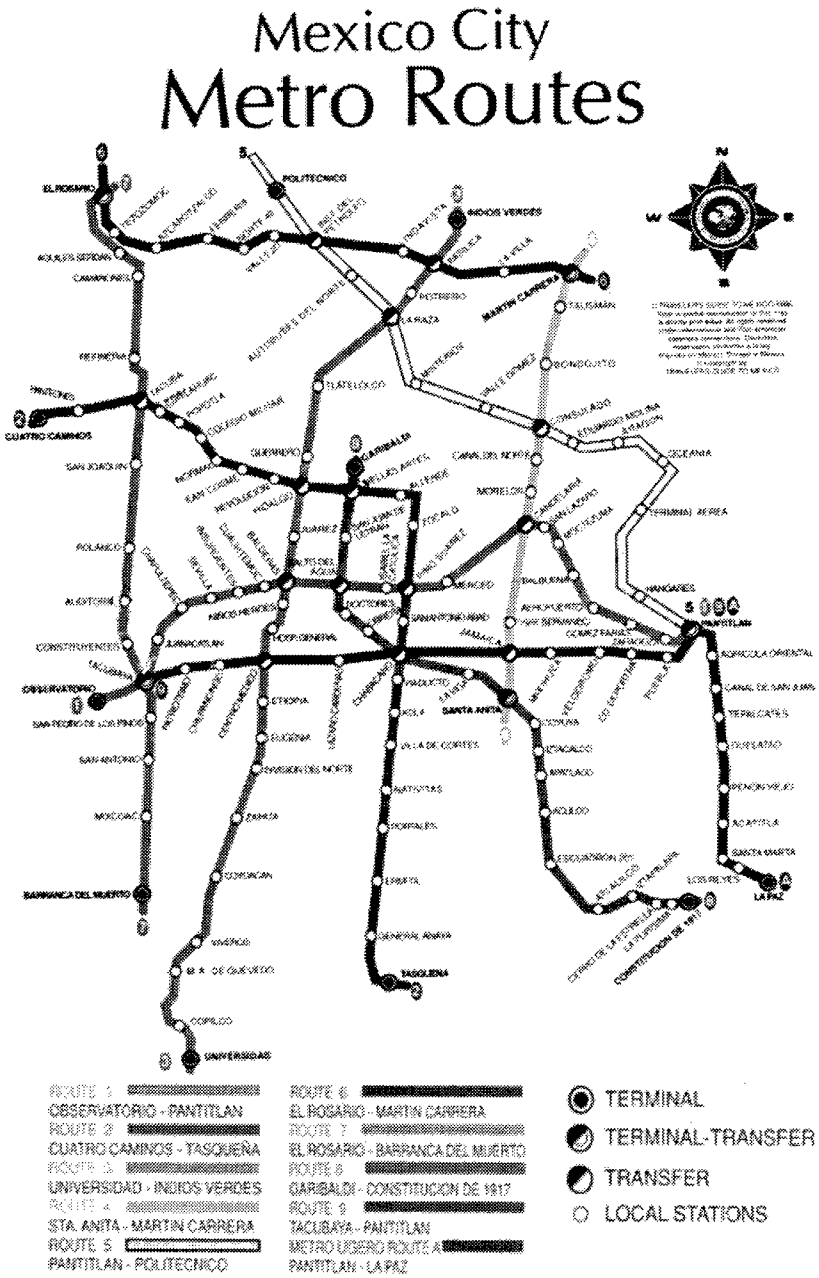
The Collective Transportation System - Metro (STC-Metro) -- the public subway company under the jurisdiction of the Federal District government -- is in the process of building a new line, Line "B," for which it will purchase metro trains.

Technical Description

The new Line "B" is a significant expansion of the existing system and a watershed in the technological evolution of the Metro system. Line "B" will be 21.32 kilometers long with 21 stations. Capacity will be 45,000 passengers per hour in each direction. The total number of passengers per workday is estimated at 800,000 people. With an overall average speed of 35 to 40 kilometers per hour, the new Line "B" will require 32 trains in operation and four in reserve, totaling 36 trains. Since the Metro system has access to eight trains in its existing reserve, it is planning to purchase the remaining 28 for a total cost of US$355 million.

Site

Line "B" will be located in the northeast part of Mexico City. Eight of the 21 stations will be located in the State of Mexico. It is estimated that passengers from this section of Mexico City represent 17 percent of the total ridership.



Project Status

Purchases of new trains will be undertaken during the years 1997-1999 according to the table below.

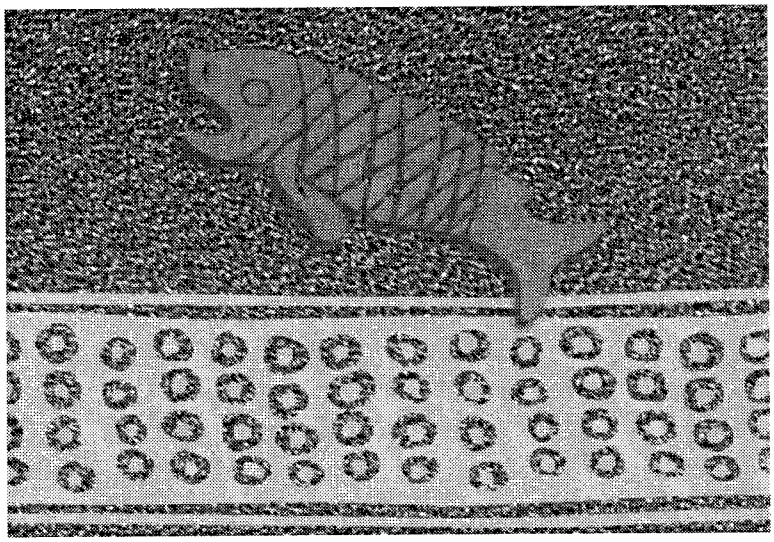
Year	1996	1997	1998	1999	Total
Train Purchases (US$ million)	0	177.66	107.87	69.8	**355.32**

Equipment & Services Demand

The Operations Division of STC-Metro is responsible for purchasing the trains that will serve the new line. The company will purchase a total of 28 metro trains between 1997 and 1999, amounting to 252 new cars to serve the new line.

Nature of Demand

Mexico City has a total population of 19 million people, making it one of the largest metropolitan areas in the world. The northeastern zone of the city, which the new Line "B" will serve, is affluent and generates 2.7 million daily trips, or 17 percent of the total, in the Mexico City Metropolitan Area.



Art from the Mexico City Metro

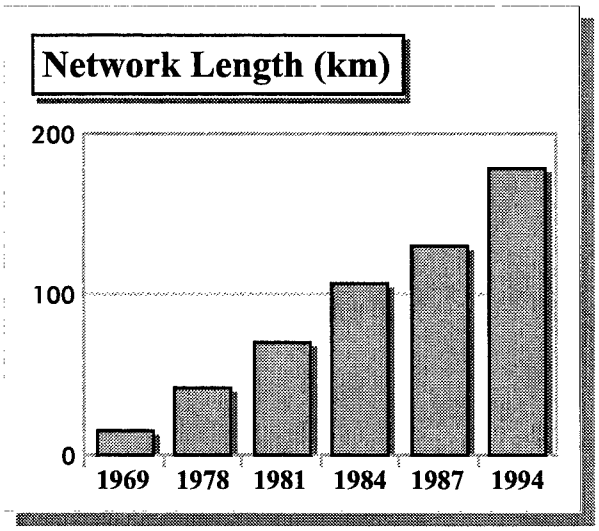
The part of Mexico City proper to be served by Line "B", by itself, generates one million trips daily. Population growth in this area is at an annual average of 3.6 percent, and it is estimated that in the next ten years the area's population will grow by approximately 500,000. Line "B" is designed to handle the impact of this growth in demand.

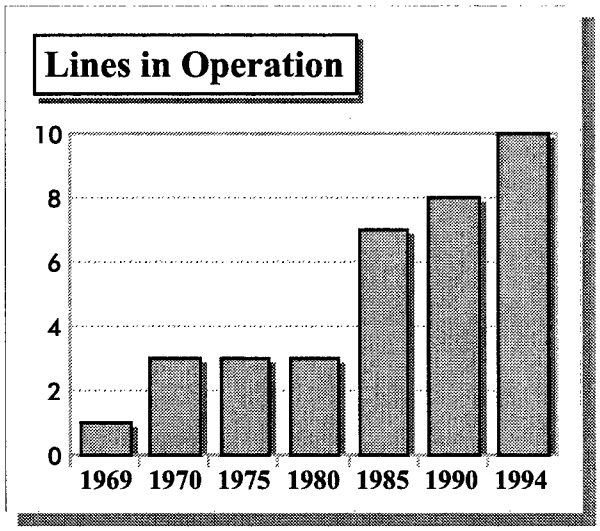
It is estimated that the Line will transport approximately 500,000 people during its first years of operation, a number which will rise to 800,000 once the line is fully operational.

Project Assessment

This is a well-planned project which was delayed due to Mexico's recent economic crisis. The project is an important priority for Mexico City authorities and it has widespread political support. However, it is dependent on the completion of the civil works for Line "B," which is handled by another division within STC-Metro. The project was to be financed partly through the STC-Metro budget and partly through revenues. Construction is currently experiencing certain difficulties and STC-Metro is seeking to finance continued construction with loans based on the expected revenue stream from operations and government subsidies.

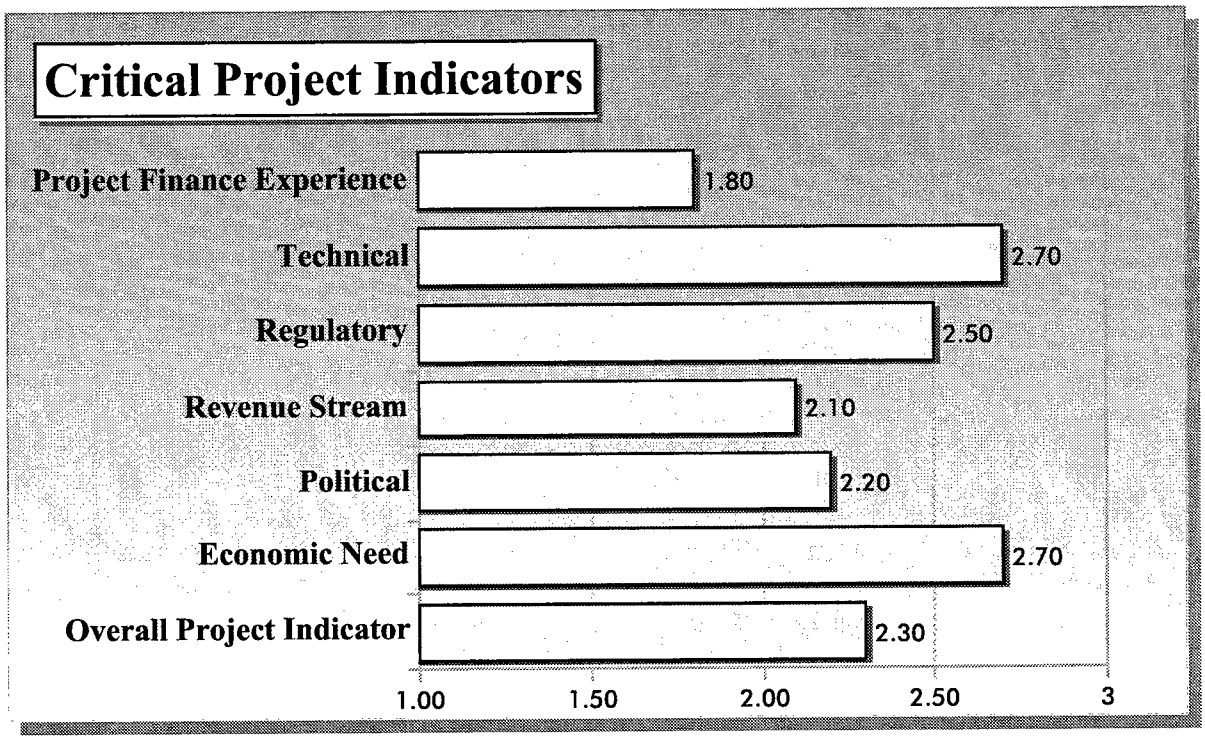
Consequently, equipment sales will have to be accompanied by equipment financing. Progress on the construction work needs to be monitored closely. Already there are indications that the construction schedule may slip one year, making the new line operational in 1999.





Source: STC-Metro

Critical Project Indicators



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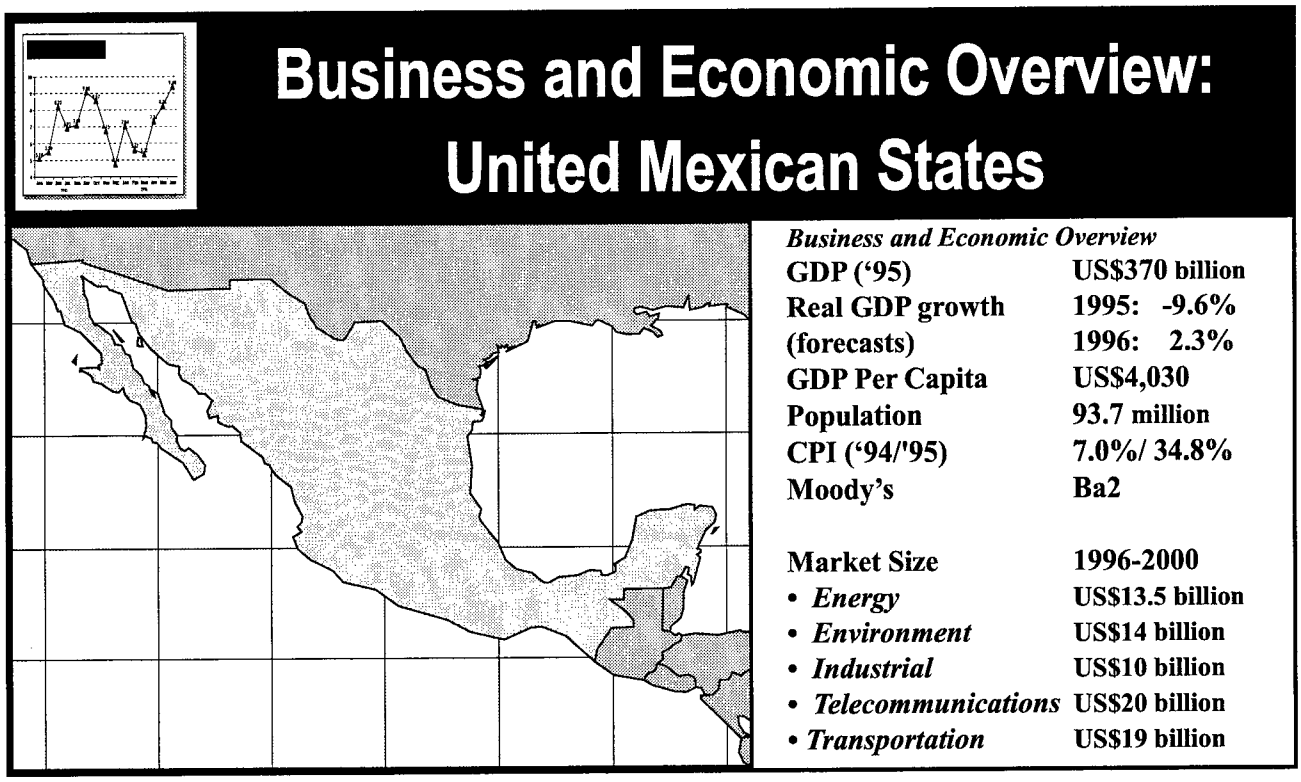


Business and Economic Overview: United Mexican States

Business and Economic Overview	
GDP ('95)	**US$370 billion**
Real GDP growth	**1995: -9.6%**
(forecasts)	**1996: 2.3%**
GDP Per Capita	**US$4,030**
Population	**93.7 million**
CPI ('94/'95)	**7.0%/ 34.8%**
Moody's	**Ba2**
Market Size	**1996-2000**
• ***Energy***	**US$13.5 billion**
• ***Environment***	**US$14 billion**
• ***Industrial***	**US$10 billion**
• ***Telecommunications***	**US$20 billion**
• ***Transportation***	**US$19 billion**

NEW INFRASTRUCTURE DEMAND

Dynamics of Demand

Mexico has been and continues to be one of the key infrastructure markets for U.S. firms due to a few fundamentals: its surging demand for infrastructure, the government's desire and need to privatize, and the unparalleled access and stability that the North American Free Trade Agreement (NAFTA) affords U.S. companies. In 1995, U.S.-Mexico trade grew by a healthy 6.3 percent to top US$107 billion.

There are a number of positive developments in the infrastructure sector that will lead to huge opportunities for U.S. firms throughout the remainder of the decade. In fact, the past 18 months have seen dramatic moves to further open up the economy to both private and foreign investment. Among these are:

1. The Mexican Constitution was amended to allow private participation in the distribution, storage and transportation of natural gas, creating an estimated $3.5 billion in investment opportunities, according to U.S. government estimates.

2. The Mexican government has moved to end Teléfonos de México's (Telmex) monopoly in

telecommunications, and has granted 8 concessions for long distance service—opening the way to billions of dollars in investment by U.S. firms and their partners.

3. The Secretariat of Energy announced it will bid 5 large power plants in the latter half of 1996, valued at close to $1.6 billion.

4. Seventeen Mexican ports were privatized and the Mexican Constitution was amended to allow private and foreign investment in both railroads and airports. The first rail line has already been let to the private sector.

The U.S. Department of Commerce estimates that these and other initiatives will result in between $49 and $56 billion in new demand for modern infrastructure—or approximately $10 billion per year over the next five to six years.

Beyond any government program, however, the rapid globalization of the Mexican economy and international competition are engines of growth in infrastructure demand. During the past six years alone, Mexico has almost doubled its foreign trade to US$152 billion per year and seen direct foreign investment levels approach US$10 billion per year. This expansion requires improved transportation and communication and it requires efficient and reliable sources of power in order to build internationally competitive industrial producers.

Nowhere is the impact of globalization more evident than in the telecommunications sector, where modern systems are needed to quickly move vast amounts of voice and data communications. In Mexico, this investment is expected to exceed US$14 billion through the end of the decade, as Mexican and international firms build new and more efficient long-distance networks and take advantage of opportunities in cellular systems, satellite communications and emerging technologies such as Personal Communications Services (PCS) technologies.

The energy sector, consisting of electrical and gas markets, will soon provide U.S. companies with extraordinary opportunities. Over US$1.6 billion in electricity projects are being bid in 1996 alone, and industrial cogeneration projects are forecast to play an important role in Mexico's future. Mexico has created a market for natural gas and is actively promoting private investment in storage, distribution and transmission projects throughout the country.

Transportation is a critical component of Mexico's plans for modernization of its infrastructure, as industry will have to increase its capacity to move cargo and people rapidly and efficiently. Seventeen newly privatized major ports will be receiving much-needed investment in modernization. Railroad privatization is already underway with one segment let and three additional opportunities soon to follow. The government is finalizing the framework for privatizing its airports and, once complete, this too will lead to a new wave of investments in infrastructure. Finally, the government expects to reinvigorate its toll-road concession in order to build and upgrade its highway system.

The magnitude of the demand for new infrastructure is, in part, demonstrated by the relatively limited stock of infrastructure in Mexico when compared to other countries at comparative levels of economic development. For example, while Mexico's GDP per capita is about 70 percent of Korea's, Mexico has only about 30 percent of the infrastructure as measured on an index that aggregates a country's existing stock of investment in transportation, telecommunications, and electricity.

Mexican Infrastructure, 1995

Highways (kilometers)	Railroads (kilometers)	International Airports	Deep Sea Ports	Telephones (thousands of lines)	Shipping (tons handled)
Paved: 93,331 Unpaved: 208,734	26,445	48	22	8,674	37,565,916
Installed Electric Capacity	**Kms of Natural Gas Pipeline**	**% of Pop. with Potable Water**	**% of Wastewater Treated**	**Haz Waste Facilities**	
34,980	13,254	87	10	1	

Source: SCT, CFE, CNA

Conditions for Development

The Mexican government is creating the conditions to turn infrastructure needs into effective demand. The government has passed a series of laws and constitutional amendments that give a predominant role to the private sector in the creation of new infrastructure. The Mexican government is increasingly becoming more of a regulator and less of an owner.

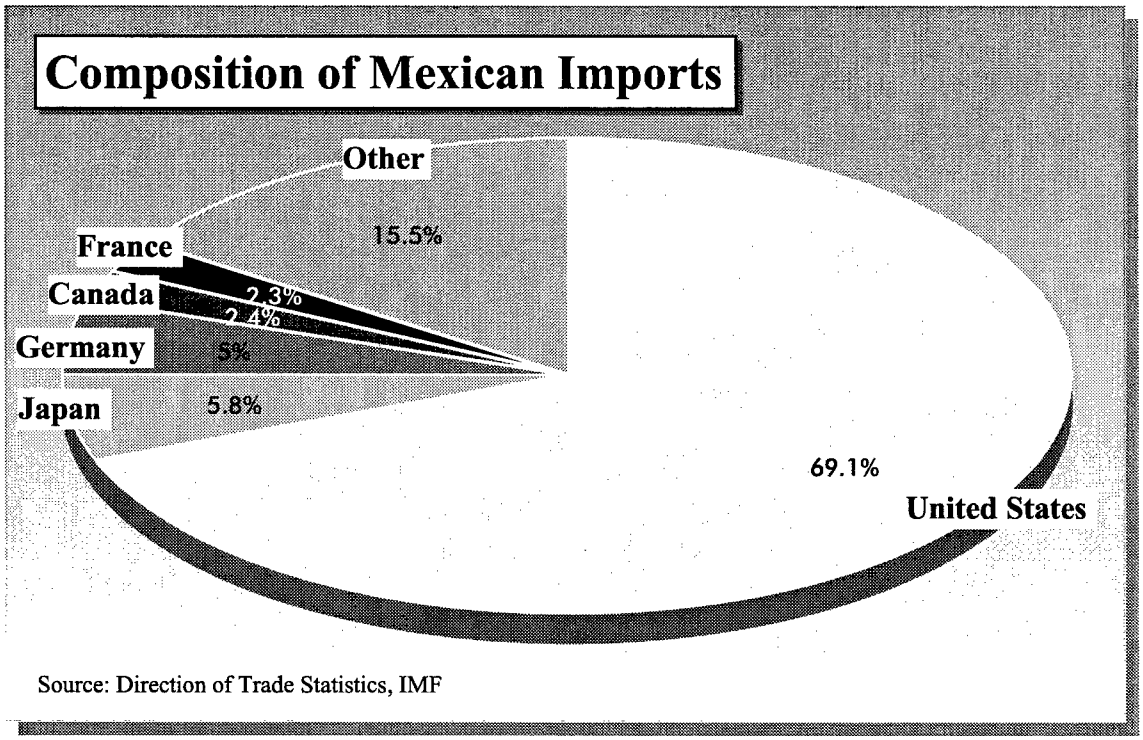
Through signing the NAFTA treaty, Mexico has agreed to abide by a set of rules that is critical to long-term infrastructure investment. While Mexico liberalized trade and investment prior to NAFTA, the signing of this treaty provides a level of certainty beyond national laws. Written into NAFTA are a whole host of trade and investment assurances; and, for the first time, mechanisms for the arbitration of regulatory disputes are in place.

The Mexican government also has made important strides toward implementation of a viable, long-term economic policy. Because of this, financial and investment markets continue to improve steadily as investors become convinced of the longer-term health of the economy. A growing Mexican economy, and an increasing per capita income, are absolutely central to the development of infrastructure and to

future economic opportunities for the United States, for it is this growth that attracts the funds to finance today's infrastructure needs.

U.S. Firms Well-Positioned

U.S. businesses are in an unprecedented position to capture a major share of the Mexican infrastructure market. U.S. firms are well-positioned because of their proximity to Mexico, the competitive advantages afforded by NAFTA, and the traditional, and growing, business linkages between the United States and Mexico. From 1991 to 1994, the United States increased its share of the Mexican import market from an already impressive 62 percent to 69 percent. Total U.S. exports to Mexico have grown since 1991 from $33.3 billion to $45.4 billion in 1995 — an increase of 36 percent despite 1995's recession.

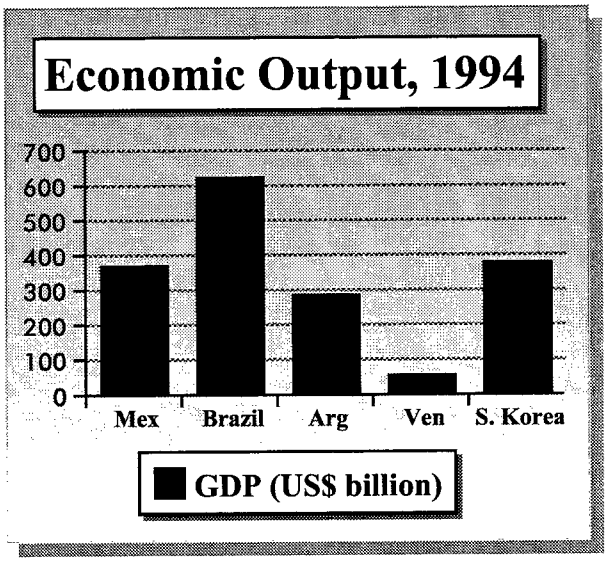


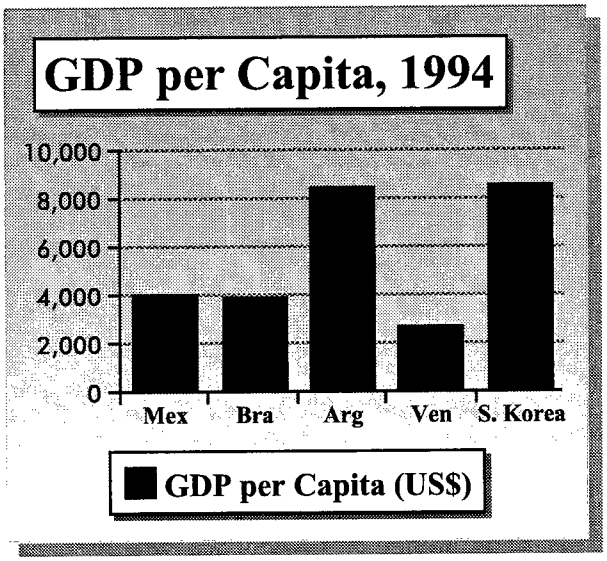
NAFTA affords U.S. firms an important competitive advantage in selling goods and services in infrastructure projects because of preferential tariffs. Over 50 percent of U.S. goods into Mexico now enter tariff-free and this percentage will increase to 100 percent over the next 12 years. This will create an up to 20 percent competitive advantage on tariffs vis-à-vis European and Asian competitors.

ECONOMIC OVERVIEW

The output of the Mexican economy is approximately $350 billion per year, or slightly over 5 percent of the output of the U.S. economy. At the same time, the Mexican population of approximately 90 million is one-third of that of the United States, demonstrating the inherent growth potential of the Mexican economy. Over the past decade, 1995 being the notable exception, Mexico has enjoyed steady economic growth of about 2.5 percent per year and a declining rate of inflation.

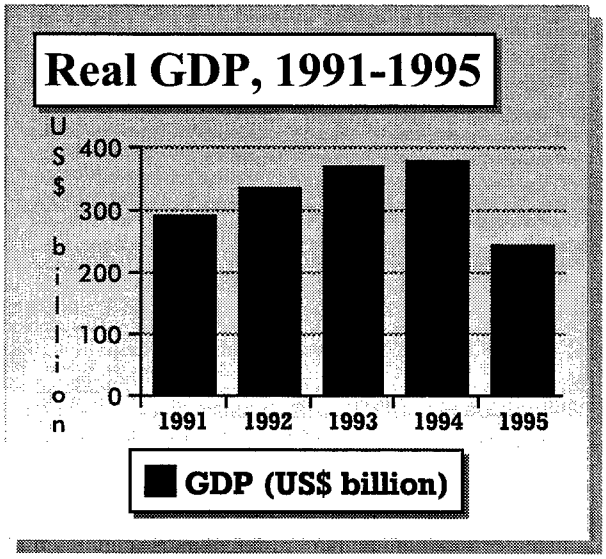
Structure of the Economy

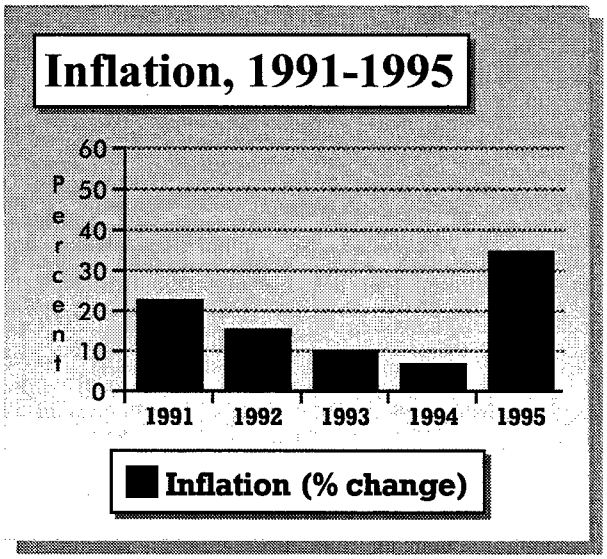




Source: EIU

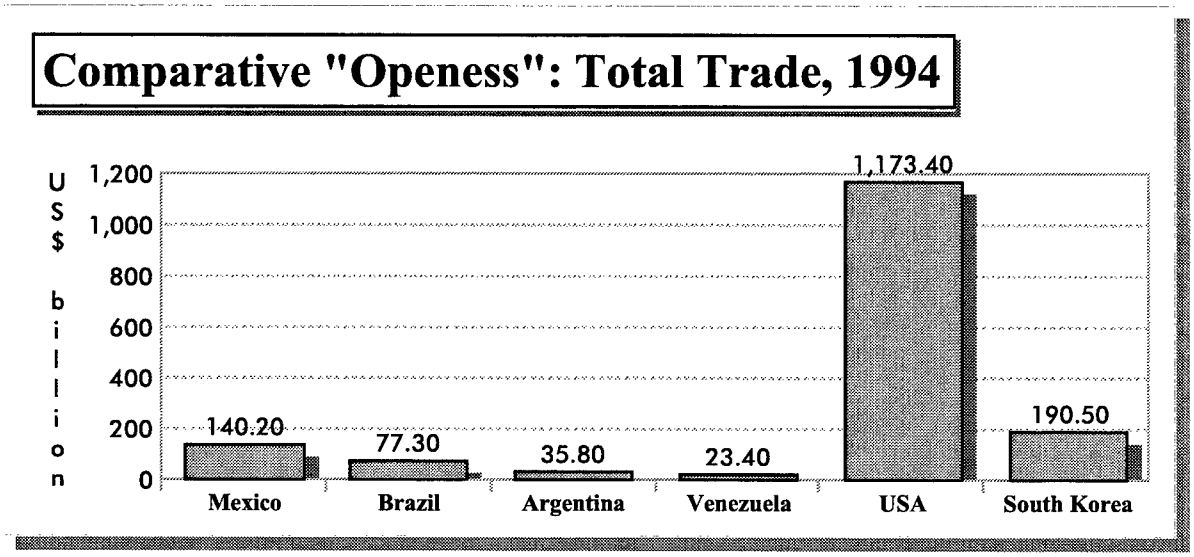
At the same time, many economists believe that the economy has a much higher potential for growth — that sustained growth levels of 5 percent per year are feasible. This belief is based on several fundamentals in the Mexican economy that go well beyond the recent recession. The country is part of one of the largest trading blocs in the world, it has abundant natural resources and is the sixth largest oil producer in the world (the country has not even begun to exploit its natural gas potential), and it boasts an educated and productive labor force.



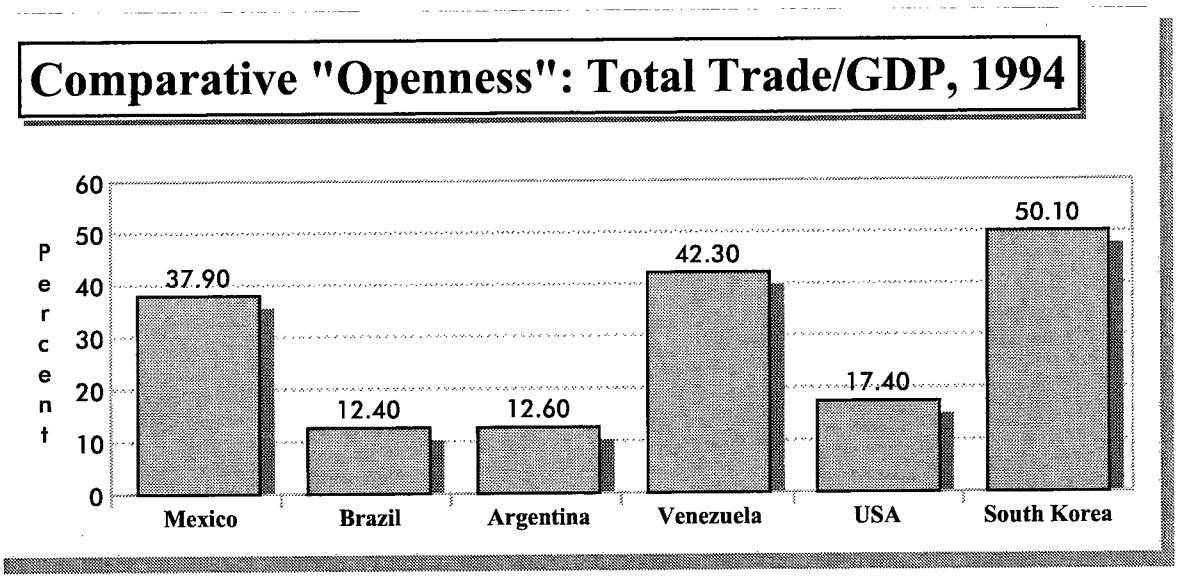


Source: EIU

Mexican policy-makers have sought to unleash private sector initiative through reduced regulation and the liberalization of trade and investment. These initiatives have produced a spectacular growth in trade and investment that will likely form the basis for future economic development. By 1995, Mexico's total trade had grown to $151 billion per year and direct foreign investment flows were averaging about $7 billion annually. By these indices, Mexico has transformed into one of the most open economies in the world.



Source: EIU

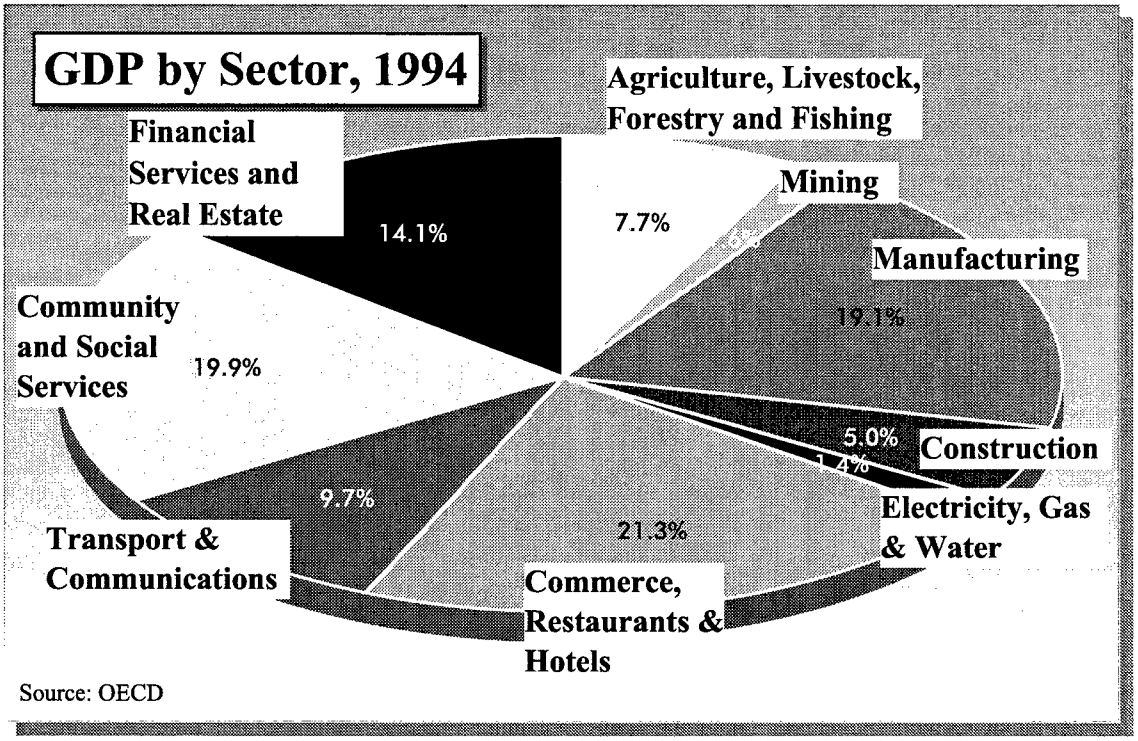


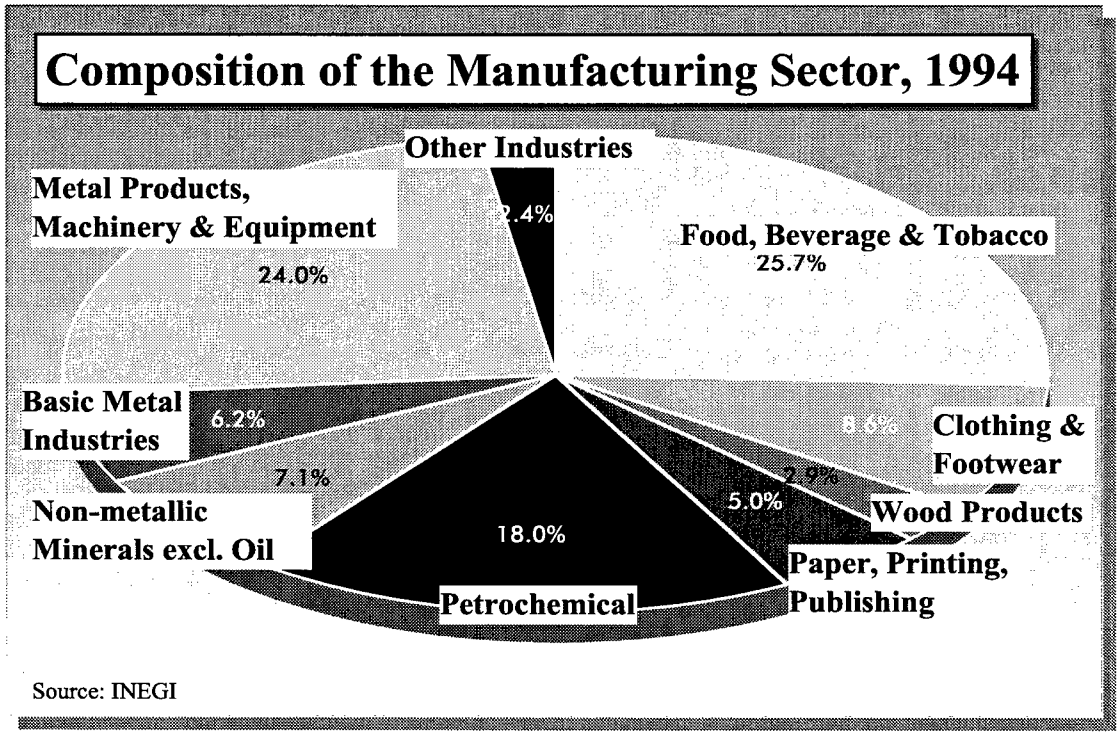
Source: EIU

Mexico is an increasingly industrialized country with manufacturing accounting for 19.1 percent of total national output. The Mexican economy is highly centralized with large, international, industrial groups accounting for a high percentage of total national output and international trade (See Chapter on Mexican Infrastructure Market Makers); these firms often take the lead role in developing and promoting modernized infrastructure. In the case of energy, for example, Mexico's industrial groups have taken the lead in developing their own energy capacity — the 180 MW ALFA-PEGI project in Monterrey has supplied electric energy and steam to its industrial owners for over 50 years.

U.S. firms in Mexico should look to these groups as both long-term clients and important partners in infrastructure projects. Their participation not only increases the economic viability of projects, but also brings important local knowledge in the country's technical capabilities. These groups are also very active overseas with much of their focus on other Latin American countries — offering U.S. firms a vehicle through which to enter these markets as well.

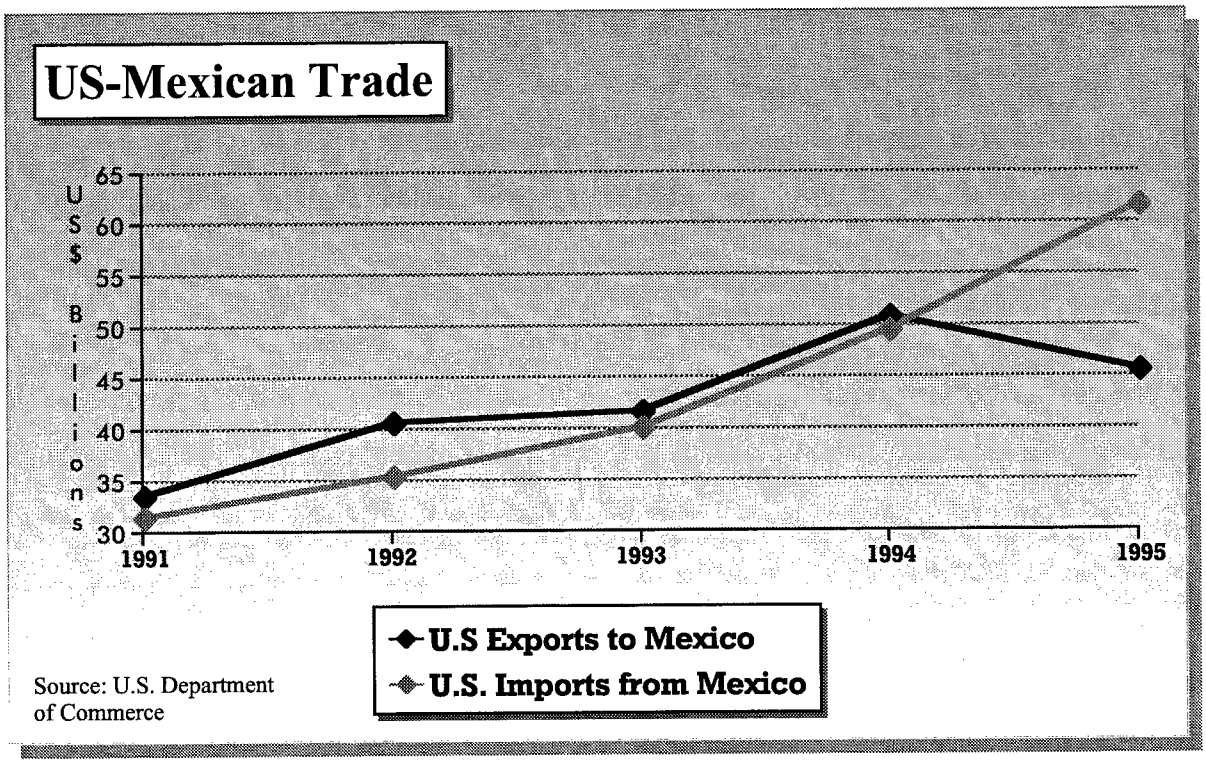
The most important industrial sectors within the Mexican economy are steel, building materials, glass, automotive, chemical and petrochemical, and food processing and beverages. As domestic demand recovers and the U.S. market opens up, these sectors look poised for improved growth; provided they can compete.


GDP by Sector, 1994
Agriculture, Livestock, Forestry and Fishing
7.7%
Mining
Manufacturing
19.1%
Construction
5.0%
Electricity, Gas & Water
21.3%
Commerce, Restaurants & Hotels
Transport & Communications
9.7%
Community and Social Services
19.9%
Financial Services and Real Estate
14.1%
Source: OECD

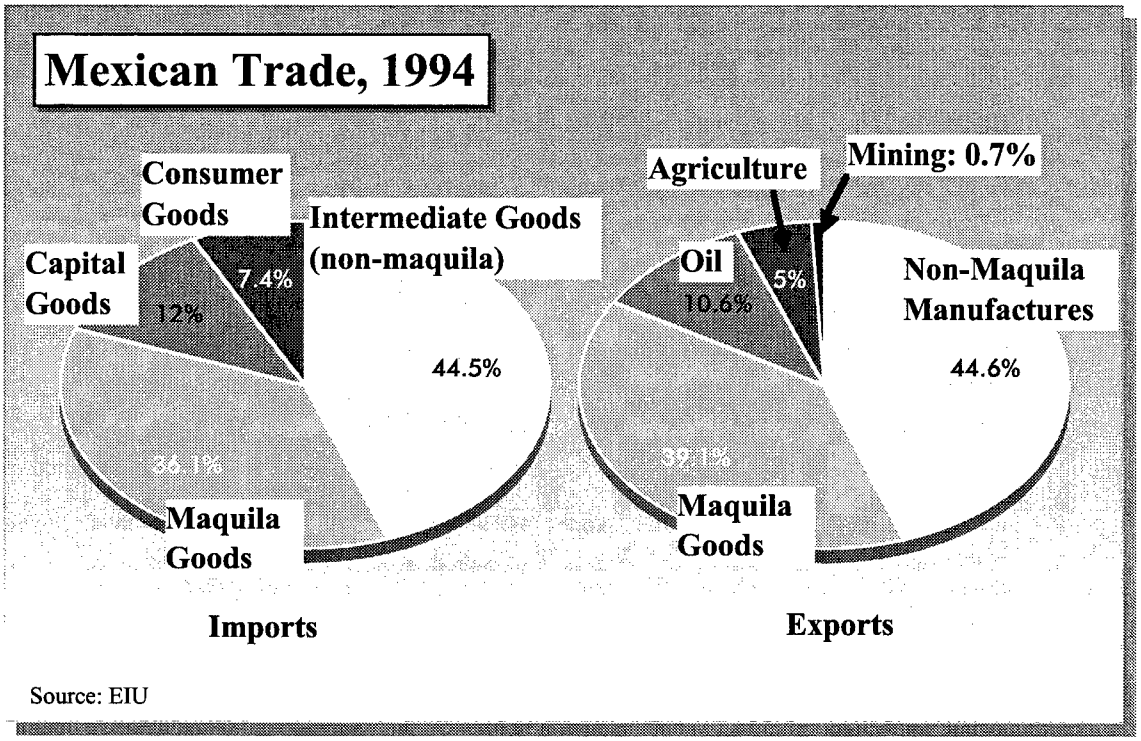

Composition of the Manufacturing Sector, 1994
Other Industries
Food, Beverage & Tobacco
25.7%
Clothing & Footwear
Wood Products
Paper, Printing, Publishing
Petrochemical
18.0%
Non-metallic Minerals excl. Oil
7.1%
Basic Metal Industries
6.2%
Metal Products, Machinery & Equipment
24.0%
Source: INEGI

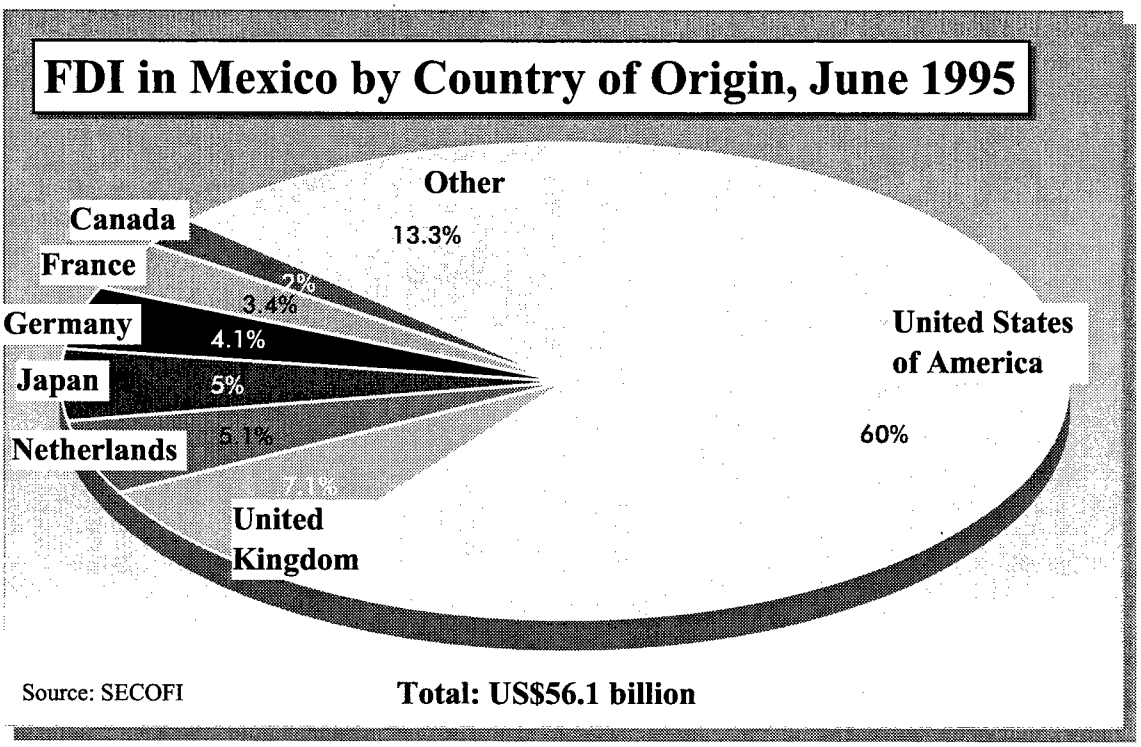
U.S.-Mexican Interdependence

The U.S. and Mexican economies are increasingly interdependent as the statistics show. The United States now absorbs about 85 percent of all Mexican exports and provides almost 70 percent of all Mexican imports. While for the larger U.S. economy these percentages are less impressive, Mexican trade is now about 8.5 percent of total U.S. trade worldwide and this figure is steadily growing. The United States continues to be the dominant long-term investor in Mexico.



The interdependence of the U.S. and Mexican economies is much more than a result of proximity; it is based on symbiotic and complementary needs and capabilities in both countries. The United States is a leader in the production of capital goods and Mexico imports this stock to build its productive base. The United States also leads in the production of components and intermediate goods which Mexican factories, taking advantage of the abundance of skilled and semiskilled labor, convert into finished products for domestic consumption and for export to the rest of the world. Together, intermediate and capital goods imports make up about 55 percent of total Mexican imports.

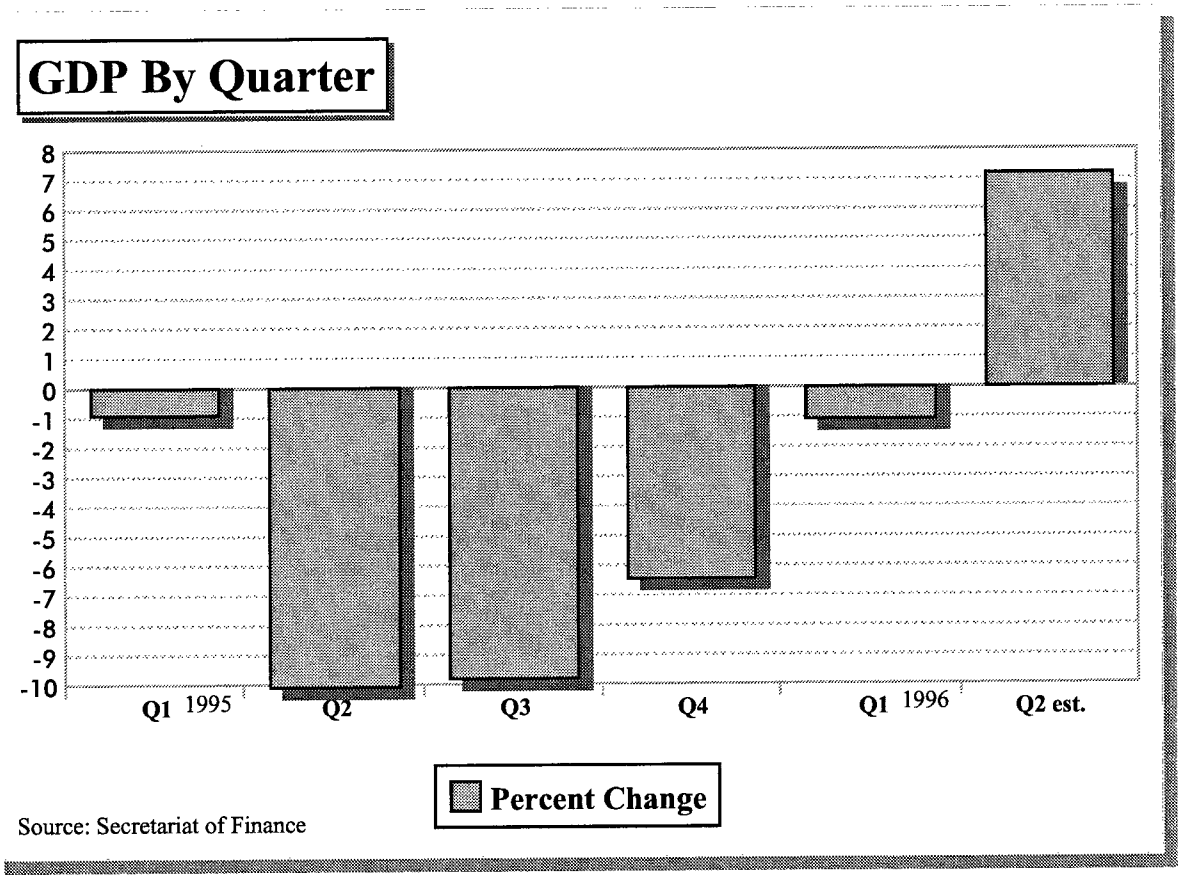

Mexican Trade, 1994
Consumer Goods
Intermediate Goods (non-maquila)
Capital Goods
7.4%
12%
44.5%
36.1%
Maquila Goods
Imports
Agriculture
Mining: 0.7%
Oil
5%
10.6%
Non-Maquila Manufactures
44.6%
39.1%
Maquila Goods
Exports
Source: EIU


FDI in Mexico by Country of Origin, June 1995
Other
13.3%
Canada
France
2%
3.4%
Germany
4.1%
Japan
5%
Netherlands
5.1%
7.1%
United Kingdom
United States of America
60%
Source: SECOFI
Total: US$56.1 billion

A Plan for Economic Recovery

The Mexican economy has shown consistent signs of recovery during the first seven months of 1996. The recovery has resulted from a consistent Mexican economic policy that has stressed austerity and a commitment to long-term monetary stability as the key to growth. Under this plan, taxes were raised, the federal budget cut in real terms, and the growth of the money supply restrained.

The Plan also tied in an aggressive privatization effort designed to attract new foreign investment and to increase efficiency throughout the economy. These privatizations include the airports, railways, satellite and long-distance and radio frequency concessions, new electricity generation plants, and the creation of a free market for natural gas storage, distribution, and transmission.



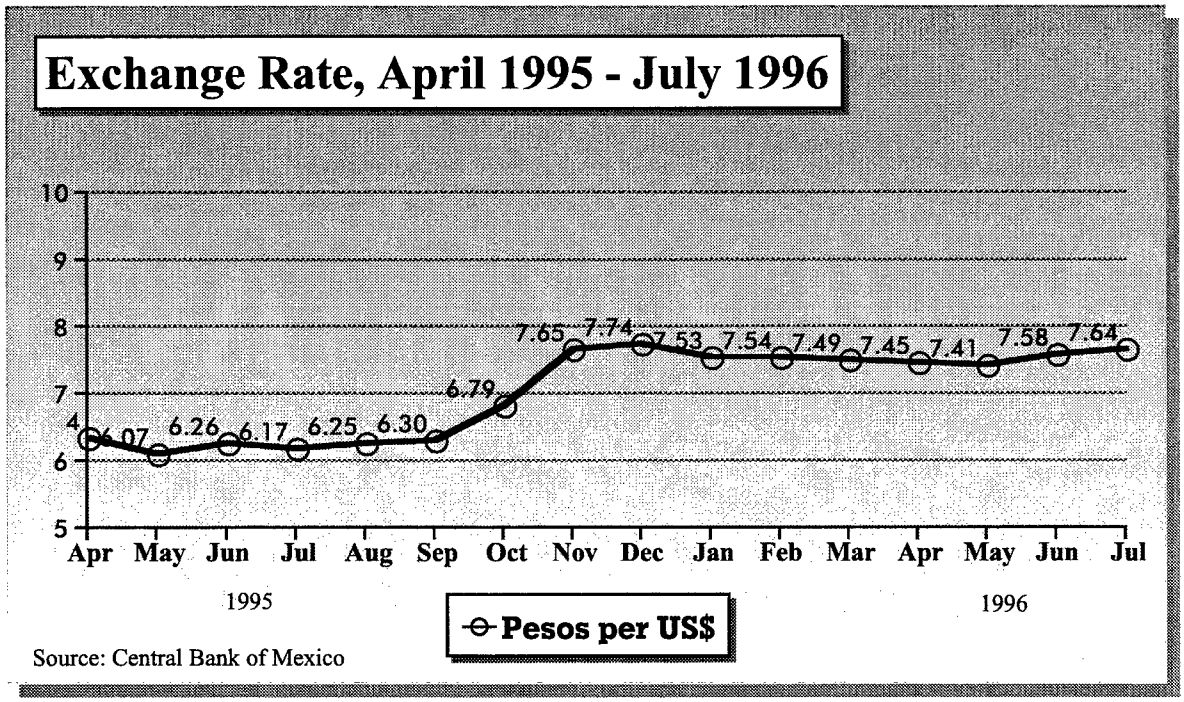
Source: Secretariat of Finance

Government and private forecasters estimate that GDP growth will increase to 5 percent during the second and third quarters of the year. Inflation rose in April due to scheduled increases in wages and public prices but inflation resumed its downward trend in both May and June to end at 1.6 percent — the lowest post-devaluation rate yet. This downward trend is expected to continue through the end of 1996.

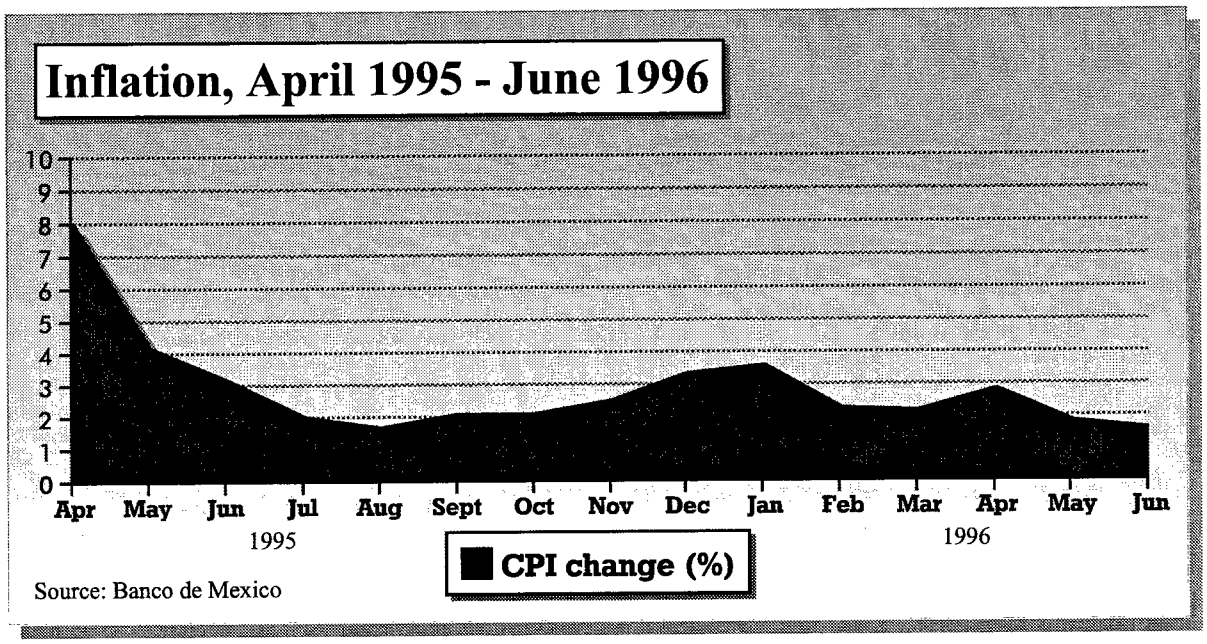
Projected Economic Indicators

Source	Year	GDP Growth	Inflation	Exchange Rate
Economist Intelligence Unit	1996	2.3	28	7.73
	1997	3.5	17	8.8
Macroasesoria Consultoria	1996	3.8	27.5	n.a.
	1997	4.5	16.9	n.a.
Average of Mexican Analysts	1996	3.2	27.52	n.a.
	1997	4.6	18.73	n.a.

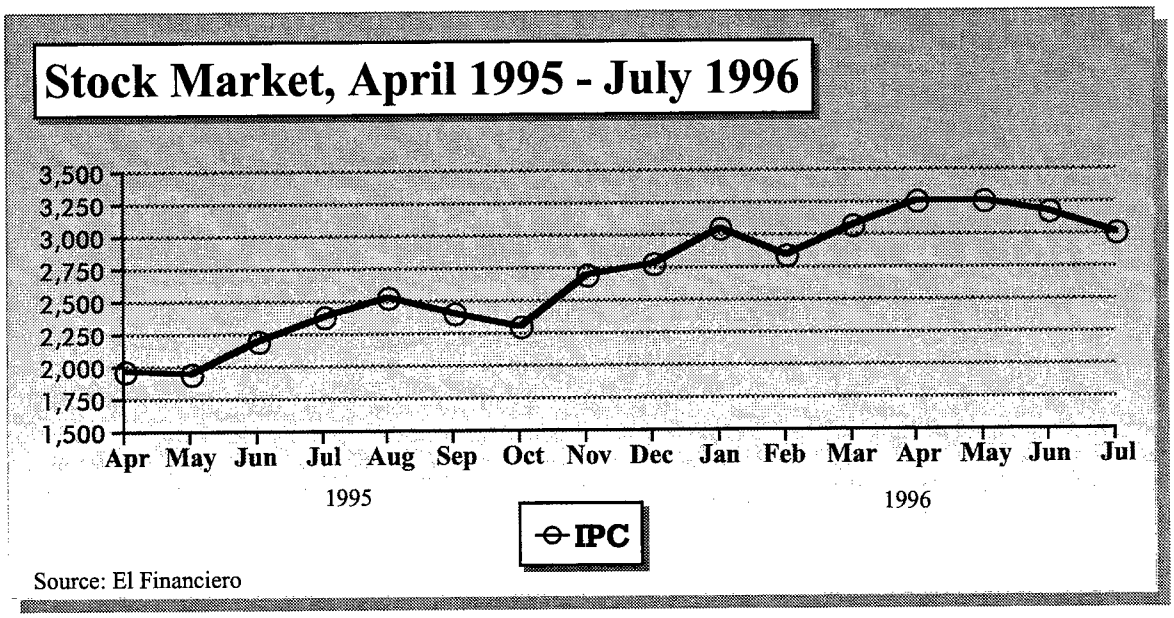
In response to this positive news, the peso has not only stabilized but went through a period of appreciation. There was even concern that the peso may become too strong and jeopardize the export sector which the government is counting on as a major stimulus to move the economy forward. Recently the peso has begun a more gradual depreciation, easing these fears.



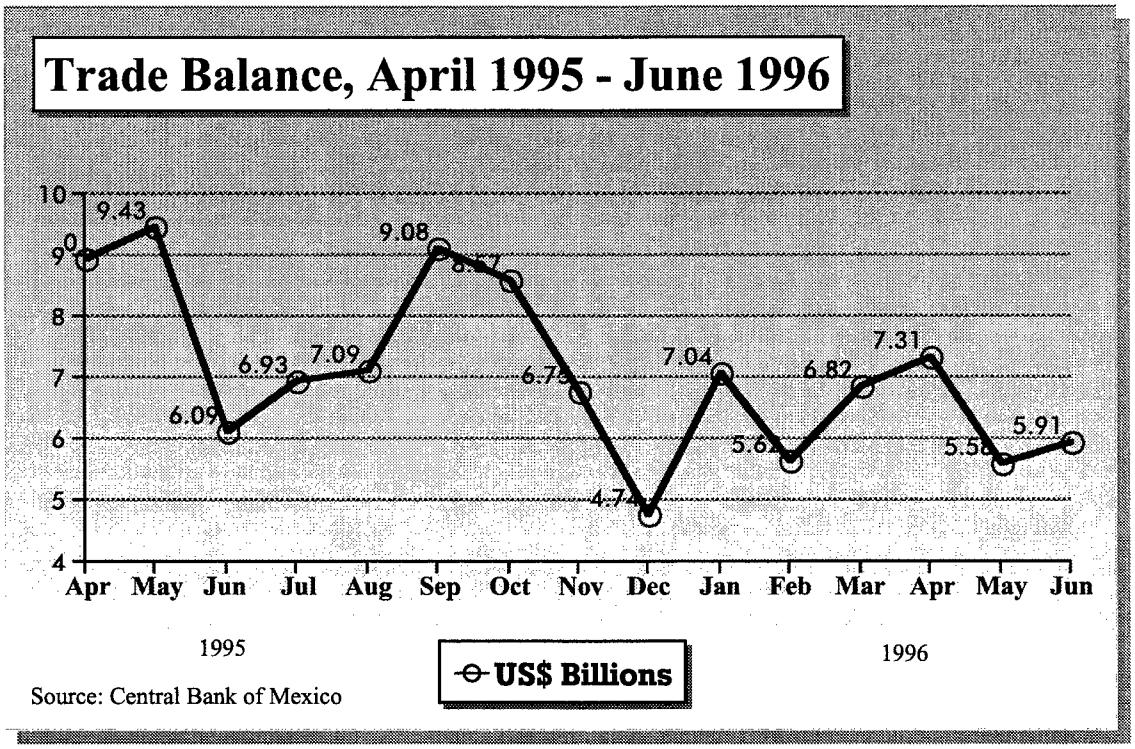
A stronger peso and diminishing inflation concerns have allowed interest rates to fall, which will promote higher industrial production over the remainder of 1996. Still, there is a need for more progress in this area as the 28-day Cetes — the government's bellwether on interest rates has again crept over 30 percent annualized.



The stock market has experienced a general upswing since April of 1995, although it has shown weakness of late. Direct long-term investors are returning to Mexico — the first 5 months of 1996 showed a 59 percent increase over the same period in 1995.

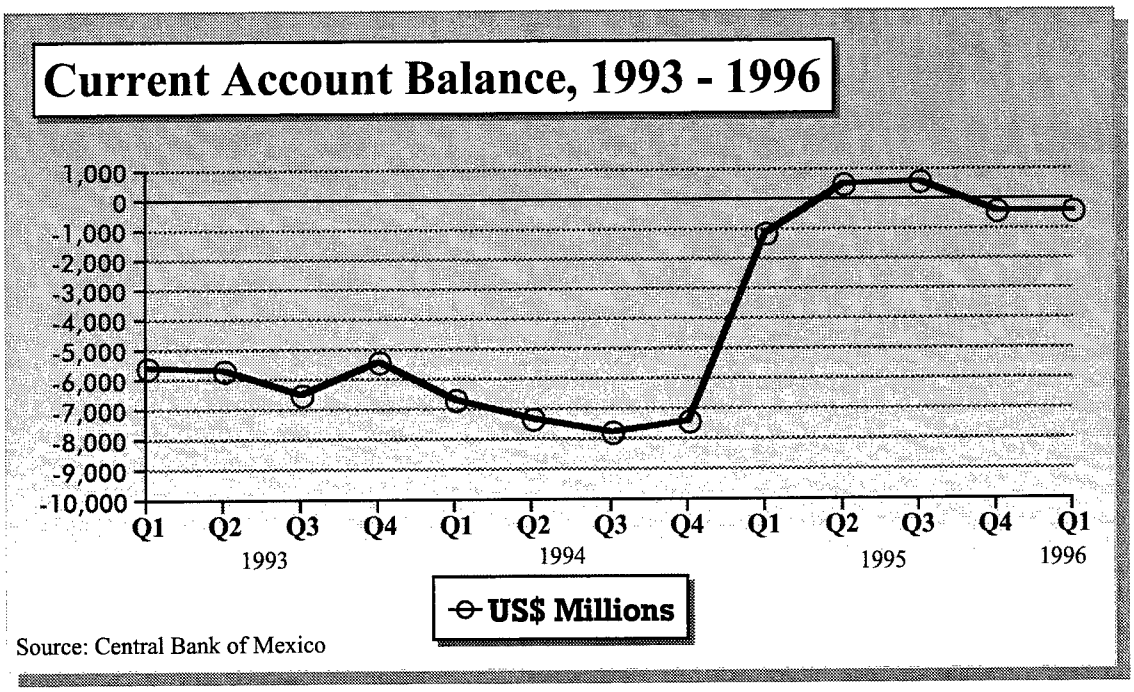


A positive impact of the peso devaluation was its success in turning around Mexico's chronic trade deficit. This deficit was hurting the country's ability to develop a strong industrial base. It limited the government's ability to manage its own economy, and it was hindering long-term investment in the country.

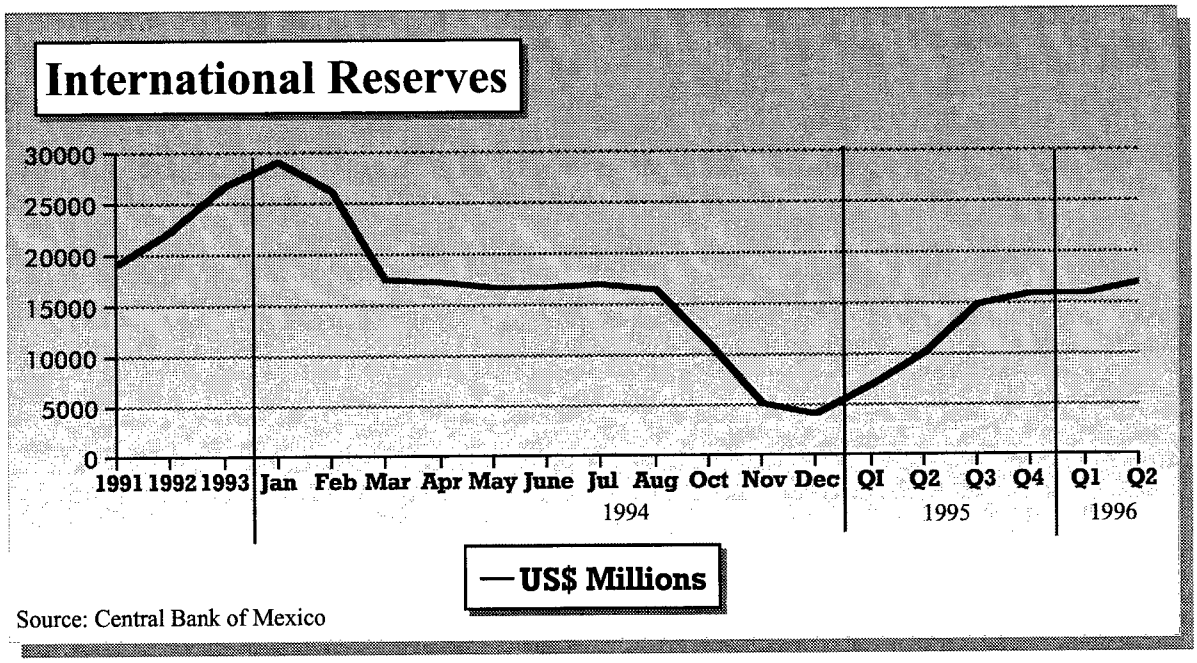


In 1995, Mexico produced a trade surplus of approximately 7 billion dollars — reversing in one year a trade deficit of almost 19 billion. At the same time, the country's current account deficit went from 28.8 billion to just 640 million.

Economists forecast that a stronger peso and an upturn in domestic demand may decrease this surplus to US$6 billion per year, but still within limits that will provide the government with the tools to continue to pay off debt and manage both the economy and the exchange rate.



The positive trade balance and increased investor inflows have allowed Mexico to gradually rebuild its international reserves — critical to retaining investor confidence and to attracting resources to manage the economy effectively. The situation improved enough to allow Mexico to prepay almost 5 billion dollars of the original US$12.5 billion drawn from the U.S. stabilization fund.



While Mexico has increased its overall debt burden within the past 18 months, it has been largely successful in restructuring along the lines of long-term maturities with multilateral lenders and foreign governments. Mexico's surge in exports has meant that its ratio of total debt to exports and debt service to exports has improved over the past 18 months. Still Mexico's debt ratio will likely average about 33 percent over the next three years.

One area for ongoing monitoring is the banking system's high indebtedness due to the impact of high interest rates. This is an important issue because of the strain it puts on new financing in Mexico.

Overall, however, investors are showing optimism in the long-term potential of opportunities in Mexico by returning to the Mexican market. This is particularly true among long-term investors.

MEXICAN BUSINESS RULES

Import/Export Rules

Under the NAFTA agreement, tariffs on U.S. products entering Mexico will be phased out gradually. Currently it is estimated that 50 percent of all U.S. industrial goods entering Mexico do so duty free. The highest level of current tariffs is reserved for agricultural products and finished automobiles. It is estimated that in accordance with the programmed reduction in tariff levels, by the year 1999, 65 percent of all U.S. exports will enter duty free, and by the year 2008 all exports will be duty free.

Overall tariff levels in Mexico are low, with the current maximum tariff on North American products at 14 percent ad valorem. There is also a nominal customs processing fee of .8 percent and all goods must pay the standard value-added tax which now stands at 15 percent. Mexico has eliminated all import licensing requirements of U.S. goods.

To qualify for preferential tariff treatment, products must qualify as North American products. The treaty establishes the so-called "Rules of Origin," which set the standards for what qualifies as a North American product. Generally, a product is considered North American if it contains a certain amount of local content and/or it is transformed in processing into a distinct customs classification. During the initial implementation period, there was confusion surrounding the rules of origin, but this situation has improved with better knowledge on the part of customs officials, brokers, and the importers and exporters themselves.

Mexican Customs law is very strict regarding documentation preparation and submission. Because of the real threat of fines or seizure of merchandise, U.S. firms are advised to employ only the most reputable of customs brokers.

Mexico also has a system of NOM certification, whereby imported products must demonstrate compliance with Mexican safety and quality standards. This often requires testing and certification from a laboratory or testing agency in Mexico. Currently, U.S., Canadian, and Mexico product requirements are not standardized and this can be a source of confusion.

Mexico is taking steps to make this process less cumbersome and to further simplify NOM certification. Under NAFTA, the United States, Canada, and Mexico are committed to making their standards compatible by 1998. The Mexican government is taking steps to recognize foreign standards and the accreditation of foreign test laboratories.

All products imported into Mexico must have a Spanish language label with the following information:

- Name and Address of Importer
- Name of Exporter

- Trademark or Commercial Name of the Product
- Importers Registry Number
- Net Contents
- Use, Handing and Care Instructions
- Warnings and Precautions

Investment Rules

In 1993, Mexico revised its foreign investment law to provide open access for most investments in Mexico. As a result, procedures for receiving authorization to invest in Mexico are generally very straightforward and virtually automatic. By law, approval must be granted within 45 days or it is considered automatic. The main body overseeing implementation of the law is the Mexican Foreign Investment Commission, which is comprised of representatives from the various government ministries.

U.S. firms may participate in concession and infrastructure projects up to 100 percent in most cases, except in specific instances where they are limited to 49 percent participation. Generally this is the case for infrastructure determined to be of national interest. In other cases, U.S. participation can achieve majority status upon approval of the Foreign Investment Commission

The trend to reduce restrictions on foreign participation in investment projects will likely continue. In terms of infrastructure investment, the current rules are as follows:

100 Percent U.S. or Foreign Investment Allowed

- Electricity Generation Projects
- Natural Gas Storage, Transmission and Distribution
- Waste Water Treatment
- Landfills
- Hazardous Waste Facilities
- Railroad Concessions
- Cellular Concessions
- Port Terminal Concessions

Participation Limited to 49 Percent

- Long Distance Phone Service
- Port Authorities (API's)

Also, foreigners cannot own land that holds 50 kilometers of the border or coastline, but there is a ready mechanism by which these properties can be "owned" through 30 year renewable trusts at a Mexican bank.

Under NAFTA U.S. investors are given the right to international arbitration in disputes with the NAFTA member countries over the interpretation of business rules.

OPIC insurance is not available in Mexico.

Conducting Transactions

Making financial transactions in Mexico is straightforward for U.S. firms from an administrative standpoint. Dollars are freely convertible, and foreign firms may hold dollar denominated checking accounts. Money can freely be wired between Mexico and the United States and there are no restrictions on currency repatriation. Contracts between private parties can be denominated in U.S. dollars and many are in practice.

The various options for structuring payment are as follows:

1. Open Account: Many U.S. firms provide Mexican clients with open accounts. Given a prudent credit review, 30-day open accounts are accepted payment policies and should not entail undue risk.

2. Advance Payment: Advance payment is generally not an accepted business practice in Mexico.

3. Irrevocable and Confirmed Letters of Credit: Letters of credit provide a high level of security for the exporter because the sale is guaranteed by a Mexican banking institution. Unfortunately, the current financial crisis has created a liquidity squeeze in banks which are restricting the issuance of these letters of credit.

4. Standby Letter of Credit: Standby Letters of Credit are useful when covering frequent shipments to a single customer. Currently, these are restricted because of the current financial crisis and because they tend to be expensive in Mexico.

5. Receivables Insurance: The U.S. Ex-Im Bank and, increasingly private sector institutions, provide short-, medium-, and long-term export and insurance projects. Insurance receivables will be financed by knowledgeable international banks.

6. U.S. Ex-Im Bank: The U.S. Export-Import Bank is an excellent source of export finance and export insurance. A particularly useful Ex-Im Bank program provides medium term credit for purchasers of U.S. capital equipment. Ex-Im Bank is willing to finance the cost of U.S. equipment and even 10 percent of domestic content in the case of project finance.

Much of Ex-Im Bank's activity is under so-called bundling facilities. A bundling facility is a large medium term loan made to a Mexican bank by a U.S. bank with the guarantee of Ex-Im Bank. The

Mexican bank then makes the actual loan for the U.S. goods to the Mexican bank. The Mexican bank is tasked with undertaking the credit assessment. All major Mexican banks employ bundling facilities.

Banking Rules

There are no significant obstacles to managing financial resources in Mexico whether in pesos or dollars. Under NAFTA, U.S. banks are allowed to establish operations in Mexico and are allowed to gradually expand their services and activities in Mexico. Within a few years, U.S. companies in Mexico will have the option to conduct a full range of normal banking activities with subsidiaries of U.S. banking institutions.

The Mexican banking system is dominated by large Mexican commercial banks. These Mexican banks already offer a wide range of banking services similar to what is available in the United States. One of Mexico's development banks, Nacional Financiera (NAFIN) has a variety of investment and loan programs designed primarily for small to medium-sized Mexican firms.

Taxation

Mexico and the United States have signed a joint tax agreement that allows joint enforcement of tax rules. Corporate taxes paid in Mexico are generally deductible as a credit on U.S. taxes. Mexico's basic tax structure is as follows:

- Corporate Tax: 34%
- Asset Tax: 1.8 percent (income tax credited against asset tax)
  Note: recently ruled unconstitutional by the Mexican Supreme Court.
- Tax on Royalties: Withholding tax of 15 percent for technical assistance/35 percent for royalties and know how
- Withholding on Interest: 4.9 percent to 35 percent
- Depreciation: 5 percent for buildings
  5 percent to 25 percent for machinery
  35 percent for tools
  25 percent for vehicles.

Intellectual Property Issues

The parties to NAFTA agreed upon a standard set of intellectual property protections consistent with those already employed in the United States. Patent protection has been extended to almost all processes and products. The term of protection has been extended from 14 to 20 years. Trademarks are granted for 10-year renewable periods. The revised copyright law protects computer programs against unauthorized reproduction for up to 50 years. Protection is now offered for trade secrets, business knowhow and even to customer lists.

Patent and Trademark regulations are enforced by the Mexican Institute for Industrial Property. The Mexican government has formed an intersecretarial commission to improve overall compliance with existing protections.

Other Trade Agreements

In addition to NAFTA, Mexico has a number of trade agreements that are useful to U.S. firms seeking to use Mexico as a base of operations. Free trade agreements include:

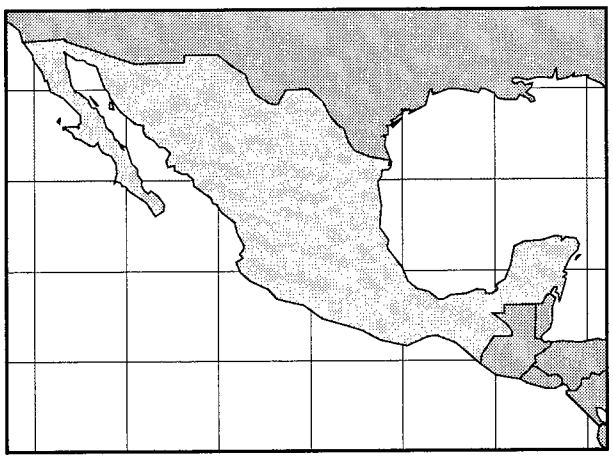
- A Free Trade Agreement with Chile
- A Free Trade Agreement with Costa Rica

Other trade agreements include Mexico's membership in the Group of Three, which includes Venezuela and Colombia, offering preferential treatment of certain tariff items. Mexico is also a member of the larger ALADI grouping of Latin American countries that offers similar preferences on specific items.

REGIONS

Statistical Report on the Regions

Overview



GDP by Region

Central:	US$159.95 billion
Central East:	US$36.52 billion
Central West:	US$45.18 billion
North:	US$31.83 billion
Northeast:	US$39.96 billion
Northwest:	US$28.76 billion
Southeast:	US$27.90 billion

Mexico's economy is driven by its three most industrialized metropolitan areas: Mexico City, Guadalajara and Monterrey. These metropolitan areas account for more than 30 percent of Mexico's GDP. Infrastructure development in these areas has always been a fundamental aspect of Mexico's development policy. Recently, the federal government has pushed for industrial decentralization to other less developed areas such as the northern regions of Mexico and the Gulf Coast.

Mexican Population by Region

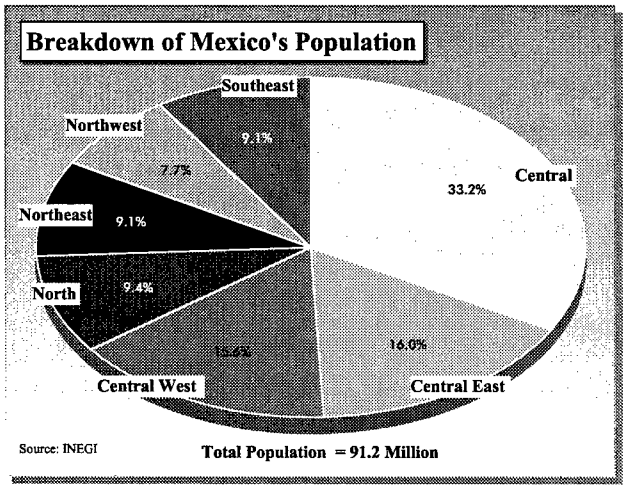
Region	Population (millions)
Central	30.3
Central East	14.6
Central West	14.2
North	8.6
Northeast	8.3
Northwest	6.9
Southeast	8.3

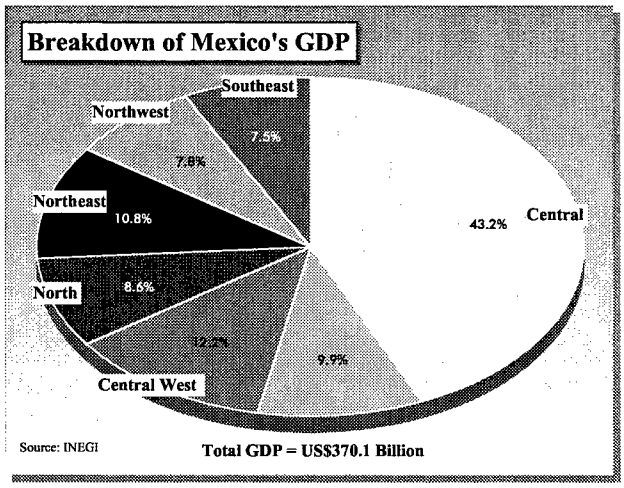
Source: INEGI

The Central Region, the economic hub of Mexico, has the best developed infrastructure in the country, but also requires significant amounts of investment to sustain its growing population and industrial base.

Mexico's North, Northwest and Northeast regions have become significant because of their maquiladora plants and other industrial production facilities. The most important industrial locations in the northern regions are the City of Monterrey and the Altamira-Tampico area. These regions require investment to maintain their growing industry and to link them more effectively with both the U.S. and Central Mexico.

The Central West Region of Mexico is led by the City of Guadalajara which is the second largest city in the nation and the leader in computer manufacturing. Unevenly developed, the region maintains solid tourism and industrial sectors. The economy of Central Eastern Mexico -- a region of contrasts -- is driven by the oil and petrochemical industries, in addition to agriculture and fishing. The Southeast Region -- the least developed in the country -- depends primarily on agriculture, livestock, and oil production.

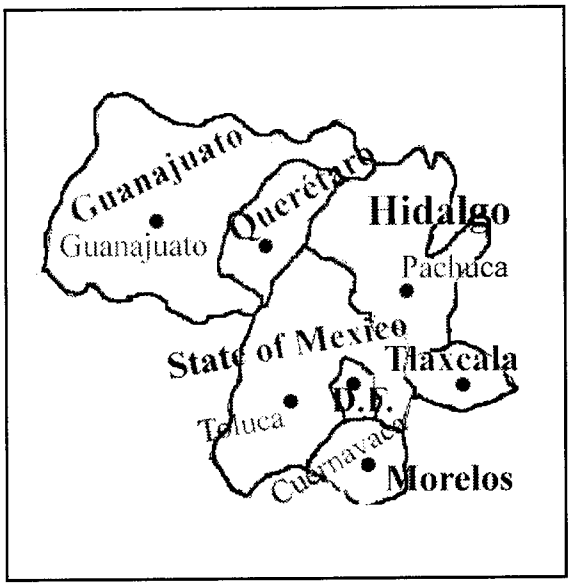




Statistical Report on the Regions

REGIONS

Central



Regional Summary

States:	**Federal District**
	Guanajuato
	Hidalgo
	Mexico, Morelos
	Querétaro
	Tlaxcala
Population:	**30.27 million**
Land Area:	**95,160 km²**
Pop. Density:	**318 (pop./km²)**

Source: INEGI

The Central Region of Mexico is the most important industrial, financial and commercial area of the entire country. The region's economy accounts for more than 40 percent of Mexico's gross domestic product and produces most of its manufactured goods.

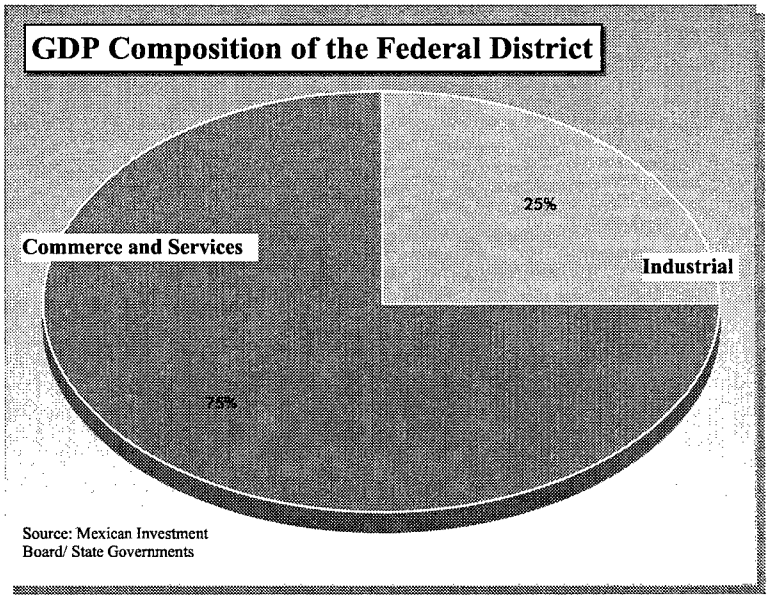
Central Mexico is the most developed region of the country, and thus it is also the one that requires the largest investment in infrastructure to continue providing services to its growing population and expanding industrial base.

Federal District (Mexico City)

Key Data	
Population	8,483,623
Land Area (sq. km)	1,499
Population Density (pop/sq. km)	5660

The Federal District of Mexico (better known as Mexico City) is the single most important industrial, financial and commercial center in the entire country, accounting for one quarter of Mexico's economy. Mexico City is located in the heart of Mexico and is its cultural and political capital. More than 35,000

domestic and foreign firms have offices in Mexico City. Major financial institutions, consultants, manufacturing, industrial and auto manufacturers are headquartered there.



Mexico City has the largest infrastructure base in the country. It has the best communications system, and accounts for key airport, railroad terminals, communications systems, and distribution centers. Infrastructure also includes a metro system with 11 lines and major water, electrical, and environmental facilities.

The Mexico City Metropolitan Area faces great challenges to provide public services to its growing population, which is nearly 20 million. There are a great number of infrastructure projects in the pipeline including water treatment, solid waste disposal, air pollution control, expansion of the metro system, expansion and modernization of existing highway and urban transportation systems, privatization of telecommunications, and the expansion of electrical capacity, among others.

Key Government Contacts

State	**Federal District (Mexico City)**
Mayor	Lic. Oscar Espinosa Villareal
Phone	(52-5) 768-9000, 768-8800
Fax	(52-5)782-3009

State	**Federal District (Mexico City)**
Secretary of Economic Development	Sr. Héctor Flores Santana
Phone	(52-5) 543-9374, 543-9376
Fax	(52-5)543-6068

Guanajuato

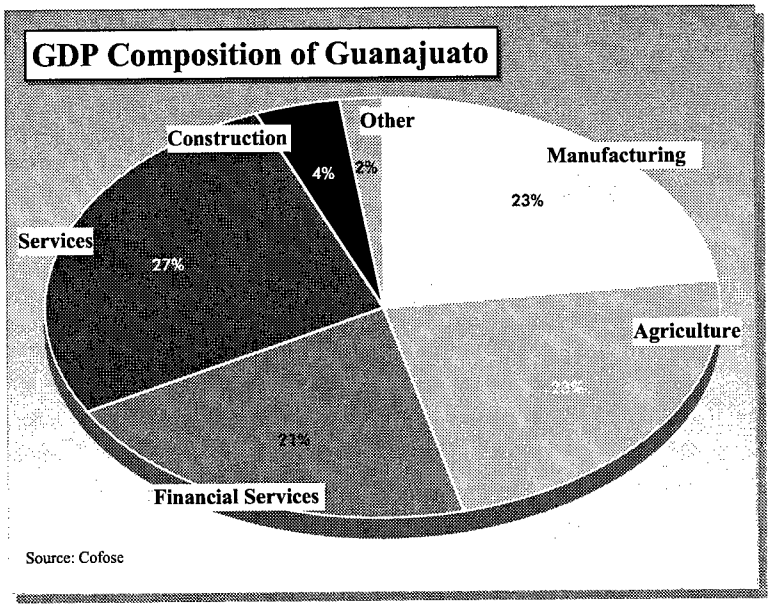
Key Data	
Capital	Guanajuto
Other Major Cities	Celaya, Irapuato, León, Salamanca
Population	4,393,160
Land Area (sq. km)	30,589
Population Density (pop/sq. km)	144

The State of Guanajuato, with the sixth largest economy in the country, accounts for 3.48 percent of Mexico's GDP, mainly driven by its manufacturing capabilities, agricultural and mining activities. Its primary industries are footwear and leather products, oil refining, petrochemicals and fertilizers. Recently, Guanajuato has become an important automobile and auto parts manufacturer. The state is also Mexico's leading producer of gold.

More than 50 maquiladora companies are operating in the state and 12 Fortune 500 companies have facilities in Guanajuato.

Guanajuato's infrastructure includes 3,384 kilometers of paved highways, 1,134 kilometers of railroads, one international airport (El Bajío Airport), two domestic airports, and 1,026 megawatts of installed electrical capacity.

Guanajuato offers attractive opportunities for industrial investment and the development of telecommunications, highways and intermodal transportation facilities.



Source: Cofose

Key Government Contacts

State	**Guanajuato**
Governor	Lic. Vicente Fox Quesada
Phone	(52-473) 2-3360, 2-0533
Fax	(52-473) 2-5355

State	**Guanajuato**
Secretary of Economic Development	Lic. José M. Mendoza Márguez
Phone	(52-473) 2-1870, 2-1854
Fax	(52-473) 2-1974

Hidalgo

Key Data	
Capital	Pachuca
Other Major Cities	Tula, Tulancingo
Population	2,111,782
Land Area (sq. km)	20,987
Population Density (pop/sq. km)	101

Hidalgo's economy accounts for 1.59 percent of the country's total GDP. The state's economy is based on textiles, apparel, agriculture, energy, oil refining, machinery, and subway/rail car manufacturing. Hidalgo's main industrial zones are located in Ciudad Sahagun and Tula, which holds one of Pemex's largest facilities.

Infrastructure in Hidalgo includes 2,257 kilometers of paved roads, 94 kilometers of railroad tracks, eight percent of Mexico's electrical generation capacity totaling 1,500 megawatts, the second largest oil refining plant in its country, and the main satellite tracking station.

The region of Tizayuca, Hidalgo, will most probably be the site for the new Mexico City Airport. Other infrastructure opportunities exist in the environmental and highway sectors.

Key Government Contacts

State	**Hidalgo**
Governor	Lic. Jesús Murillo Karam
Phone	(52-711) 3-2699, 3-2788
Fax	(52-711) 3-2420

State	**Hidalgo**
Secretary of Economic Development	Lic. Eugenio Imaz Gispest
Phone	(52-711) 13-785, 13-678
Fax	(52-711) 14-195

Mexico

Key Data	
Capital	Toluca
Other Major Cities	Cuautitlán, Texcoco
Population	11,704,934
Land Area (sq. km)	21,461
Population Density (pop/sq. km)	545

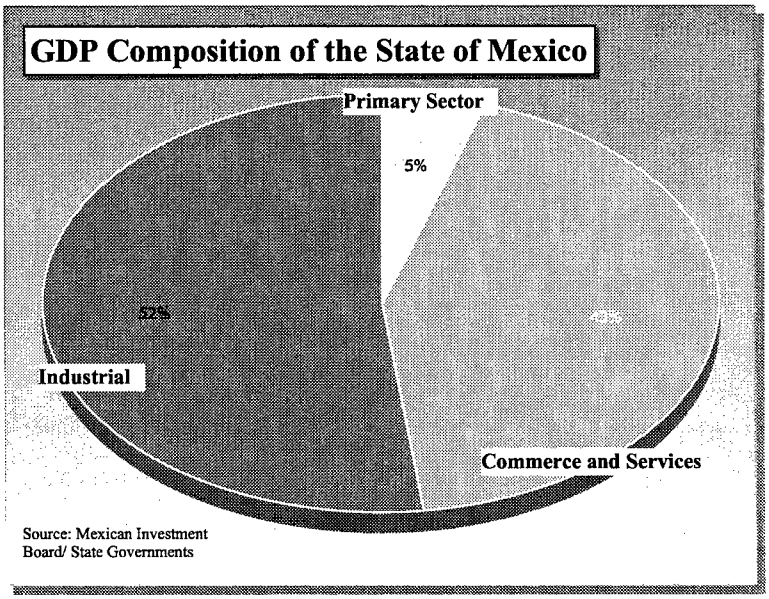
The State of Mexico is the second largest economy in Mexico, contributing more than 10 percent of Mexico's GDP, driven by industrial capacity in the Mexico City Metropolitan Area. The state's industrial base is very strong in food processing, automobile and auto parts production, machinery and equipment, textiles, chemical, pharmaceutical, electronics, rubber, plastics, and paper products.

Leading U.S. firms, including auto manufacturers, have facilities throughout the state. Recently German car manufacturers established assembly facilities close to Toluca, the state capital, 30 minutes from Mexico City.

Existing infrastructure in the State of Mexico includes 4,786 kilometers of paved roads, 1,076 kilometers of railroad tracks connecting with the three major railroad lines, one international airport, and 15 electric power plants with installed capacities totalling 1,497 megawatts.

Most of the state's population is located inside the Mexico City Metropolitan Area, but outside the Federal District. This location led to the greatest investment in infrastructure development in the country.

Although the State of Mexico has a very well developed infrastructure, its growing population will place increasing demands on existing infrastructure. To address these problems, there is a project to develop a new industrial and residential area north of Mexico City called Pro-Oriente.



Additionally, the state offers opportunities to continue construction of the Mexico City beltway, access highways to Mexico City, mass transportation development, water works and water treat-

ment facilities, telecommunications including rural telephony, electric power services and environmental solutions for air pollution and solid waste disposal. Together with Mexico City, the State of Mexico offers the greatest number of infrastructure projects in the country.

Key Government Contacts

State	**Mexico**
Governor	Lic. César Camacho Quiróz
Phone	(52-72) 15-8360
Fax	(52-75) 14-4172

State	**Mexico**
Secretary of Economic Development	Ing. Juan José Guerra Abud
Phone	(52-72) 14-0887, 14-8090
Fax	(52-72) 13-2134

Morelos

Key Data	
Capital	Cuernavaca
Other Major Cities	Cuautla, Yautepec
Population	1,442,587
Land Area (sq. km)	4,941
Population Density (pop/sq. km)	292

The State of Morelos contributes 1.61 percent of Mexico's GDP. The state's expanding economy is based on agriculture, automobile, and manufacturing industries.

Agricultural production is based on sugar cane, vegetables, oil seeds and flowers. A major Japanese auto manufacturer is established in Cuernavaca, the state capital. Recently, pharmaceutical and diversified manufacturing facilities have opened in both the capital and the City of Cuautla.

Existing infrastructure includes 266 kilometers of highway and one domestic airport. The state is connected to Mexico City by Highway 95, one of the most modern in the nation.

Opportunities in infrastructure development are focused on the construction of the Mexico City beltway which is projected to pass through the state. There is also a need to invest in water works and telecommunications.

Key Government Contacts

State	**Morelos**
Governor	Lic. Jorge Carrillo Olea
Phone	(52-73) 18-4254
Fax	(52-73) 11-3020

State	**Morelos**
Secretary of Economic Development	C.P. Miguel Angela Dávila
Phone	(52-73) 11-3657, 11-3658
Fax	(52-73) 17-2531

Querétaro

Key Data	
Capital	Querétaro
Other Major Cities	San Juan del Río, Tequisquiapan
Population	1,248,844
Land Area (sq. km)	11,769
Population Density (pop/sq. km)	106

Querétaro accounts for 1.41 percent of the country's GDP, led by its agricultural, dairy, non-metallic mineral, cellulose and paper, metal, furniture, glass and auto parts sectors.

Due to its proximity to Mexico City, Mexico's federal government has targeted the state as an industrial center, in an effort to decentralize the congested Mexico City Metropolitan Area. Existing infrastructure includes one domestic airport, 1,170 kilometers of highways, 520 kilometers of railroads including one electric rail system connecting to Mexico City.

Querétaro offers a strong opportunity to develop infrastructure surrounding industrial areas in its capital and San Juan del Río.

Key Government Contacts

State	**Querétaro**
Governor	Lic. Enrique Burgos García
Phone	(52-42) 14-3840
Fax	(52-42) 14-3684

State	**Querétaro**
Secretary of Economic Development	Lic. Abel Vaca Atala
Phone	(52-42)24-1992
Fax	(52-42) 24-1832

Tlaxcala

Key Data	
Capital	Tlaxcala
Other Major Cities	Apizaco, Huamantla
Population	883,630
Land Area (sq. km)	3,914
Population Density (pop/sq. km)	226

The State of Tlaxcala is the smallest state in Mexico and contributes 0.56 percent of Mexico's GDP. The state's economy is based on agriculture.

Existing infrastructure includes 347 kilometers of railroad tracks, one domestic airport, 17 electric power substations with a combined capacity of 496 megawatts.

The state requires investment in the following sectors: environmental, telecommunications (rural telephony) and transportation (highways).

Key Government Contacts

State	**Tlaxcala**
Governor	Lic. José Antonio Alvarez Lima
Phone	(52-24) 62-0016, 62-0028
Fax	(52-24) 62-3173

State	**Tlaxcala**
Secretary of Economic Development	Lic. José Gilberto Temoltzin M.
Phone	(52-24) 62-1502, 62-1130
Fax	(52-24) 62-1678

REGIONS

Statistical Report on the Regions

Central East

Regional Summary

States:	**Oaxaca**
	Puebla
	Veracruz
Population:	**14.6 million**
Land Area:	**202,098 km²**
Pop. Density:	**72 (pop./km²)**

Source: INEGI

Central Eastern Mexico is a region of contrasts. While it contains very well developed areas in the States of Veracruz and Puebla, it also contains some of the poorest regions in the country. The economy of this region is driven mainly by its oil and petrochemical industries, supported by its agricultural and fishing capabilities.

The States of Veracruz and Puebla, which rank fifth and seventh, respectively, in contributing to Mexico's GDP, present a solid manufacturing base which includes automobile, textile, steel and iron, and smaller diversified manufacturing industries for equipment and machinery.

Although much of this region is well developed, especially in Puebla and Veracruz, the region presents good opportunities for infrastructure development, mainly in the transportation, environment and petrochemical industries.

OAXACA

Key Data	
Capital	Oaxaca
Other Major Cities	Juchitán, Puerto Angel Salina Cruz, Puerto Escondido
Population	3,224,270
Land Area (sq. km)	95,364
Population Density (pop/sq.km)	34

The State of Oaxaca contributes 1.71 percent of Mexico's GDP, which positions it as the 18th state economy in the country. Its economy is based on oil refining, agriculture, and cattle raising. Its main crops are pineapple, coffee, exotic fruits, sugarcane and rice.

The Port of Salina Cruz is well known for its oil refining and petrochemical facilities and for its services as the Pacific gate for crude exports. Recently, the state's tourism industry has grown rapidly, driven by the new tourism destinations of Huatulco and Puerto Escondido.

Existing infrastructure includes 683 kilometers of railroad tracks connecting to central Mexico and linking the Port of Salina Cruz with the gulf port of Coatzacoalcos. The state has two international and one domestic airports, two hydroelectric facilities, and one of the largest oil refining complexes in Mexico. Oaxaca offers opportunities for the development of highways, as well as for rail modernization, modernization of ports, and environmental solutions for its oil industry.

Key Government Contacts

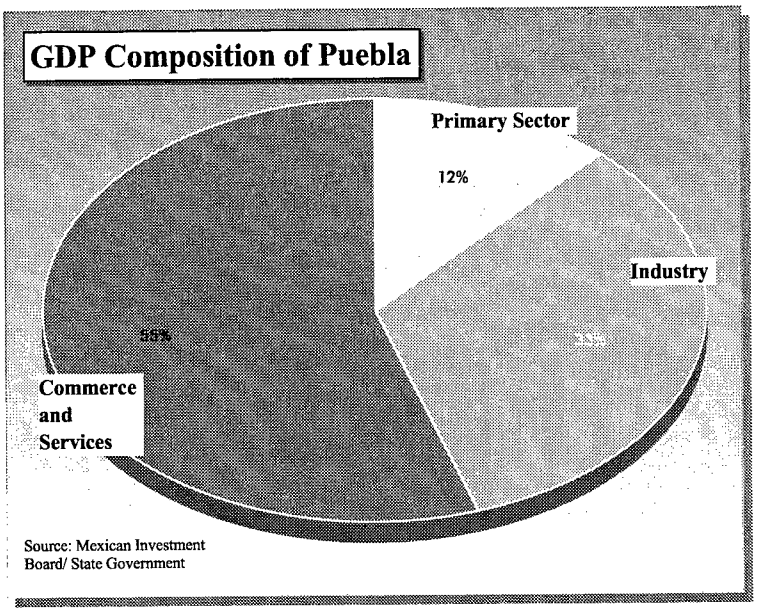
State	**Oaxaca**
Governor	Lic. Diodoro Carrazo Altamirano
Phone	(52-951) 6-3850
Fax	(52-951) 6-3737

State	**Oaxaca**
Secretary of Economic Development	Lic. Eduardo Olguín Zehfuss
Phone	(52-951) 5-0302, 5-0366
Fax	(52-951) 5-2899

PUEBLA

Key Data	
Capital	Puebla
Other Major Cities	Tehuacán
Population	4,624,239
Land Area (sq. km)	33,919
Population Density (pop/sq.km)	136

Puebla is the seventh largest economy in Mexico, accounting for 3.22 percent of the country's GDP with its automotive, textile, iron and steel, beverage, and chemical industries. A major German automobile manufacturer is located near the state capital.



Existing infrastructure in Puebla includes 2,943 kilometers of paved highways, 1,017 kilometers of railroads, 900 megawatts of installed electricity capacity and seven major dams. Puebla is well connected to Mexico City due to its proximity and is highly dependent on economic opportunities provided by the nation's capital. Infrastructure opportunities are found in telecommunications, highways, and water works.

Key Government Contacts

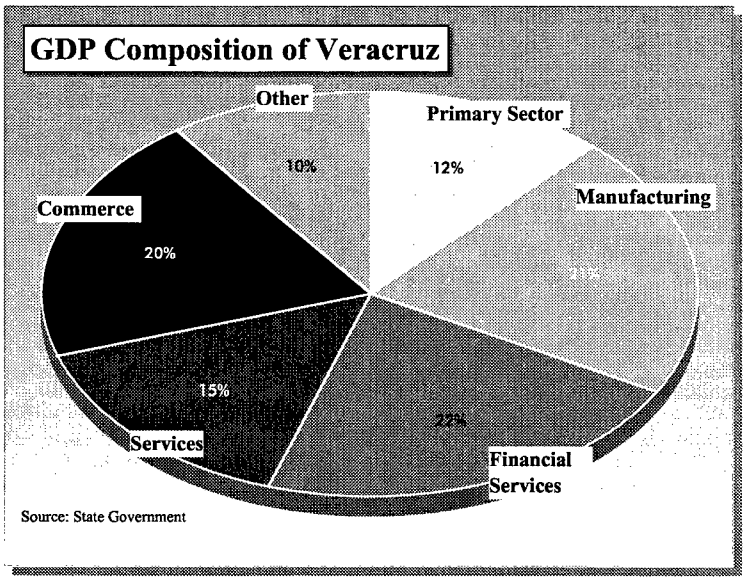
State	**Puebla**
Governor	Lic. Manuel Bartlett Díaz
Phone	(52-22) 46-7022, 46-7025
Fax	(52-22) 46-0271

State	**Puebla**
Secretary of Economic Development	Lic. Mario Riestra Venegas
Phone	(52-22) 35-8182, 35-8194
Fax	(52-22) 34-1224

VERACRUZ

Key Data	
Capital	Xalapa
Other Major Cities	Córdoba, Minatitlán, Orizaba, Coatzacoalcos, Tuxpan, Veracruz
Population	6,734,545
Land Area (sq. km)	72,815
Population Density (pop/sq.km)	92

The State of Veracruz ranks third in total population and contributes almost five percent of Mexico's GDP, making it the fifth most important economy in the country. The state's economy is based on its oil, petrochemical, agricultural, fishing, and diversified manufacturing industries.



The state contributes more than 18 percent of Mexico's crude oil production and produces close to 78 percent of its petrochemicals, ranking first in this sector. Its fishing industry is also ranked number one, with 12 percent of the market. Veracruz plays an important role in the agricultural and cattle breeding segments, and it leads in production of meat, coffee, rice, sugar and citrus fruits.

Veracruz's well developed infrastructure includes 1,783 kilometers of railroads, one international and two domestic airports, 1,986 megawatts of installed electricity capacity, including Mexico's only nuclear plant in Laguna Verde, and three major deep sea ports: Tuxpan, Coatzacoalcos and the most important port in the country, Veracruz.

Although well developed, the State of Veracruz needs significant investment to modernize its transportation networks, water treatment and water works in its major cities, and to further develop its petrochemical facilities and solve environmental hazards caused by its oil and petrochemical industries.

Key Government Contacts

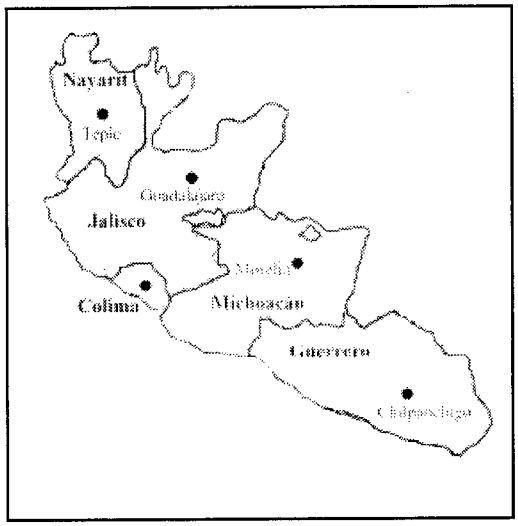
State	**Veracruz**
Governor	Lic. Patricio Chirinos Calero
Phone	(52-28) 17-0716, 17-3281
Fax	(52-28) 18-2167

State	**Veracruz**
Secretary of Economic Development	Ing. Juan Fernando Perdomo Bueno
Phone	(52-28) 12-6043, 12-7544
Fax	(52-28) 12-7208

REGIONS

Statistical Report on the Regions

Central West



Regional Summary

States:	**Colima**
	Guerrero
	Jalisco, Michoacán
	Nayarit
Population:	**14.2 million**
Land Area:	**236,871 km²**
Pop. Density:	**60 (pop./km²)**

Source: INEGI

The Central Western region of Mexico possesses a solid infrastructure base and accounts for 12 percent of Mexico's total economy. The State of Jalisco — specifically its capital Guadalajara — is the largest industrial area in this region and accounts for most of Mexico's computer production. The region is also a strong producer of agricultural, iron and steel products.

The region's infrastructure includes major highways connecting Mexico City and Guadalajara to major ports, Manzanillo and Acapulco, on Mexico's Pacific coastline.

COLIMA

Key Data	
Capital	Colima
Other Major Cities	Tecoman, Manzanillo
Population	487,324
Land Area (sq. km)	5,455
Population Density (pop/sq.km)	89

Colima accounts for 0.63 percent of Mexico's GDP. The state's economy is based on agricultural, livestock, electricity and tourism activities. Main products of the state include sugar, corn, lemons, mango and avocado, cereal milling and beverages.

Existing infrastructure in the state includes 1,558 kilometers of paved roads, 218 kilometers of railroad, connecting to the port of Manzanillo, Mexico's second most important port, on Mexico's Pacific coastline. The port of Manzanillo accounts for 12 percent of Mexico's port cargo and ranks first in container movement on the Pacific Coast. The state also has one international and one national airport.

The state needs investment to modernize the Port of Manzanillo and its road and rail infrastructure. There are also opportunities in the environmental and electric generation sectors.

Key Government Contacts

State	**Colima**
Governor	Lic. Carlos de la Madrid Virgen
Phone	(52-331) 2-6363, 2-0411
Fax	(52-331) 4-3508

State	**Colima**
Secretary of Economic Development	Lic. Miguel Angel Villaseñor Uribe
Phone	(52-331) 2-1434
Fax	(52-331) 2-5509

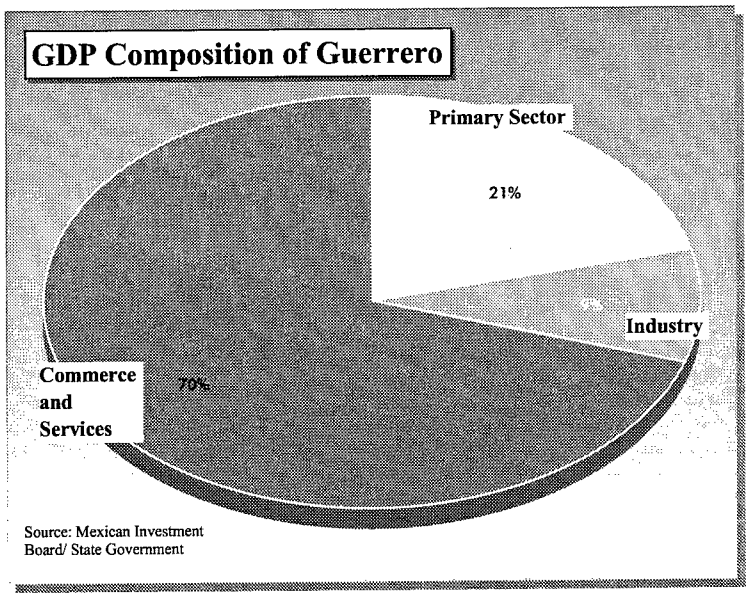
GUERRERO

Key Data	
Capital	Chilpancingo
Other Major Cities	Taxco, Acapulco, Iguala, Zihuatanejo
Population	2,915,497
Land Area (sq. km)	63,794
Population Density (pop/sq.km)	46

The State of Guerrero accounts for almost two percent of Mexico's GDP. Guerrero's economy is based mainly on its tourism and agricultural industries. Tourism is the key source of foreign currency.

Existing infrastructure includes 2,791 kilometers of paved roads including the modern Autopista del Sol highway which connects Mexico City to the Port of Acapulco, 1,063 kilometers of railroad tracks, two international airports and two tourism ports: Zihuatanejo and Acapulco. The latter also handles cargo and automobiles.

Guerrero needs significant amounts of investment in rural areas. Opportunities for infrastructure development exist in water works, rural telephony and improving communications throughout the state.



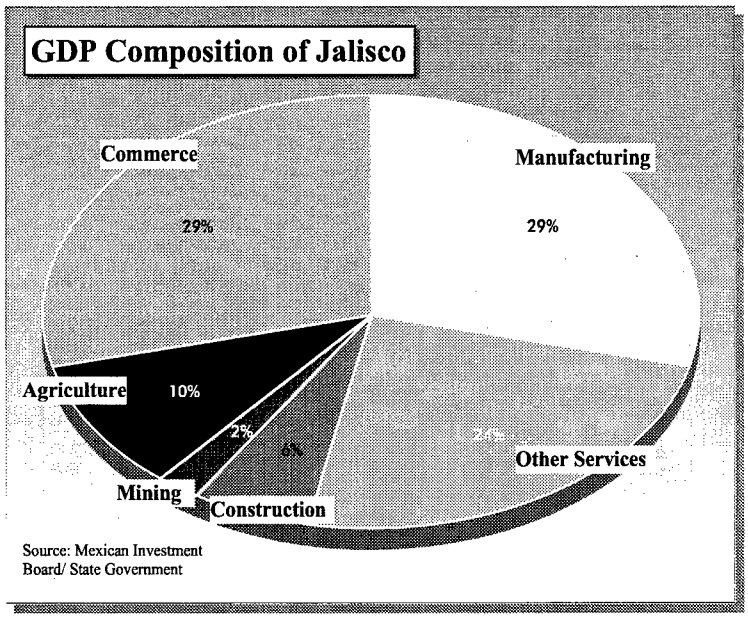
Key Government Contacts

State	Guerrero
Governor	Lic. Angel Eladio Aguirre Ribero
Phone	(52-747) 2-2489, 2-3309
Fax	(52-747) 2-3072

State	Guerrero
Secretary of Economic Development	Lic. Francisco Javier Abarca Escamilla
Phone	(52-747) 2-3717, 2-7964
Fax	(52-747) 2-7363

JALISCO

Key Data	
Capital	Guadalajara
Other Major Cities	Ciudad Guzman, Lagos de Moreno, Puerto Vallarta
Population	5,990,054
Land Area (sq. km)	80,137
Population Density (pop/sq.km)	75



The State of Jalisco is the third largest economy in Mexico, after Mexico City and the State of Mexico, and it accounts for 6.58 percent of Mexico's GDP. The state's manufacturing sector includes: agribusiness, industrial machinery, electronics, metalworks, autoparts, chemicals, pharmaceuticals, textiles, apparel, footwear, rubber and plastics, jewelry and handicrafts.

Jalisco is also the largest agricultural producer in the nation and its computer industry, centered in the City of Guadalajara, produces more than 60 percent of Mexico's output.

Existing infrastructure includes 905 kilometers of railroads including an intermodal terminal in Guadalajara, 5,095 kilometers of paved roads, two international airports which rank among the 10 busiest in the nation, and the tourist port of Puerto Vallarta. The state capital of Guadalajara is effectively linked with the rest of the country and with the Port of Manzanillo.

The state offers numerous opportunities to develop its infrastructure to provide services to its growing industrial base. Areas of opportunity exist in the environmental, telecommunications and industrial sectors.

Key Government Contacts

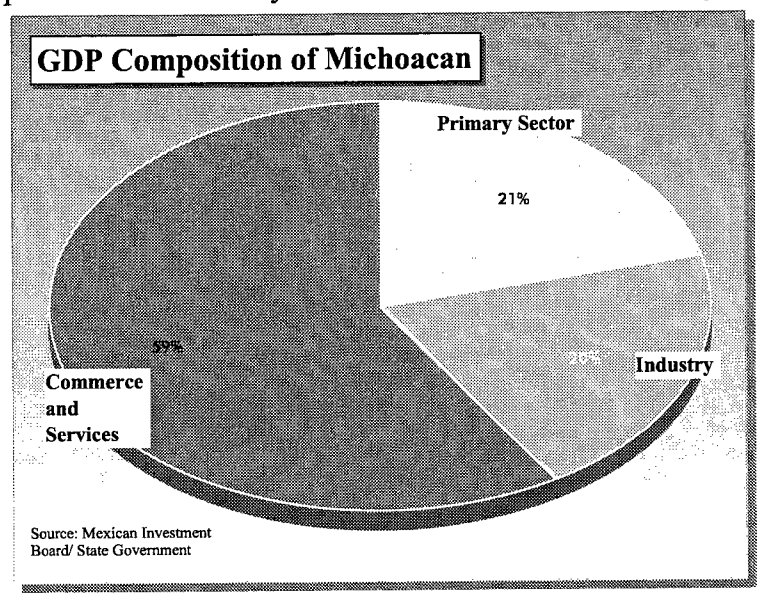
State	**Jalisco**
Governor	Ing. Alberto Cárdenas Jiménez
Phone	(52-3) 613-3634, 613-3602
Fax	(52-3) 613-6097

State	**Jalisco**
Secretary of Economic Development	Lic. Sergio A. García de Alba
Phone	(52-3) 823-6259, 823-6206
Fax	(52-3) 823-3972

MICHOACÁN

Key Data	
Capital	Morelia
Other Major Cities	Patzcuaro, Uruapan, Zamora
Population	3,869,133
Land Area (sq. km)	59,864
Population Density (pop/sq.km)	65

The State of Michoacán accounts for 2.29 percent of the country's total GDP. The state's economy is based on its iron and steel, agricultural, livestock and forestry industries. Michoacán is well known for its agricultural production including avocado (70 percent of Mexico's production), sugar cane and fruits. It is the third largest producer of timber in Mexico. The Port of Lázaro Cárdenas, Mexico's largest cargo port, contains a key industrial zone which produces iron, steel, and fertilizers. Existing infrastructure includes 4,667 kilometers of highways, 1,176 kilometers of railroad tracks, four domestic airports, 13 hydroelectric plants that contribute more than 15 percent of Mexico's output, and the port of Lázaro Cárdenas.



Although Michoacán is a key producer, its infrastructure development lags behind other state economies. Michoacán offers opportunities for investment in the environmental (water supply and water treatment), telecommunications, transportation and industrial sectors.

Key Government Contacts

State	**Michoacán**
Governor	Lic. Victor Manuel Tinoco Rubi
Phone	(52-43) 12-2032, 12-2033
Fax	(52-43) 12-6110

State	**Michoacán**
Secretary of Economic Development	Ing. Carlos Genaro Martínez García
Phone	(52-43) 14-6412, 14-3967
Fax	(52-43) 14-6281

NAYARIT

Key Data	
Capital	Tepic
Other Major Cities	Acaponeta, Ahuacatlán, Compostela, San Blas
Population	895,975
Land Area (sq. km)	27,621
Population Density (pop/sq.km)	32

Nayarit is one of the smallest economies in Mexico: it contributes 0.73 percent of Mexico's GDP. The state's economy is based primarily on its agricultural sector, although recently tourism has played a growing role.

Existing infrastructure includes 393 kilometers of railroad tracks, one domestic airport and the small port of San Blas.

Nayarit's government has developed a plan to build infrastructure, which includes the construction of the port of Aztan, industrial parks, irrigation systems, highway communications and the expansion of its water and energy resources.

Key Government Contacts

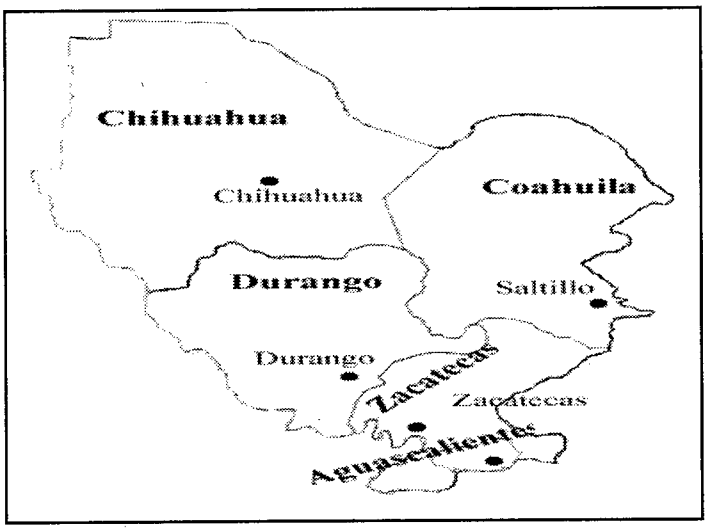
State	**Nayarit**
Governor	Ing. Rigoberto Ochoa Zaragoza
Phone	(52-321) 3-2216, 3-2623
Fax	(52-321) 4-0888

State	**Nayarit**
Secretary of Economic Development	Lic. José Armenta Anaya
Phone	(52-321) 3-4810, 3-4225
Fax	(52-321) 3-4810

Statistical Report on the Regions

REGIONS

North



Regional Summary

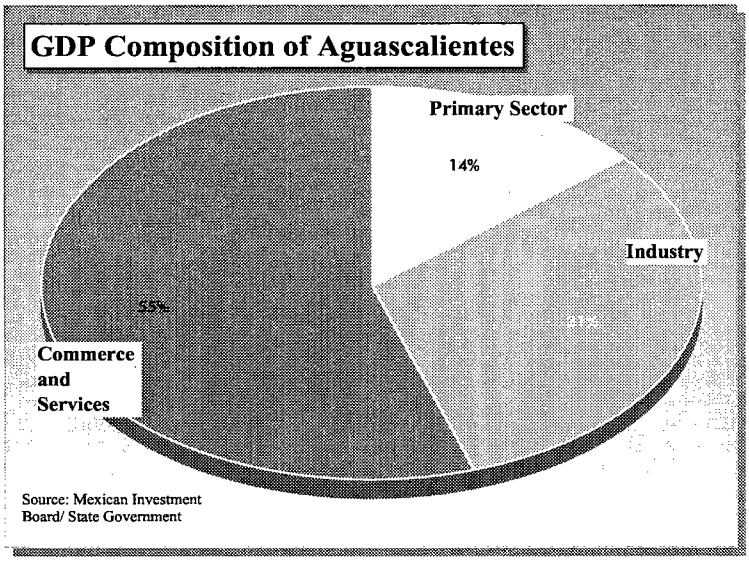
States:	**Aguascalientes**
	Chihuahua
	Durango, Zacatecas
	Coahuila
Population:	**8.59 million**
Land Area:	**598,935 km^2**
Pop. Density:	**14 (pop./km^2)**

Source: INEGI

AGUASCALIENTES

Key Data	
Capital	Aguascalientes
Other Major Cities	Rincón de Romos
Population	862,335
Land Area (sq. km)	5,589
Population Density (pop/sq.km)	154

The State of Aguascalientes has an economy based on textile, food and beverage, automobile, mining and electronics industries. A major Japanese auto manufacturer established operations in the state, taking advantage of its land transportation network. Existing infrastructure includes 226 kilometers of railroad track on the Northeast railway and one international airport.



Key Government Contacts

State	**Aguascalientes**
Governor	Lic. Otto Granados Roldán
Phone	(52-49) 16-1585, 15-3120
Fax	(52-49) 18-2053

State	**Aguascalientes**
Secretary of Economic Development	Ing. José Carlos Lozano de la Torre
Phone	(52-49) 12-3511
Fax	(52-49) 12-1930, 2-1990

CHIHUAHUA

Key Data	
Capital	Chihuahua
Other Major Cities	Ciudad Juárez, Ciudad Camargo, Delicias
Population	2,792,989
Land Area (sq. km)	247,087
Population Density (pop/sq.km)	11

The State of Chihuahua ranks ninth in contribution to Mexico's GDP, supported by its mining, forestry, cattle breeding, agricultural and maquiladora industries. Chihuahua is the country's leader in timber and meat production, and its maquiladora industry near Ciudad Júarez has experienced strong growth.

Existing infrastructure includes the largest railroad extension with 2,679 kilometers of track, one international and one domestic airport and border crossings in the cities of Ciudad Júarez and Ojinaga.

Major infrastructure needs exist in environmental, energy, water, and rural communications.

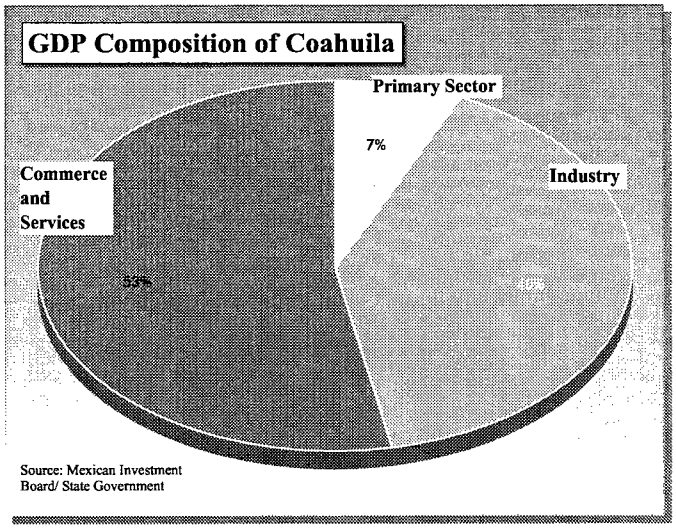
Key Government Contacts

State	**Chihuahua**
Governor	C.P. Francisco Barrio Terrazas
Phone	(52-14) 10-1146, 10-1147
Fax	(52-14) 16-0719

State	**Chihuahua**
Secretary of Economic Development	Ing. Enrique Terrazas Torres
Phone	(52-14) 10-8556, 10-9948
Fax	(52-14) 16-0032

COAHUILA

Key Data	
Capital	Saltillo
Other Major Cities	Torreón, Monclova, Piedras Negras
Population	2,171,136
Land Area (sq. km)	151,571
Population Density (pop/sq.km)	14



The State of Coahuila ranks twelfth in contribution to Mexico's GDP, driven mainly by its automobile, steel, beverage, construction materials (cement) and maquiladora industries. Its proximity to the United States has enabled this state to develop a strong in-bond and auto parts industry. The state's steel production accounts for more than 30 percent of Mexico's total production.

Existing infrastructure includes 3,540 kilometers of paved roads including a border crossing in Piedras Negras, 2,163 kilometers of railroads, the Northeast and the Pacific-North Railways, one international and three domestic airports and 1,450 megawatt installed electrical capacity.

Major U.S. auto parts and car manufacturers have established facilities in Coahuila. These are now spurring the need for new infrastructure in the areas of water, energy, industry and transportation (highways, intermodal and railroads).

Key Government Contacts

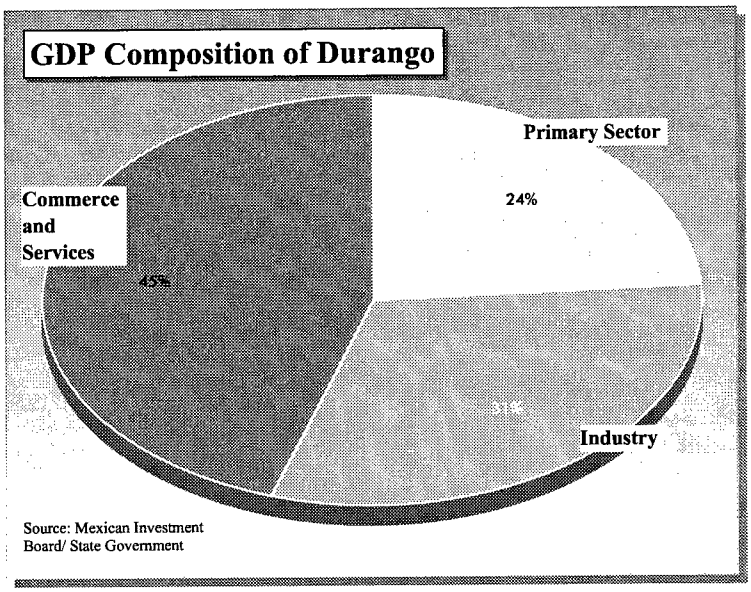
State	**Coahuila**
Governor	Dr. Rogelio Montemayor Seguy
Phone	(52-84) 14-5611, 14-5628
Fax	(52-84) 14-1360

State	**Coahuila**
Secretary of Economic Development	Ing. José Antonio Murra Y.
Phone	(52-84) 15-1714, 15-4053
Fax	(52-84) 15-1714 ext. 102

DURANGO

Key Data	
Capital	Durango
Other Major Cities	Gómez Palacio
Population	1,430,964
Land Area (sq. km)	119,648
Population Density (pop/sq.km)	12

The State of Durango's economy is boosted by its agriculture, meat, forestry, textile and mining industries. It ranks twentieth in the composition of Mexico's GDP and is the largest supplier of sawmill products. Durango also has a well developed mining industry which ranks second in gold extraction, in addition to the state's uranium, silver, lead and iron deposits.



Existing infrastructure includes 3,433 kilometers of paved roads, 1,204 kilometers of railroads, one international airport and a 416 megawatt of installed electricity capacity. The state's major infrastructure needs are concentrated in the energy and environmental sectors.

Key Government Contacts

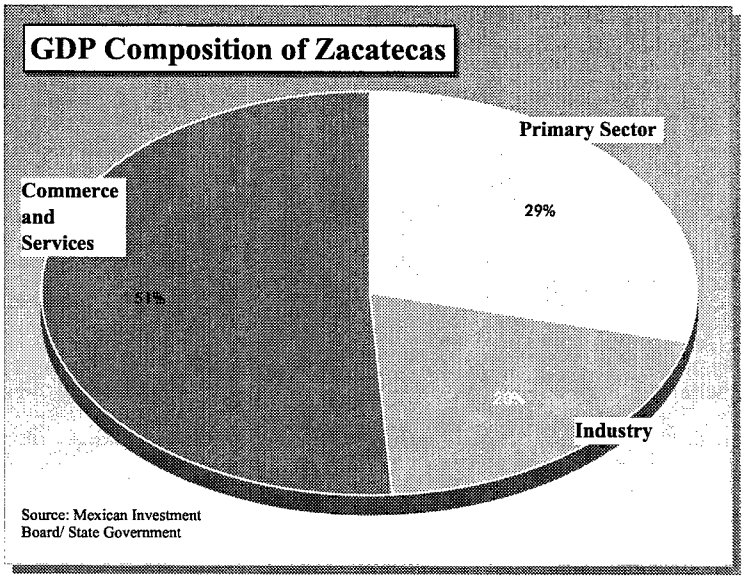
State	**Durango**
Governor	Lic. Maximiliano Silerio Esparza
Phone	(52-18) 12-4313, 12-2655
Fax	(52-18) 12-1330

State	**Durango**
Secretary of Economic Development	Sr. Eduardo Fuhrken Pinelli
Phone	(52-18) 12-1121, 11-3563
Fax	(52-18) 12-4808

ZACATECAS

Key Data	
Capital	Zacatecas
Other Major Cities	Fresnillo, Sombrerete
Population	1,336,348
Land Area (sq. km)	75,040
Population Density (pop/sq.km)	18

Zacatecas' economy is driven by its agriculture, mainly food and tobacco production, nonmetallic minerals, metallic products, textile and tooling industries. It also maintains significant deposits of zinc, copper and lead and is well positioned as a construction material supplier.



Existing infrastructure includes 9,952 kilometers of paved and rural roads, 678 kilometers of railroads, one international airport and a 150 megawatt of installed electricity capacity.

The state's major infrastructure needs lie in the energy, water and environmental sectors.

Key Government Contacts

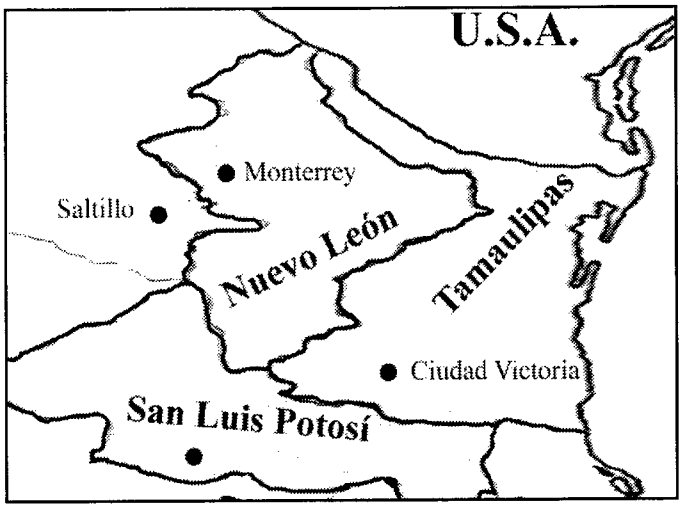
State	**Zacatecas**
Governor	Lic. Arturo Romo Gutiérrez
Phone	(52-492) 20-020, 20-284
Fax	(52-492) 25-576

State	**Zacatecas**
Secretary of Economic Development	Lic. Raúl Rodríguez Márquez
Phone	(52-492) 20-077, 26-415
Fax	(52-492) 41-396, 29-329

REGIONS

Statistical Report on the Regions

Northeast



Regional Summary

States:	**Nuevo León**
	San Luis Potosí
	Tamaulipas
Population:	**8.27 million**
Land Area:	**207,229 km²**
Pop. Density:	**40 (pop./km²)**

Source: INEGI

The Northeast region of Mexico is well known for its industrial base, located primarily in the city of Monterrey and the Altamira-Tampico industrial corridor. The city of Monterrey is among Mexico's largest industrial zones.

The region's infrastructure is one of the best developed in the nation. A significant percentage of trade with the U.S. is transported by sea and land through the Northeast Region.

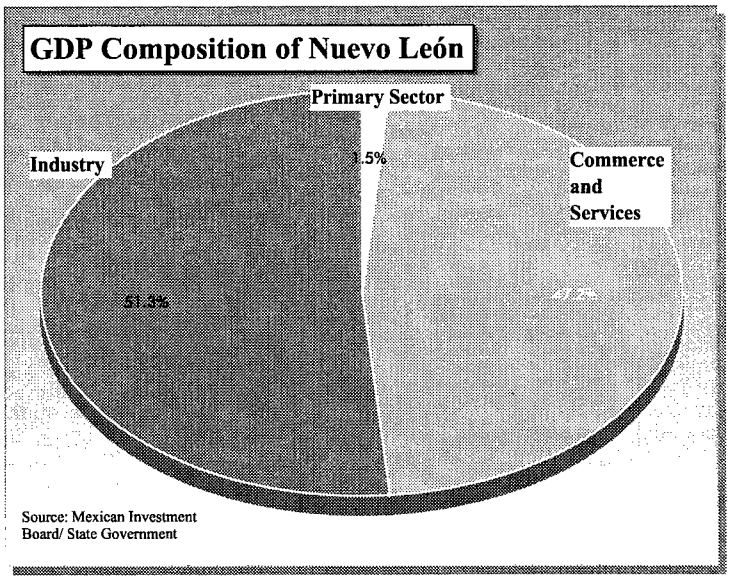
NUEVO LEON

Key Data	
Capital	Monterrey
Other Major Cities	Linares
Population	3,549,273
Land Area (sq. km)	64,555
Population Density (pop/sq.km)	55

The State of Nuevo León ranks third behind Mexico City and the State of Mexico in contribution to the country's GDP. The state's economy is boosted by its cement, beer, iron and steel, glass, electrical, paper and diversified manufacturing industries.

Seven of Mexico's largest 15 industrial and commercial consortia have headquarters in the city of Monterrey. Among these are Alfa, Protexa, Femsa, Cemex and Cydsa.

Existing infrastructure includes 3,943 kilometers of paved roads, 1089 kilometers of railroads connecting with Mexico City, the Gulf Coast and the State of Texas, one international and one domestic airport, and a well-developed energy, water, and telecommunications base. The city of Monterrey is the only city besides the nation's capital that has a subway as part of its public transportation system.



Nuevo León presents great opportunities for the development of infrastructure projects needed to sustain industrial growth, in particular in the areas of environment, energy and telecommunications.

Key Government Contacts

State	**Nuevo León**
Governor	Lic. Benjamin Clarion Reyes Retana
Phone	(52-8) 343-5569, 343-6360
Fax	(52-8) 344-9877

State	**Nuevo León**
Secretary of Economic Development	Ing. Jorge Arambide Garza
Phone	(52-8) 345-0031, 345-0091
Fax	(52-8) 345-3032

SAN LUIS POTOSI

Key Data	
Capital	San Luis Potosí
Other Major Cities	Matehuala, Cd. Valles
Population	2,191,712
Land Area (sq. km)	62,848
Population Density (pop/sq. km)	35

The State of San Luis Potosí's economy is supported by mining (iron, steel and nonferrous materials), agriculture and cattle raising. The industrial base is located in its capital and is concentrated in the electronic and automotive sectors.

San Luis Potosí is the least developed state of the three Northeast states in terms of infrastructure. Existing infrastructure includes 3,278 kilometers of paved roads, 1,142 kilometers of railroads, and two domestic airports.

The state's major infrastructure needs are in the environmental, energy and transportation sectors.

Key Government Contacts

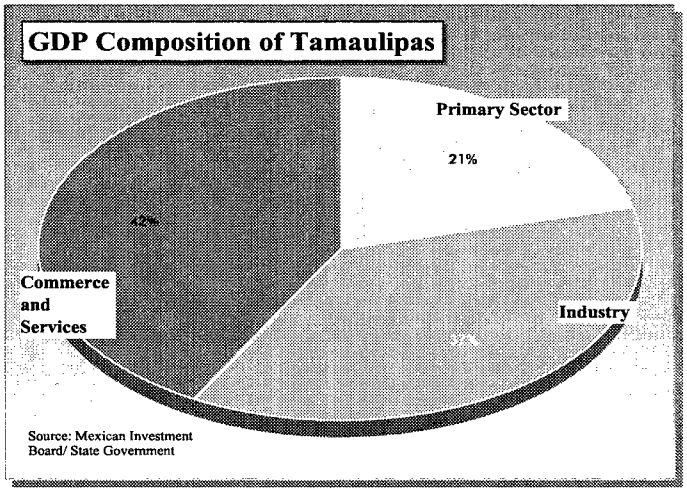
State	**San Luis Potosí**
Governor	Lic. Horacio Sánchez Unzueta
Phone	(52-48) 12-29-50, 14-14-04
Fax	(52-48) 12-27-07

State	**San Luis Potosí**
Secretary of Economic Development	Lic. Carlos Pérez
Phone	(52-48) 14-98-60, 14-29-94
Fax	(52-48) 14-23-11

TAMAULIPAS

Key Data	
Capital	Ciudad Victoria
Other Major Cities	Matamoros, Nuevo Laredo, Reynosa, Tampico
Population	2,526,387
Land Area (sq. km)	79,829
Population Density (pop/sq km)	32

The State of Tamaulipas ranks eighth in its contribution to Mexico's GDP, mainly driven by its oil refining, petrochemical, electronics, automotive and maquiladora industries. Existing infrastructure includes 3,302 kilometers of paved roads including 12 international bridges that connect to the neighboring State of Texas, 938 kilometers of railroads connecting with two major ports and the border cities of Nuevo Laredo and Matamoros, four international airports and two major deep sea ports in the Gulf of Mexico: Tampico and Altamira.



Major groups from Monterrey and Mexico City are locating their industrial facilities in the Altamira-Tampico industrial and petrochemical corridor. This is currently driving the need for new infrastructure in the areas of energy and transportation (highways, ports and railroads).

Key Government Contacts

State	**Tamaulipas**
Governor	Lic. Manuel Cavazos Lerma
Phone	(52-131) 22-107, 21-144
Fax	(52-131) 23-492

State	**Tamaulipas**
Secretary of Economic Development	Lic. Miguel Rubiano Reyna
Phone	(52-131) 22-448, 28-583
Fax	(52-131) 22-448

Statistical Report on the Regions

REGIONS

Northwest

Regional Summary

States:	**Baja California Norte and Sur, Sinaloa, Sonora**
Population:	**6.99 million**
Land Area:	**386,816 km²**
Pop. Density:	**18 (pop./km²)**

Source: INEGI

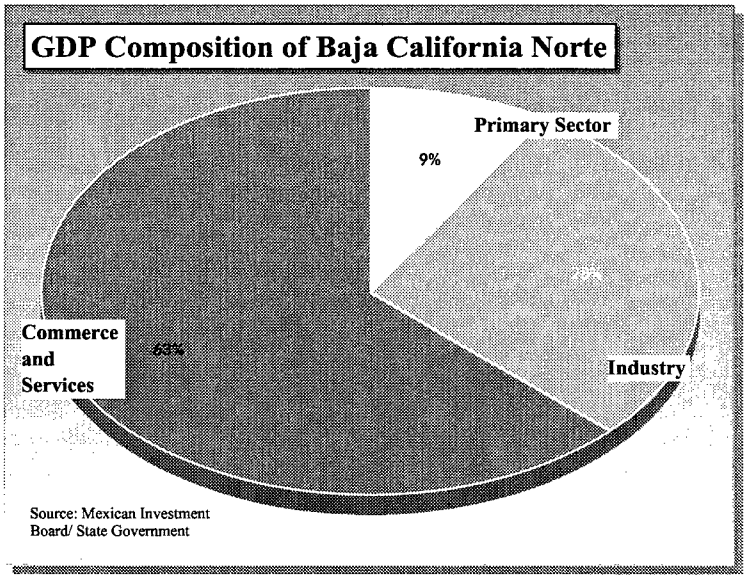
Located on the southwest border of the United States, Mexico's Northwest region is driven by the maquiladora industry. The region is also well known for its agricultural and mining capabilities which contribute substantially to Mexico's domestic economy.

The region's infrastructure, for the most part, is well developed. However, it will face great challenges in accommodating projected industrial growth.

BAJA CALIFORNIA NORTE

Key Data	
Capital	Mexicali
Other Major Cities	Tijuana, Ensenada, Tecate
Population	2,108,118
Land Area (sq. km)	70,113
Population Density (pop/sq. km)	30

The state's economy is boosted by its proximity to the U.S. market and its manufacturing industries in clothing, machinery, electronics, agricultural and machine tools, and furniture.



A substantial number of U.S. and Japanese firms are establishing industrial facilities in the state. Booming tourism and the fishing industry amplify the need for new infrastructure investment to sustain this growth.

Existing infrastructure includes 213 kilometers of railroads connecting Mexicali, the state capital, with the North Pacific railroad and the United States, 1,102 megawatts of installed electrical capacity, two international and two domestic airports, and the Port of Ensenada.

Baja California Norte presents great opportunities for the development of infrastructure essential to sustaining its growth in manufacturing and tourism. The greatest growth potential lies in the areas of environment, energy and transportation (railroads, highways and ports).

Key Government Contacts

State	**Baja California Norte**
Governor	Lic. Héctor Terán Terán
Phone	(52-65) 58-1090, 58-1128
Fax	(52-65) 52-2033

State	**Baja California Norte**
Secretary of Economic Development	Lic. Jorge Gallegos Salas
Phone	(52-65) 58-1000
Fax	(52-65) 58-1192

BAJA CALIFORNIA SUR

Key Data	
Capital	La Paz
Main Cities	Cabo San Lucas, Loreto San José del Cabo
Population	375,450
Land Area (sq km)	73,677
Population Density (pop/sq. km)	5

The State of Baja California Sur has an economy underpinned by tourism, mining, agriculture and fishing. The state is responsible for close to 20 percent of Mexico's fish production. The state is also well known for its salt production.

Existing infrastructure includes 3,957 kilometers of primarily rural roads, three international airports servicing tourists primarily, and 192 megawatts of installed electrical capacity.

Major infrastructure needs for the state are concentrated in the transportation sector.

Key Government Contacts

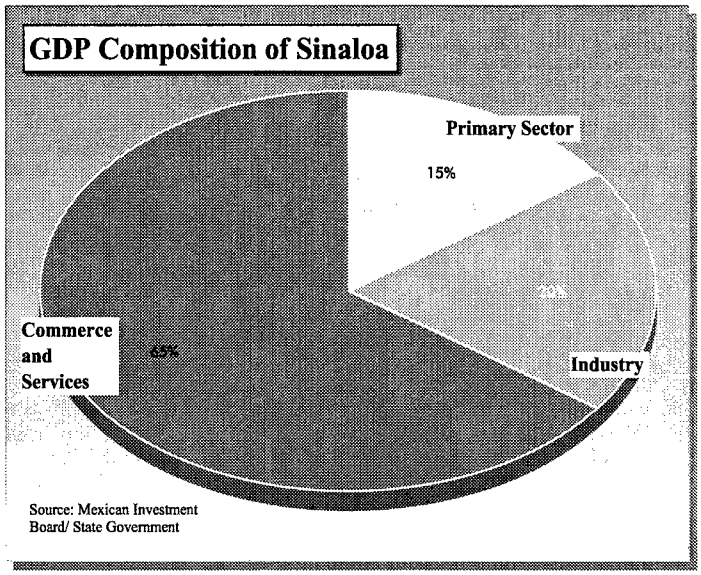
State	**Baja California Sur**
Governor	Lic. Guillermo Mercado R.
Phone	(52-112) 20-760, 20-761
Fax	(52-112) 54-190

State	**Baja California Sur**
Secretary of Economic Development	Lic. Ramón Salido Almada
Phone	(52-112) 51-912, 52-280
Fax	(52-112) 52-280

SINALOA

Key Data	
Capital	Culiacán
Other Major Cities	Los Mochis, Mazatlán
Population	2,424,745
Land Area (sq. km)	58,092
Population Density (pop/sq. km)	42

The economy of the state of Sinaloa is dominated by agricultural activity, in particular, vegetable and cereal production. Main crops include wheat, beans, tomatoes and sugarcane. Existing infrastructure includes 3,119 kilometers of paved roads, 1,237 kilometers of railroads connecting with the ports of Topolobampo and Mazatlán, one international airport and two domestic airports.



Infrastructure opportunities in Sinaloa include the development of Topolobampo industrial corridor and rail and road improvements. The first railway for privatization in Mexico will be the Chihuahua-Pacific railroad, which connects the port of Topolobampo to Ciudad Juárez on the U.S. border.

Key Government Contacts

State	**Sinaloa**
Governor	Ing. Renato Vega Alvarado
Phone	(52-67) 14-0745, 14-7870
Fax	(52-67) 14-7870

State	**Sinaloa**
Secretary of Economic Development	Ing. Lauro Díaz Castro
Phone	(52-67) 14-4406, 14-0095
Fax	(52-67) 14-4153

SONORA

Key Data	
Capital	Hermosillo
Other Major Cities	Navojoa, Nogales, Ciudad Obregón, Guaymas
Population	2,083,630
Land Area (sq. km)	184,934
Population Density (pop/sq. km)	11

Sonora accounts for more than 35 percent of Mexico's mining, primarily in copper, barite and graphite. Sonora also has a solid base in the automotive, cement, beverage and electrical industries in addition to its in-bond industry.

The state's automotive industry has experienced strong growth with the recent establishment of a major U.S. manufacturer in the city of Hermosillo.

Existing infrastructure includes 5,417 kilometers of paved roads, 2,009 kilometers of railroads connecting with the port of Guaymas and the border city of Nogales, three international airports and one domestic airport.

The State of Sonora presents infrastructure development opportunities in intermodal transportation, port, environment and industrial sectors.

Key Government Contacts

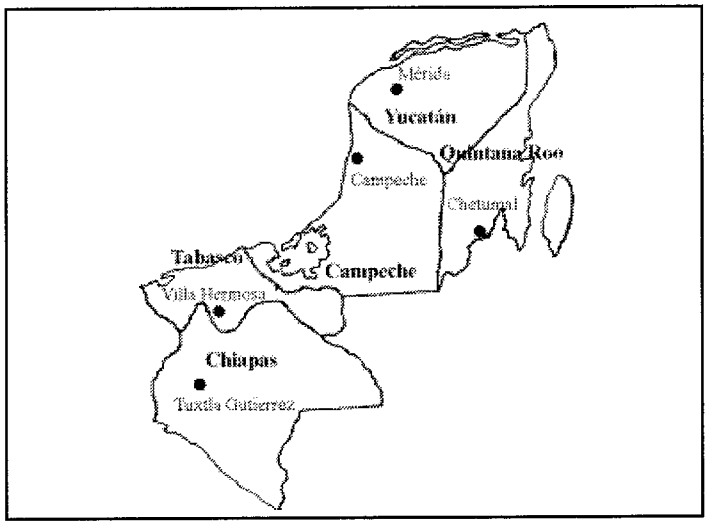
State	**Sonora**
Governor	Lic. Manlio Favio Beltrones Rivera
Phone	(52-62) 12-00-01, 12-00-51
Fax	(52-62) 17-41-26

State	**Sonora**
Secretary of Economic Development	Lic. Ernesto Antonio Cadena Beraud
Phone	(52-62) 17-08-30, 17-29-44
Fax	(52-62) 17-27-75

Statistical Report on the Regions

REGIONS

Southeast



Regional Summary

States:	**Campeche**
	Chiapas
	Quintana Roo
	Tabasco, Yucatán
Population:	**8.3 million**
Land Area:	**240,071 km²**
Pop. Density:	**34 (pop./km²)**

Source: INEGI

The southeast region is the least developed in the country, though it is rich in natural resources. The states that form the region are largely involved in agricultural, livestock and fishing activities. Campeche and Tabasco account for the majority of Mexico's oil reserves and Quintana Roo has proven to be a premier international tourism destination.

Mexico's southeast is probably the region that requires the greatest amount of investment to develop infrastructure in highways, water works, energy and ports.

CAMPECHE

Key Data	
Capital	Campeche
Other Major Cities	Champotón, Ciudad del Carmen
Population	642,082
Land Area (sq. km)	51,833
Population Density (pop/sq. km)	12

The State of Campeche in the Yucatán Peninsula accounts for 1.64 percent of Mexico's GDP. The state's economy is boosted by its petroleum and gas industry and accounts for around one quarter of Mexico's natural gas production. It also has a solid base in forestry and fishing.

Existing infrastructure includes 1,260 kilometers of paved highways, 393 kilometers of track of the Southeastern railroad, two international airports and the port of Ciudad del Carmen.

Campeche does not have well-developed infrastructure and needs investment to develop new highways, water works and energy capacity.

Key Government Contacts

State	**Campeche**
Governor	Ing. Jorge Salomon Azar García
Phone	(52-981) 6-2039, 6-3866
Fax	(52-981) 1-4004

State	**Campeche**
Secretary of Economic Development	C.P. Jorge Luis Lavalle Azar
Phone	(52-981) 6-9019, 6-9031
Fax	(52-981) 6-9142

CHIAPAS

Key Data	
Capital	Tuxtla Gutierrez
Other Major Cities	Palenque, Tapachula, San Cristóbal, Puerto Madero
Population	3,606,828
Land Area (sq. km)	73,887
Population Density (pop/sq. km)	49

The State of Chiapas accounts for 1.82 percent of the country's GDP. The state is rich in agriculture (cocoa, coffee, sugarcane and exotic fruits), cattle raising, and forestry. Chiapas is also a major provider of water and energy resources.

Existing infrastructure includes 3,189 kilometers of paved roads, 547 kilometers of railroad track, one international and one national airport, the port of Puerto Madero and several border crossings along its 658-kilometer border with Guatemala. Major infrastructure needs are in the environmental and transportation sectors, specifically in highway, port and water projects.

Key Government Contacts

State	**Chiapas**
Governor	Lic. Julio César Ruiz Ferro
Phone	(52-761) 2-1093, 2-3352
Fax	(52-761) 2-9618

State	**Chiapas**
Secretary of Economic Development	Ing. Oscar Castañon Morell
Phone	(52-761) 3-3461, 3-3462
Fax	(52-761) 1-0231

QUINTANA ROO

Key Data	
Capital	Chetumal
Other Major Cities	Cancún, Cozumel, Isla Mujeres
Population	703,442
Land Area (sq. km)	50,350
Population Density (pop/sq. km)	14

Quintana Roo is located in the Yucatán Peninsula. Its economy is strongly driven by the international tourism industry, with more than 26,000 hotel rooms generating significant dollar denominated revenues. The state also produces diversified forestry products. The state's economy accounts for 1.34 percent of the total GDP.

Existing infrastructure includes 2,088 kilometers of roads, three international airports and tourism port facilities. Quintana Roo is one of two states in Mexico with no railroad.

Opportunities for infrastructure development are related to the state's tourism industry: there is a need for new highways, tourism port terminals, and sewage and water treatment facilities.

Key Government Contacts

State	**Quintana Roo**
Governor	Ing. Mario Ernesto Villanueva Madrid
Phone	(52-983) 2-0620, 2-0621
Fax	(52-983) 2-2457

State	**Quintana Roo**
Secretary of Economic Development	Sr. Guillermo Vázquez Handall
Phone	(52-983) 2-0266, ext. 225
Fax	(52-983) 2-0266, ext. 136

TABASCO

Key Data	
Capital	Villahermosa
Other Major Cities	Cárdenas, Frontera
Population	1,748,664
Land Area (sq. km)	24,661
Population Density (pop/sq. km)	71

The State of Tabasco contributes 1.48 percent of Mexico's GDP, though it ranks number one in oil and natural gas production. Pemex facilities have boosted infrastructure development in all parts of the state. Tabasco's economy is also dependent on its agricultural, fishing and cattle raising activities: main products are bananas, sugar cane, cocoa, copra, peppers, citrus, tropical fruits and oysters.

Existing infrastructure includes 298 kilometers of railroad track on the Southeastern railway, one international airport and the agricultural Gulf port of Frontera.

Tabasco requires investment mainly in highway construction, telecommunications and environmental solutions for its oil industry.

Key Government Contacts

State	**Tabasco**
Governor	Lic. Roberto Madrazo Pintado
Phone	(52-93) 14-0258, 12-0711
Fax	(52-93) 12-3347

State	**Tabasco**
Secretary of Economic Development	Lic. Gustavo Rosario Torres
Phone	(52-93) 16-3535, 16-1249
Fax	(52-93) 16-3519

YUCATÁN

Key Data	
Capital	Mérida
Other Major Cities	Tizimin, Progreso
Population	1,555,733
Land Area (sq. km)	39,340
Population Density (pop/sq. km)	40

Yucatán accounts for 1.26 percent of Mexico's GDP. The state's economy is based on its agricultural activities including chili peppers, citrus, tomatoes and natural fibers such as sisal. More recently the state's capital has seen significant increases in investment in maquiladora industries, which assemble electronics and electrical appliances shipped from the nearby port of Progreso.

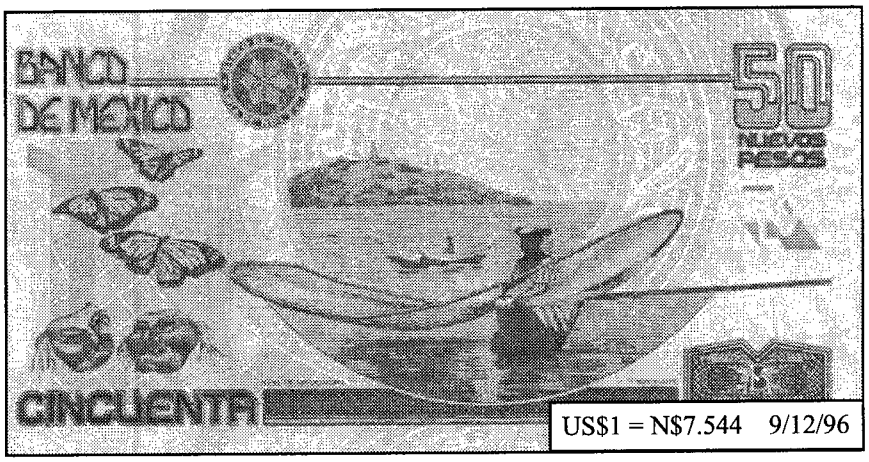
Existing infrastructure includes 3,659 kilometers of paved highways, 610 kilometers of railroads, one international airport and the Port of Progreso. Infrastructure opportunities exist in telecommunications, transportation and energy and gas distribution.

Key Government Contacts

State	**Yucatán**
Governor	Sr. Victor Manuel Cervera
Phone	(52-99) 280-600, 280-699
Fax	(52-99) 280-900

State	**Yucatán**
Secretary of Economic Development	C.P. Ricardo Dajer Nahún
Phone	(52-99) 24-8013, 24-8002
Fax	(52-99) 28-6548

Financing Infrastructure in Mexico



US$1 = N$7.544 9/12/96

OVERVIEW

While Mexico's demand for infrastructure is unquestioned, it is the availability of long-term financing at low rates that will ultimately determine if this demand can be fully met and satisfied. Financing for infrastructure projects does not originate from a unitary source but comes from a variety of sources that accept different risk profiles, prefer distinct financial instruments, and command different pools of capital. It is important to understand these factors and what their likely involvement will be in financing projects in the Mexican environment. Implicit in this discussion is that the Mexican government itself will not be a major source of finance for Mexican infrastructure because of the acute fiscal constraints under which it must operate.

Mexico is gradually regaining access to capital in order to finance its infrastructure needs. Access was severely restricted after the peso devaluation in 1994. The return of capital will be a gradual process as the country demonstrates that it can maintain overall macroeconomic and political stability, and demonstrate solid payment performance on individual infrastructure projects. Currently, money for infrastructure financing is limited mainly to funding from developers and suppliers from the U.S., Europe, and Mexico, as well as export credit agencies (particularly the U.S. Ex-Im Bank) and the multilateral development banks. These institutions have an interest in seeing infrastructure projects move forward beyond a purely financial investment, and they have been the first to re-enter the Mexican infrastructure market.

The challenges facing Mexico in broadening its access to capital are as follows:

Investment Grade Ratings

An important impediment to Mexico's access to a broader pool of long-term capital is that Mexico is now rated one level below investment grade by both Standard and Poor's and Moody's for long-term foreign currency denominated debt. This country rating constitutes the sovereign ceiling, and projects within Mexico, except in the rarest of cases, cannot exceed this country rating. This situation precludes investors such as pension funds, and insurance companies from investing in infrastructure projects in Mexico. These institutions control vast amounts of capital and almost all debt capital markets. These institutions will continue to be constrained by Mexico's credit rating because of their need to maintain an overall portfolio of investment grade quality.

Although Mexico has achieved economic stability, an upgrade of its credit rating in the short term is unlikely. At this point, only continued economic stability over the medium term, combined with a credible economic policy that emphasizes exports and accumulates foreign reserves, is likely to convince the major rating agencies and regulatory authorities that Mexico merits the designation of investment grade.

Regulatory Ratings

In addition to investment grade ratings, risk rankings from the commercial bank regulatory agencies are also an impediment to investment. Commercial banks both in the U.S. and Europe are not affected by investment grade ratings nearly as they are from the numerous agencies that regulate their lending. The U.S., Germany, Switzerland, France, and other countries had eased up on regulations for cross-border loans with Mexico in the early 1990s, but they reimposed restrictions after the peso devaluation.

Improving Revenue Streams

One fundamental criterion for the financing of any infrastructure project is the quality, strength, and durability of the revenue stream originating from the project. Since private investment in infrastructure projects in Mexico is relatively new, these streams, because of the lack of a revenue track record, are currently perceived to be risky and often need credit enhancement. The specific issues include:

Developing and Maintaining a Positive Track Record

The track record in terms of revenue streams for infrastructure projects in Mexico is mixed, and the country needs solid cases of successfully financed infrastructure projects to bring in additional capital. Revenue flows have required credit enhancement or cash bailout by agencies of the federal govern-

ment in the municipal waste water program and the toll road concession program. In both cases, the expected revenue stream in hard currency equivalents, was devastated by the peso devaluation. The task of the Mexican government is to begin to build a portfolio of successful infrastructure projects — a long and gradual process.

Mitigating Currency Risk

Mexico's history of devaluations leaves investors wary about peso revenue streams. Mexican infrastructure is ultimately denominated in peso terms to the end user. The only exceptions are infrastructure projects for which the end-user is a dollar-based entity such as an exporter like Pemex. Since most infrastructure ultimately relies on a peso revenue stream, it will be important to elimate the risk of devaluation through the maintenance of a predictable dollar/peso exchange rate and through the creation of improved currency hedging mechanisms. One such mechanism, the ability to buy peso futures, although currently quite expensive, is a positive step in this regard.

Defining Government Credit Enhancement

The Mexican government is attempting to fine tune a policy whereby credit enhancements are offered only in those limited instances where the government is at fault for non-performance. In this sense, the Mexican government is opposed to providing guarantees to private parties but rather prefers to consider this an issue of risk allocation, whereby the government is only liable for its own contractual non-performance.

Nevertheless, the Mexican government is still providing guarantees for the municipal waste water program, whereby Banobras guarantees both liquidity payments and long-term payments to the concessionaire in the event of default by the municipality.

Improving Financial Transparency

U.S. financial institutions are accustomed to a level of financial transparency that is new to Mexico. This lack of transparency results in Mexican revenue streams being judged as risky. As Mexican institutions become more familiar with the financial reporting requirements of international investors, and as international investors become more familiar with Mexican business and accounting practices, this situation should improve.

Resolving Institutional Issues

While the decision-making process on infrastructure projects is gradually being decentralized, local and state jurisdictions have very limited control over revenue streams. For example, states and municipalities in Mexico have no bonding authority and very limited taxing or revenue raising authority. This lack of control precludes these local institutions from collateralizing infrastructure revenue streams and developing their own credit ratings.

Political Issues

The continuing consolidation of a political consensus supporting private sector participation in infrastructure projects will facilitate the efficient creation of many more projects in the areas of transportation, communications, energy and the environment.

These political issues range from developing the necessary consensus for charging the true cost for waste water treatment, to achieving a national consensus for the privatization of the country's petrochemical facilities. Few investors will place long-term money in a sector that is still in the center of political debate. Other widely publicized political problems in Mexico add to the discomfort of investors and lenders.

Building a Regulatory Structure

Mexico has begun to construct the regulatory protections that are needed to support the successful financing for infrastructure projects. Mexico's economic development is spurring the implementation of such frameworks on a sector by sector basis. Most of this regulatory framework is already in place, but requires market testing for investors to gain confidence in the rules and and the manner in which they are implemented and applied. Regulatory action such as the deregulation of natural gas, the creation of the Energy Regulatory Commission, and the enactment of the private power regulations have opened new markets to investors in ways not possible years ago. Compared with other Latin American countries, Mexico's regulatory framework is relatively well developed.

SOURCES OF FINANCE

U.S. Private Sector Sources

Developers/Suppliers

During the past several years, the vast majority of Mexican infrastructure projects were funded through equity, supplier/developer credit or a combination thereof. This phenomenon is taking place partially due to scarce publicly available sources of infrastructure financing, and also as a means for developers/suppliers to secure orders for hardware and ongoing interest in the projects.

The Samalayuca II project is a good example of how developer financed projects are put together, for a winning combination. The developer group, consisting of a major U.S. engineering firm, a natural

gas supplier, a Mexican construction firm and an equipment supplier, provided one hundred percent (100 percent) of the funding for this project.

Prior to the 1994 peso devaluation, Mexican and U.S. developers often invested substantial internal capital in projects in order to secure concessions and commence working. There are numerous examples in the municipal wastewater and highway sectors.

Mexican developers had been highly successful in floating stock and debt issues in public markets, thus obtaining the liquidity needed to make direct investments in new projects which they wanted to control. This has not been the case for the past 20 months, and Mexican developers are generally incapable of providing long-term capital, debt or equity, to new projects in any significant manner. U.S. developers and suppliers will therefore have to bear a greater financial burden/opportunity than in the pre-December 1994 period.

Private Equity Funds

The U.S. has seen an explosive growth in private equity funds capitalized by major institutional investors and high net worth individuals, not necessarily all U.S. persons. Many of these funds are targeted toward equity and debt investments in infrastructure projects in developing countries. Such funds include the Emerging Markets Partnership Fund, and the Scudder Latin America Power Fund, among others. To date, none have made major in-roads in Mexico but they will likely be one of the next major categories of investors to enter the Mexican market.

U.S. Commercial Banks

U.S. commercial banks have avoided Mexico's infrastructure market, except indirectly through corporate finance to Mexican industrial groups and U.S. developers. U.S. commercial banks are likely to continue to be quite conservative in their approach to long-term Mexican financing. All medium-term lending, including loans to infrastructure projects, is currently subject to severe regulatory restraints. Presently, U.S.-based banks cannot hold Mexican debt with a maturity longer than one year without suffering a loan-loss provision, required by regulators upon making such loans in Mexico. The only loans that can escape these restraints are those subject to a guarantee from a non-Mexican party or co-participation with the U.S. Ex-Im Bank, World Bank, IDB, or other multilateral institution.

U.S. banks operating in Mexico are focusing on developing a market niche in the corporate sector. This exposure in the market should accelerate their willingness to provide a broader range of financial instruments, including the financing of infrastructure projects.

Private Placement of Debt

Loans made available by insurance companies to projects and individual borrowers are also a good source of finance. Insurance companies can provide long-term fixed-rate funding and project finance expertise. They are also not regulated in the same manner as commercial banks thus avoiding the loan-loss reserve issue.

U.S. Government Sources

U.S. Trade and Development Agency (TDA)

Point of Contact: Albert W. Angulo,
Director, Latin America and the Caribbean, (703) 875-4357

The U.S. Trade and Development Agency (TDA), is an independent agency of the United States Government. TDA provides effective assistance to the U.S. private sector facing international competition for major capital infrastructure projects in developing and middle-income countries. TDA accomplishes its mission as a primary agency for funding feasibility studies that shape the future of projects in the region.

TDA actively markets its programs in nine countries of the region (Argentina, Bolivia, Brazil, Chile, Ecuador, Mexico, Peru, Uruguay and Venezuela). TDA also considers unusually attractive projects in other eligible countries, or projects under the auspices of the Inter-American Development Bank or the World Bank and/or their private sector.

Potential projects come to TDA's attention from several sources. A foreign government agency may approach TDA with a funding request directly or through a U.S. Embassy, Consulate or trade center. TDA may also be approached by the international agencies such as the World Bank or the Inter-American Development Bank. TDA is increasingly being approached directly by foreign or U.S. private sector firms soliciting assistance in developing a project as a project sponsor and/or investor. Initially, most TDA projects were public sector projects, planned by government ministries or agencies. Increasingly, however, developing countries, including many in the LA&C region, have been privatizing major sectors. As a result, infrastructure and industrial projects sponsored by private sector parties are being considered by TDA on an increasing basis.

TDA provides funding, on a grant basis, for both public and private sector projects by commissioning studies to determine the technical, economic, and financial feasibility of proposed projects, and to provide detailed data for making decisions on how to proceed with project finance and implementation. In addition, TDA provides funding for training programs, bidders briefings, technical seminars, technical assistance, conferences that present U.S. technology and equipment capabilities for a particular sector, or orientation visits to the United States.

TDA has been very active in promoting development/infrastructure in Mexico, where it has funded several feasibility studies and orientation visits including the following:

Recent U.S.TDA Supported Projects in Mexico

Project	Description	Related Project Profile in Book
Ecatepec Paper Mill Cogeneration Plant	A 1994 study by Tazcogen, a private sector developer. Partially funded by TDA ($130,000).	N/A
Cogeneration Project	A study on the Alfa-PEGI cogeneration project. Partially funded by TDA ($620,000).	ENE-01
State of Chihuahua Wastewater Projects	A feasibility study for the State of Chihuahua on the design of 9 wastewater plants. Partially funded by TDA ($558,000).	ENV-10
Saltillo Wastewater Project	A 1994 study by Freese & Nichols to study the concession of the Saltillo Wastewater Project. Partially funded by TDA($375,000).	ENV-12
Hazardous Waste Recycling Facility	A 1994 feasibility study by the Radian Corporation to look at recycling facilities for Mexico City. Partially funded by TDA ($475,000).	N/A
Valsequillo Reservoir Restoration	In 1995 TDA funded a study ($300,000) undertaken by ASI to look at a reservoir restoration project in the State of Puebla.	N/A
Industrial Hazardous Waste and Environmental Management	A 1995 study to design a waste management system for IUSA's plant in the State of Mexico. Partially funded by TDA ($700,000).	ENV-04
Mexico City Subway	A 1995 TDA-funded orientation visit for U.S. systems manufacturers to look at the Mexico City Metro.	TRA-11 TRA-12
Railroad Sector Hazardous Waste	A 1995 TDA-funded study ($487,000) on soil and groundwater remediation for FNM by Brown Root.	ENV-02
Tecamachalco Irrigation Project	TDA is funding a feasibility study ($160,000) for the Angelopolis Regional Development Program on an irrigation project in the State of Puebla.	ENV-02
Veracruz Hazardous Waste	A 1996 TDA-funded study ($280,000) to look at the feasibility of a hazardous waste recycling plant. The study is being done by Molten Metal Technology.	ENV-08

Export-Import Bank of the United States

U.S. Ex-Im Bank will play a critical role in the next several years to the overall development of Mexican infrastructure and to the participation of U.S. firms in these projects. The participation of Ex-Im Bank was instrumental in the closing of the Samalayuca II Power Plant, for example. Ex-Im Bank has

proven itself willing to accept Mexico's country risk as well as payment streams guaranteed by the Federal Electricity Commission (CFE). Ex-Im Bank will also extend loans against projects and equipment sales guaranteed by major Mexican banks and industrial groups. Ex-Im Bank offers attractive rates and loan terms up to 12 years which can be critical to financing long-term infrastructure projects.

Point of Contact: Bob Haight
Business Development Officer, (202) 565-3919

General information can be found through Ex-Im's toll free number, (800) 565-EXIM.

The U.S. Ex-Im Bank seeks to facilitate the export of U.S. goods and services. Ex-Im Bank provides short to medium-term debt financing, guarantees, and insurance to short- and medium-term lenders.

Ex-Im Bank has seen an upswing in lending and activity in the last two years. In 1994, Ex-Im Bank authorized US$15 billion of financing. A considerable amount of effort has been directed towards Latin America, making it the single largest outlet for Ex-Im Bank financing in 1994 with US$5.2 billion in authorizations.

In response to the movement away from sovereign-guaranteed lending, Ex-Im Bank established a Project Finance Division in June 1994 providing loans and guarantees on the basis of expected project revenue stream.

Ex-Im Bank offers considerable flexibility in the structuring of projects. For example, there is no upper or lower size limitation to projects nor any pre-determined debt-equity proportion. Virtually any combination of risk insurance and loans may be used.
In order to receive Ex-Im Bank project financing, it is imperative to have long-term contracts from creditworthy entities for the purchase of the project's output and supply of its inputs. Such contracts should usually extend beyond the period of requested Ex-Im Bank financing.

Ex-Im's Loan and Guarantee Program offers medium- and long-term support for environmental projects. A special feature is the 15 percent local cost coverage provision which allows Ex-Im Bank funding to cover a greater portion of locally incurred costs such as installation and civil works. The program also allows capitalization of interest during construction as part of the financial package provided by Ex-Im Bank.

Another important program is the Small Business Program. Ex-Im Bank has begun focusing on assisting the export efforts of small businesses. In September 1994 it blended its working capital loan program with that of the Small Business Administration (SBA).

A large part of Ex-Im Bank's business is done through bundling facilities. A bundling facility in this case is a large medium-term loan to a Mexican bank, by an American bank, which carries an Ex-Im

Bank guarantee. The Mexican bank can then make loans to Mexican companies for the purchase of American goods.

U.S. companies should direct their foreign buyers to one of the following approved Mexican financial institutions which employ bundling facilities:

- Arrendadora Bancomer
- Banamex
- Banco Serfín
- Banco del Atlántico
- Banco Mercantil del Norte (Banorte)
- Banco Mexicano
- Banco Nacional de Comercio Exterior
- Bancomer
- Bancrecer
- Banco Nacional de Obras Públicas (Banobras)
- Multibanco Inverlat

North American Development Bank

Point of Contact: Mr. Victor Miramontes
Deputy Managing Director, (210) 231-8000

The North American Development Bank (NADBANK) specializes in long-term loans and guarantees for environmental infrastructure projects for the 100-kilometer area on either side of the U.S.-Mexico border. NADBANK acts as an investment bank in organizing "financial teams of players" and may finance both private and public entities. The U.S. and Mexican Governments reached a recent agreement in which they committed to contribute an additional US$1.5 billion to NADBANK. Of this, US$225 million will be in cash; the remainder will be capital to be used as collateral for other institutions that offer credit, or alternatively for NADBANK to apply for loans. NADBANK has a total capitalization of US$3 billion.

In order for a project to be considered by the NADBANK, it must receive technical certification by the Border Economic Cooperation Commission (BECC). In 1996, the BECC certified eight projects, four of which are in Mexico: the US$8 million water re-use plant in Ensenada, Baja California; a US$39 million water supply and distribution project in Nogales, Sonora; a US$700,000 water supply and wastewater treatment project in Naco, Sonora; and a US$1 million secondary treatment plant for non-process wastewater at the FINSA Industrial Park in Monterrey. In August 1996, NADBANK gave preliminary approval to provide financing for its first two projects: FINSA and Naco.

Mexican Sources of Financing

Banco Nacional de Obras y Servicios Publicos (Banobras)

Point of Contact: Ing. Arturo Olvera Vega
Director of Financial Engineering, (525) 573-6010

In 1995, the National Bank of Public Works and Services (Banobras) created its Mexico Infrastructure Investment Fund (FINFRA). The Mexico Infrastructure Investment Fund can participate in the following sectors: highways, ports and airports, water, sewage and water treatment, urban transport, and waste collection, waste treatment and recycling. Projects financed through FINFRA will be assigned through public auctions or bids, with a maximum stake of approximately 212.5 million pesos (approximately US$28.3 million in February 1996 pesos). Through this fund Banobras seeks to achieve three objectives:

- Identify and promote opportunities for infrastructure investment.
- Provide suitable financial schemes for infrastructure projects.
- Promote direct foreign investment.

Another recent development in project financing is the Memorandum of Understanding between Ex-Im Bank and Banobras. This agreement allows Ex-Im Bank up to US$500 million to finance U.S. exports of environmental goods and services over the next 5 years. The agreement targets construction of wastewater treatment facilities by municipalities.

Nacional Financiera (Nafin)

Point of Contact: Ing. Federico Patiño
Director of Finance, (525) 325-6722

Nacional Financiera (Nafin) operates as the principal government bank for promotion of industry in Mexico. Since the Mexican peso devaluation in December 1994, Nafin has shifted its outlook regarding the promotion of foreign investments and strategic alliances. Priority was given to attracting potential foreign investors to Mexico. Nafin primarily funds micro-, small- and medium-sized businesses. Nafin also undertakes strategic equity investments and contributes equity to joint ventures.

Commercial Banks

Prior to the peso devaluation of 1994, Mexican banks were active in financing major infrastructure projects, usually in concert with major Mexican developers or construction firms. At that time, many Mexican banks were flush with capital as a result of public offerings, and they were actively promoting new loans.

Because of increased debt levels following the devaluation, many banks currently rely on equity holders and foreign partners for infusions of capital. The Mexican banking sector is consolidating. Until Mexican banks are able to regain health, they will probably be only a limited source of long-term capital for infrastructure projects.

Banks	Total Assets (US$ Millons)	Total Deposits (US$ Millons)	Total Loans (US$ Millons)
Banamex	25,882	14,646	16,030
Bancomer	23,174	13,613	16,446
Serfin	18,756	9,632	11,390
Banco Mexicano	9,256	4,293	4,469
Banco Internacional	7,891	3,154	3,881
Banco del Atlántico	6,299	3,264	2,961
Banco Promex	5,699	2,861	3,625
Bancrecer	4,898	2,975	3,610
Banca Confia	3,704	2,644	2,453

Securities Markets

The 1994 devaluation led to an exodus of foreign capital, which caused the stock market to tumble. There are signs that the Mexican economy has been stabilizing. The second quarter of 1996 has seen a rise of 7.2 percent in GDP relative to the previous year. As Mexico's economy improves, foreign investors and Mexican exported capital will return. In all likelihood however, this will be a slow process.

Multilateral Sources

Although traditional public sector lending from the multilateral development banks is not expected to play a central role, it still provides an important component of overall project financing. However, there are now a number of private sector programs which the multilaterals have designed to address the growing need for private sector capital in project development. The partial credit guarantee programs — in which the beneficiary is the private sector — are designed to stimulate private co-participation.

World Bank

Point of Contact: M.G. Sri-Ram Aiyer,
Director, Technical Department for Latin America and the Caribbean, (202) 473-9003

One of the most important programs of the World Bank are the Partial Risk and Credit Guarantee Programs. The World Bank Partial Guarantee Programs can be instrumental in private sector infrastructure financing. The Bank's program guarantees principal, allowing borrowers to secure long-term debt finance at significantly lower rates. Guarantees cover specific obligations undertaken contractually by a government — such as allowing highway tolls to rise according to a previously negotiated formula, delivering fuel for a power project, or compensating for project delays caused by the government. In addition to insuring against political risks such as these, the programs also insure against traditional forms of country risk such as war, expropriation, and currency convertibility.

International Finance Corporation (IFC)

Point of Contact: James F. Martin,
Senior Investment Officer, Infrastructure, (202) 473-8926

The IFC provides financing to private sector projects as a lender or equity-investor. The IFC is limited to 25 percent of the total project cost for the initial financing and up to 40 percent for secondary financing. In addition to lending to the project, it may also take an equity stake in the project company and thereby play the role of catalyst for other investors from the private sector. The participation of the IFC often provides a greater degree of comfort to other local and international project investors.

The IFC-financed municipal wastewater project in Puerto Vallarta, Mexico, could be a model for other similar projects in Latin America. The project sponsor (the British firm Biwater), the IFC and the Mexican national development bank, Banobras, worked together to structure the project. The key was securing an acceptable payment guarantee for the municipal government. Banobras created a revolving line of credit which could be drawn on if the municipality were unable to pay the monthly fee to the operator. If the municipality is not able to replenish the draw down on the line of credit by a determined period of time, Banobras can then divert federal government grants and tax distributions destined to the municipality to pay back the line of credit. With this payment guarantee in place, the IFC provided a US$7 million ten-year loan package as part of the US$33.2 million concession project.

Inter-American Development Bank (IDB)

Point of Contact: Carlos Trujillo
Financial Advisor, Infrastructure Division Region II, (202) 623-3852

The Inter-American Development Bank (IDB) is progressively putting increased emphasis on the environment and private sector participation. Because of this renewed emphasis, they created an environ-

mental division within the Social Programs and Sustainable Development Department. Environmental divisions were also created in each of the three new regional departments.

Moreover, moving away from its almost exclusive focus on the public sector as the primary agent of infrastructure creation, in September 1994, the IDB created new instruments for promoting private sector involvement, particularly in infrastructure projects. The IDB is trying to promote public-private partnerships in infrastructure finance particularly in potable water and wastewater projects.

In September 1994, the IDB formed a new department charged with allocating five percent of the Bank's lending portfolio to private infrastructure projects without government guarantees. Up to US$350 million will be set aside for the program per year. Bank participation may not exceed US$75 million or 25 percent of the total financing. Private sector infrastructure projects eligible for financing include initiatives in transportation, power, telecommunications, and water and sanitation.

The Private Sector Department has approved its first six loans: three in electric power generation, one in electric power transmission, one in toll roads, and one in ports. The total value of each of the projects ranges from US$30 million to US$640 million. The largest of the new loans was US$75 million provided by the IDB Private Sector Department in early 1996 for the US$650 million 700-megawatt Samalayuca II combined-cycle power plant. (Please see the case study, CAS-01, on the Samalayuca II power project.)

Point of Contact: Makoto Sunagawa
Manager, Private Sector Department, (202) 623-1501

Another important IDB program involves the provision of guarantees for private sector projects. In an unprecedented initiative, the IDB is attempting to mobilize private sector resources for infrastructure creation by the implementation of a loan and risk guarantee facility directed mainly at private infrastructure projects. These guarantees would not require a counter-guarantee by the government in the recipient country.

This program is designed to complement the private sector and will primarily target infrastructure projects. One aspect of the new initiative entails partial risk guarantees. These will mitigate risks stemming from dependence on public sector entities to supply inputs or to purchase the goods or services provided. The aim is to reduce the commercial risk of public sector entities reneging on their contractual obligations. For example, in the case of a private wastewater plant selling its treatment services to the municipal government, the IDB would offer guarantees of payment. These risk guarantees may provide up to 100 percent coverage in the case of a government's inability to perform specific contractual obligations.

The second aspect of the new private sector lending program is aimed at the problem of short maturities in the financial markets. The program will provide partial guarantees for borrowing in the credit or

capital markets, extending the maturity of available medium-term funding, thus transforming it into long-term financing. The instruments envisioned are:

- Guarantees for longer-dated maturities.
- Liquidity guarantees in the form of put options and take-out financing (for example, post-construction).
- Rolling guarantees that cover a fixed number of scheduled payments.

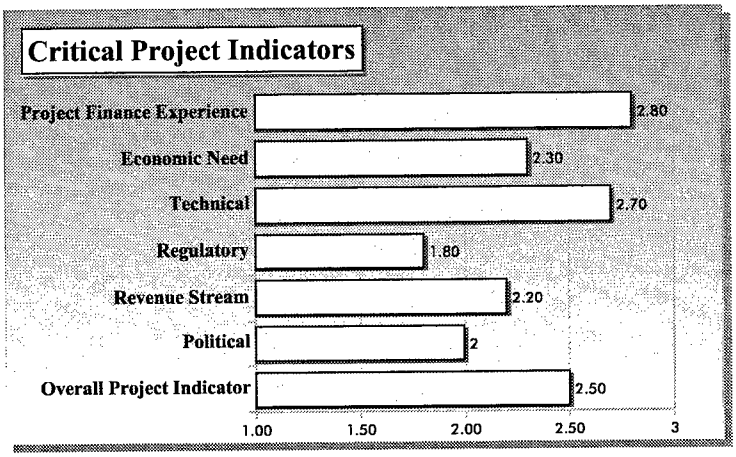
The result of the IDB guarantees would be to diversify risk and upgrade the investment grade of the relevant project, giving it access to major investment grade financial markets.

Inter-American Investment Corporation (IIC)

Point of Contact: Carlos Aguilar
Coordinator and Senior Investment Officer for Region II, (202) 623-3768

To provide financing for private sector projects, the IIC was set up by the IDB in 1989. The IIC differs from the Private Sector Department in that it targets small and medium sized projects. IIC provides long-term loans and equity between US$2 million and US$10 million per project. The average IIC investment is worth US$4 million. The IIC can finance up to 33 percent of new enterprises and up to 50 percent of project expansions. Projects financed by the IIC have included: hydroelectric power, telecommunications, food processing, and health care.

Critical Project Indicators



Project Assessment

Critical Project Indicator ratings — provided in the form of charts included in the Infrastructure Project Profiles — are given on a scale of one to three, with three being the highest rating. The ratings are preliminary assessments, using existing data, of the impact of a given factor on project viability — and thus the likelihood that the project, will proceed in a timely fashion. These are not based on detailed project cash flow assessments or credit ratings of individual companies or government institutions. Furthermore, they are not based on a detailed credit analysis of the project because, quite simply, the projects included in the study are for the most part in early stages of development and insufficient information is available.

Ratings are qualitative and broad. A rating near "one" indicates that the factor is considered to be an extreme impediment to the project's success and viability. On the other end, a rating near "three" indicates that the factor supports the project's successful outcome and presents few obstacles to a potential lender or investor. A rating of "two" is important as it indicates an area that must be carefully monitored and needs resolution for the project to proceed. At the same time, unlike a rating of "one," a "two" indicates that the obstacles are potentially resolvable.

Critical Project Indicators are subjective. Ratings should not be used to rank projects — rather to flag areas that will need to be addressed by the developer. Many issues associated with lower rankings can be overcome with the correct financial and commercial strategy.

We assess project factors according to the seven factors of most importance to international financial institutions. These factors are:

Economic Need

Is there a strong economic need driving a project, with many prospective beneficiaries?

Example: There is a project to upgrade the country's principal port that currently experiences long delays for outgoing and incoming shipments. Many businesses suffer losses because products cannot get to market and consumers are hurt because goods are slow to arrive and costly. The rating will tend toward three, meaning that there is a strong economic need for the project that will drive the project forward, despite obstacles.

Political

Are there strong political pressures to push the project forward or is there political opposition which might derail the project? Also, is it possible that the project could be impacted by political uncertainty? For Mexico, we are providing a sovereign rating of 2.5 indicating the presence of some political uncertainty at the national level. The presence of local uncertainty lowers this rating still further.

Example: The government is bidding a new electric power plant to be built by the private sector. There is broad political consensus that the private sector should build the plant and so the rating would start at the sovereign rating of 2.5. A further evaluation would look at whether the plant is to be located in a zone with uncertain political conditions.

Revenue Stream

How secure is the flow of funds that will provide an adequate rate of return on the initial investment? Are investors being asked to take on devaluation risk or are contracts denominated in dollars with dollar project flows to back repayment? Are there government guarantees?

Example: A toll road is to run from the capital to the major port. Congestion clogs existing older roads, resulting in significant shipping delays. Expectations of high levels of commercial traffic and high toll collections will push the rating toward a three. At the same time, if tolls are collected in pesos without provisions to keep parity with the dollar, our evaluation of the revenue flow will be lowered.

Regulatory

Are adequate government regulations in place to protect the rights of the investor or concession owner? Are the rules of the game clear or do ambiguities exist that might hurt the concessionaire?

Example: Mexico has issued new regulations for the distribution and transportation of natural gas. The regulations were developed during lengthy consultations with international legal and financial

experts and are perceived to offer clear and concise rules for the provision of gas services. The body charged with implementing the regulations, the National Energy Regulatory Commission, has a good reputation as an impartial professional institution. This regulatory rating for gas projects would tend toward 3, indicating a strong regulatory base for investment.

Technical

Are there technical issues that might impact on the ability to complete the project or for the project to operate according to plan?

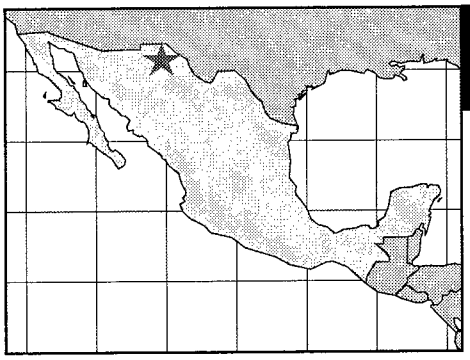
Example: The project is centered around a new technology that tests well in the lab but has never seen long-term commercial application. The risk that unknown flaws may be revealed in actual long-term application lowers the project's rating.

Project Finance Experience

Has the entity coordinating the project had experience in international project financing?

Example: The sponsor is the country's oil company that has financed four projects in the past five years. They have a sophisticated financial capacity and understand the key issues of importance to international investors. This situation pulls the rating toward three.

The relative importance of these factors across projects is not uniform, and where a factor dominates this is noted in the accompanying assessment text. For example, a bridge project that spans country borders may be heavily impacted by political factors including ratification by Congress. In this case, political factors dominate the project's potential to be financed. On the other hand, a private sector project to upgrade a steel mill is dominated by market and price factors with little or no political intervention. In cases where a factor is not relevant to judging project viability, it is omitted from the chart.



Case Study

Samalayuca II: A Model for Private Power Financing

In June 1996, Samalayuca II, a 700-megawatt gas-fired combined-cycle power plant, achieved financial closing, and construction was initiated. The project calls for an investment of US$650 million, of which, over US$400 million represents U.S. exports. It is structured as a 20-year Build-Lease-Transfer (BLT) project with ownership reverting to CFE at the end of the lease period. Construction is expected to take 33 months.

Samalayuca II was won by a consortium of North American firms; each bringing its particular speciality and core know how. Bechtel will provide engineering and construction management. El Paso Natural Gas will supply gas from its pipeline system in Southern Texas. GE will supply much of the technology and equipment in the form of three GE STAG 107FA gas-fired modules rated at 230 megawatt each. Finally, Grupo ICA, Mexico's largest construction firm, along with its joint venture partner, Fluor Daniel, will provide on-site construction and procurement services.

The closing of Samalayuca II is illustrative of many key issues in the future development of infrastructure projects in Mexico, including important lessons on how future BLT projects will be structured in Mexico. The project is also a transitional one in Mexico's dramatic shift from a state controlled electricity sector to one where the private sector plays an increasing role in the financing, construction, operation and even ownership of electric generation assets.

Project Structure

Samalayuca II provides an excellent model of how future BLT power projects might be structured in Mexico; differing substantially from the Mérida III power project. The Mérida III power project is structured as an Independent Power Producer (IPP), meaning the plant will be privately-owned and sell power to CFE on a long-term PPA basis. Mexico remains in the midst of a debate over whether future projects will be done according to BLT or IPP models. U.S. firms should be prepared to see both models utilized for new projects in the electric sector.

Samalayuca's funding was structured as follows:

1. 20 percent equity and 80 percent debt.

2. Equity is divided among the four members of the winning consortium as follows:

   - General Electric 40 percent
   - Grupo ICA 20 percent
   - Bechtel (Intergen) 20 percent
   - El Paso Natural Gas 20 percent

3. Funding for the project is as follows:

   - US$445 million from an Ex-Im Bank Term Loan (including guaranty fee).
   - US$75 million from the Inter-American Development Bank.
   - US$130 million from the equity partners.

4. Commercial U.S. and Mexican banks are providing construction financing but this will be replaced by the Ex-Im Bank Loan at the commencement of the Basic Lease Agreement.

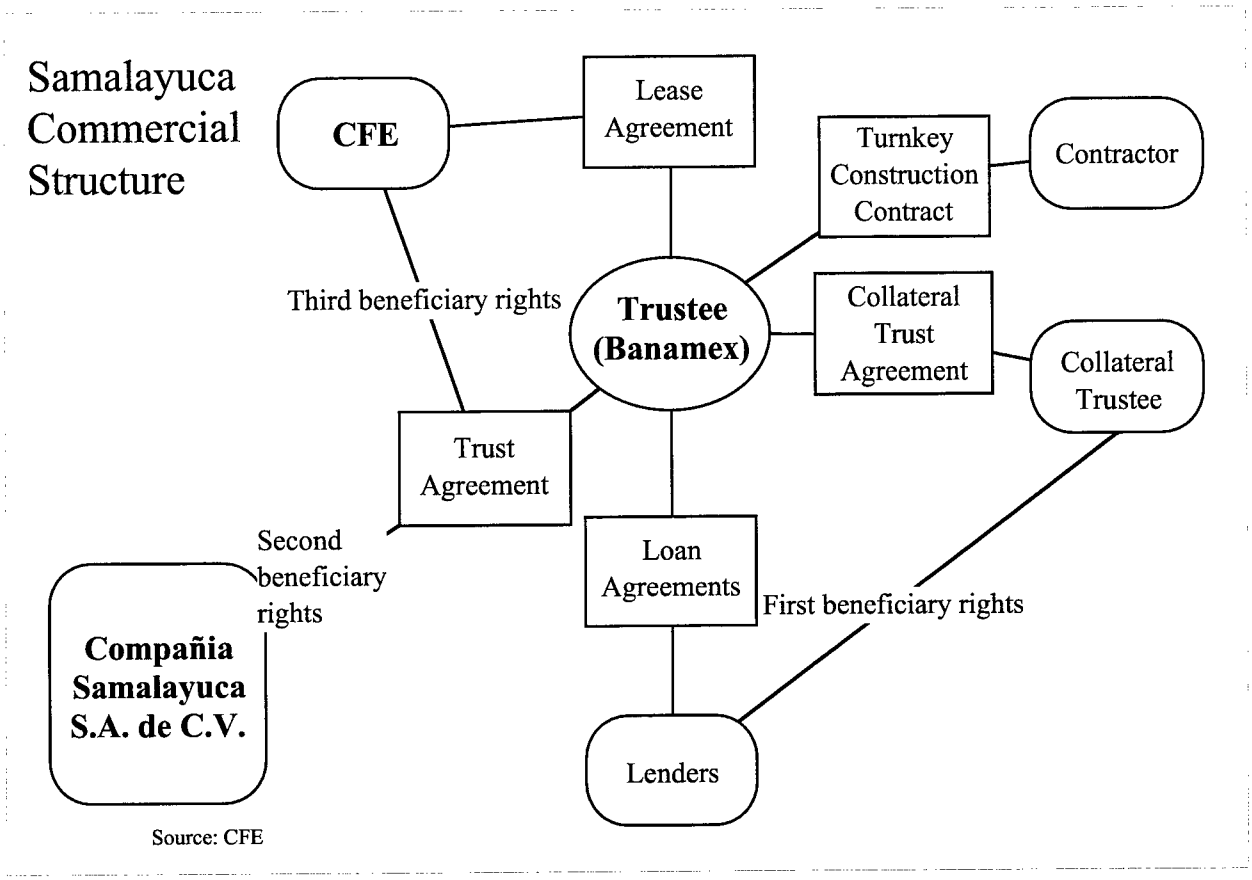
5. Plant operations are the responsibility of CFE and lease payments are made on a "Hell or High Water" basis regardless of actual plant performance once the plant has met post construction performance requirements.

6. CFE's Lease payment obligations rank pari-passu with other Public External Indebtedness of CFE.

From a financial standpoint, the project represents several firsts. It is the first BLT power project in Mexico that is based solely on a lease agreement with CFE without other government guarantees. This demonstrates the increased willingness by developers, multilateral lending institutions, and export credit agencies (ECAs) to accept CFE payment risk in order to move forward with major infrastructure projects.

It is also the first power project that contains lease equity—in this case US$130 million of equity contributed by the project sponsors. The deal has an interesting structure in that the equity earns from two separate fixed income streams—a higher rate paid during the 30 months of construction and a lower rate for 20 years commencing upon commercial operation. Payments are made under Mexican Tax Indemnity meaning that lease payments are credited on a tax-paid basis.

The project also demonstrates the growing importance of the U.S. Ex-Im Bank in structuring and closing major infrastructure projects—and the growing importance of the newly-formed (1994) Project Finance division within the bank. With its contribution of US$445 million out of a total of US$650 million, Ex-Im Bank's role was critical in providing long-term, low-cost financing to bring this project to fruition. The Inter-American Development Bank also played a key role, illustrating how multilateral institutions continue to act as a catalyst in such projects.



Source: CFE

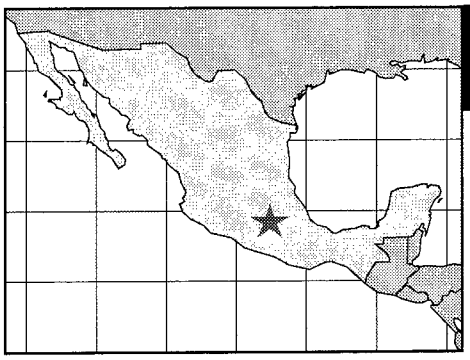
The closure demonstrates that while the major developers, Ex-Im Bank and the IDB, were willing to make very substantial long-term debt and equity investments in Mexico's power sector, third parties and commercial debt sources are still evaluating their participation in this market. For this transaction, commercial banks were only willing to provide construction financing. They would not step forward to provide long-term lease financing. At no time were the commercial banks willing to take Mexican risk, since construction financing was guaranteed by either the developers for technical completion or Ex-Im Bank for political risk.

It will be very instructive to see whether either the Mérida III project or the Alpek co-generation project in Altamira sponsored by Alfa and CSW International will be able to break this barrier in Mexico. Once broken, it will greatly increase the pool of money available to energy projects across Mexico.

Other Lessons and Trends

When the award was announced in December 1992, it was known to be a complex project and experts were quoted as stating that financial closing might take "as long as a year." Three and half years, a major devaluation, and a presidential election later the project reached financial closing. Similar delays have been experienced with the Mérida III project, which will be Mexico's first IPP project. Both of these cases are indicative of the problems that major infrastructure projects can face in any part of the world that seek to break new ground in moving from a state owned to private sector model.

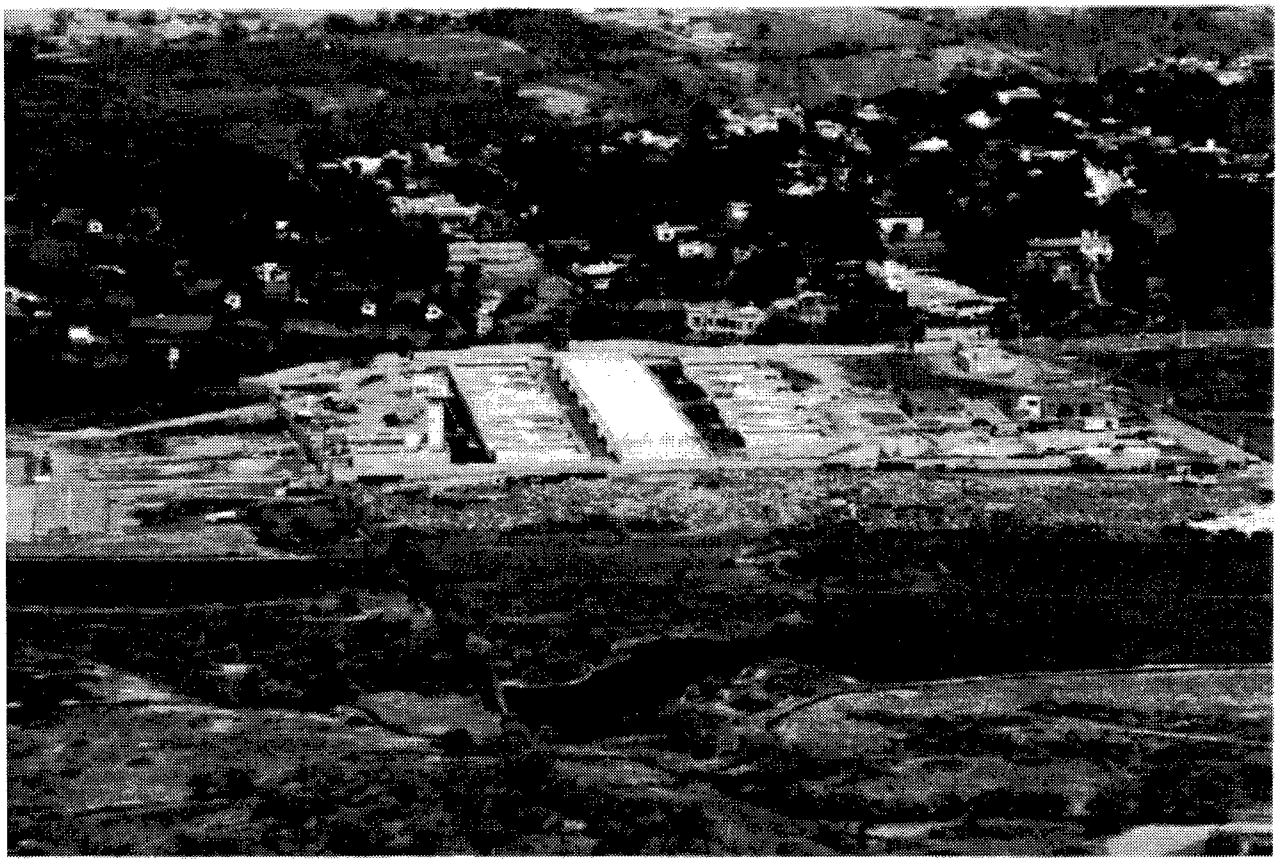
The project is also indicative of the ongoing integration that is occurring in economic terms between Mexico and the United States. This is seen not only in the bilateral nature of the consortium but also in how the project will fit into an overall energy system increasingly oblivious to the political boundaries of either nation. Natural gas will initially be sourced from the United States and, once built, the Samalayuca II Plant, located about 40 kilometers south of Ciudad Juárez in the State of Chihuahua, will be part of the large Northern Mexican power pool that will buy and sell power across the U.S.-Mexico border.



Case Study

U.S. Filter Wastewater Plant: Successful Market Entry

In August 1993, U.S. Filter became the first U.S. company to win a wastewater concession in Mexico when it was awarded the a 13-year concession for the Cuernavaca wastewater treatment plant, located in the State of Morelos. Total project cost was US$20 million.

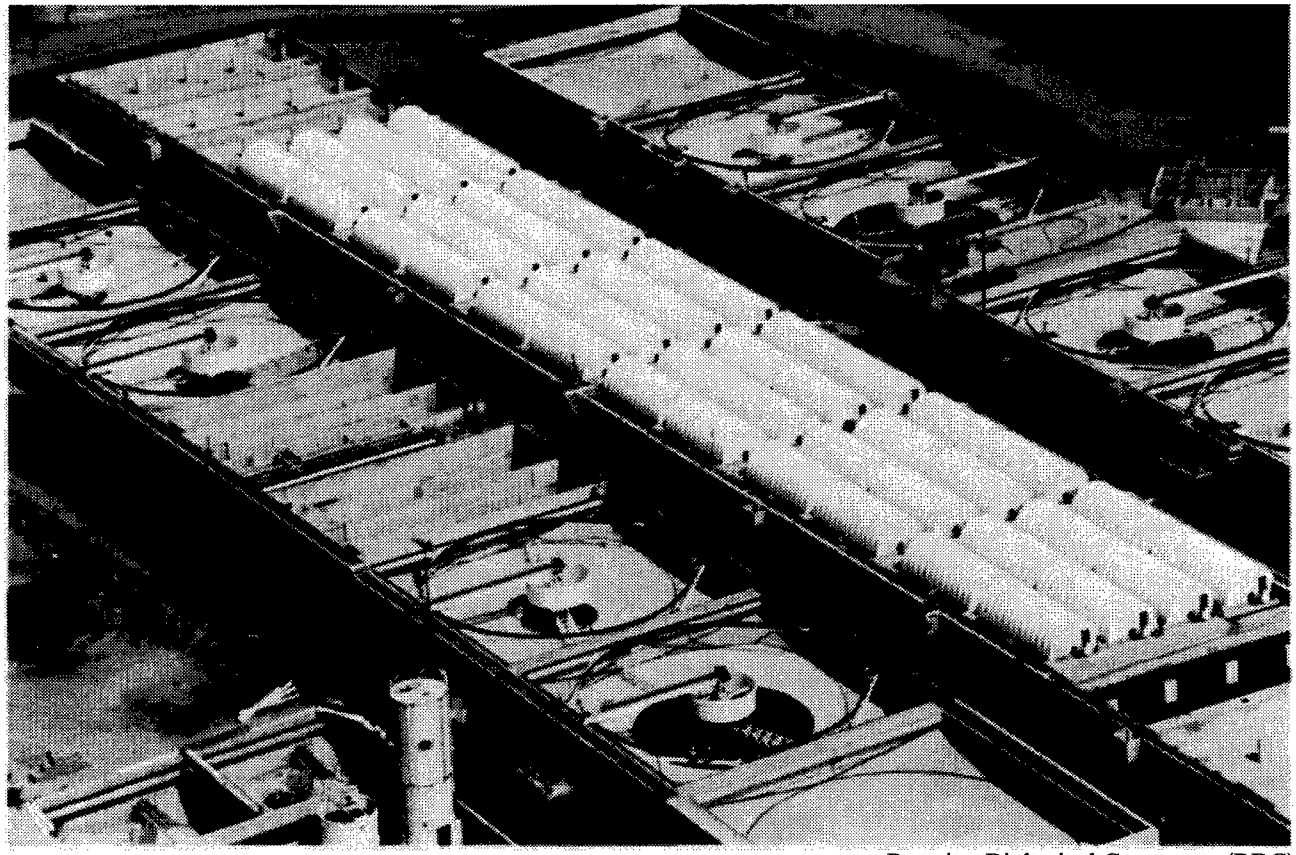


U.S. Filter's Wastewater Treatment Plant in Cuernavaca

In order to win this concession and enter into the Mexican municipal water market, U.S. Filter had to be both flexible and responsive to its clients' needs as well as risk its own capital.

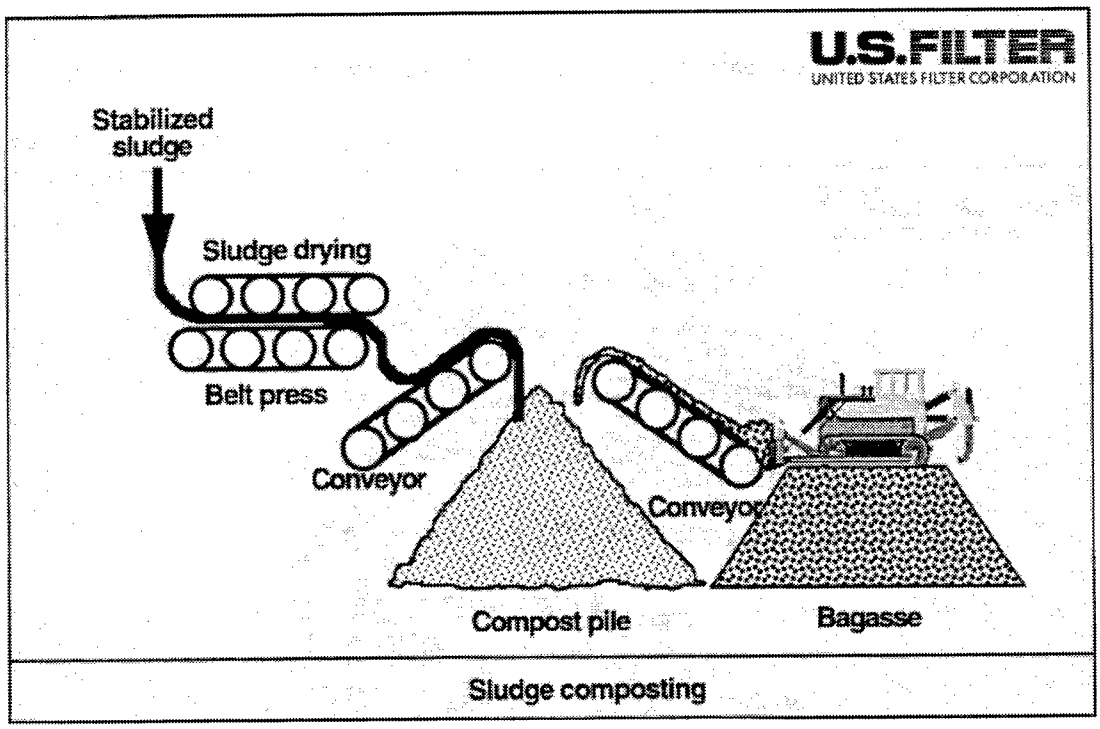
Technical Description

Phase I, completed in May 1994, reached a capacity of 400 liters per second (9.1 million gallons per day). Phase II -- which entailed the expansion of the plant to full capacity, 600 liters per second (13.8 million gallons per day) -- was postponed until 1999 due to the economic difficulties presented by the peso devaluation of December 1994. Of the total cost, the sludge treatment part is worth approximately US$3 million. The plant's design is centered around a fixed-film biological treatment process that uses U.S. Filter's Rotating Biological Contactor (RBC) technology.

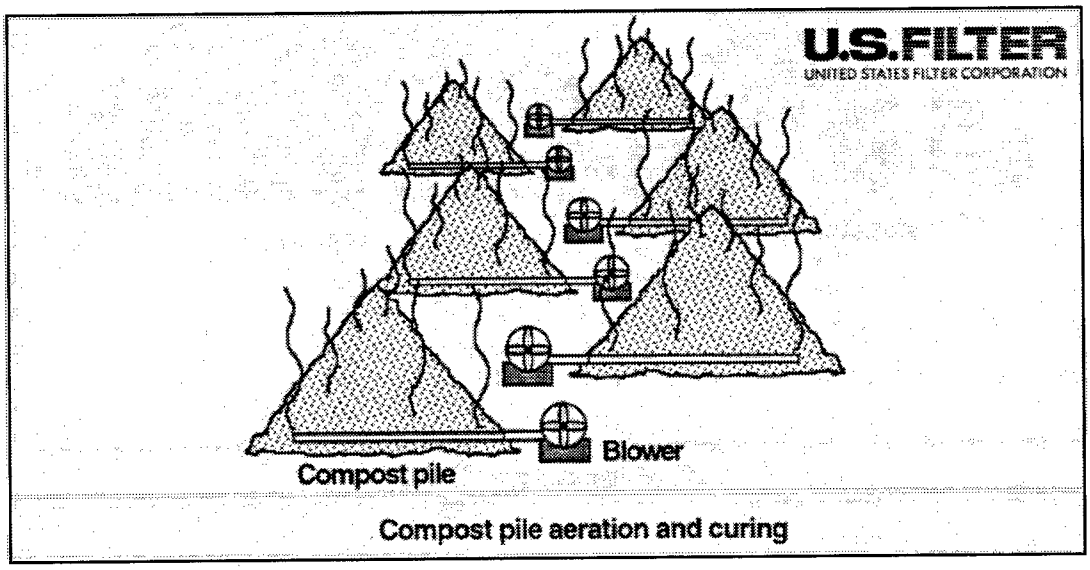


Rotating Biological Contactors (RBC)

The sludge generated is dewatered, disinfected, and composted together with locally procured sugarcane bagasse and subsequently sold to local plant nurseries and farmers. The 50 tons of sludge that are produced each day by the plant are mixed with 15 to 20 tons of sugar cane bagasse from local sugar mills. (Please see the diagram on the following page.) Apart from eliminating agricultural waste from the sugar mills, the bagasse and sludge mixture also improves the characteristics of the sludge by making it lighter, improving its structure and reducing total water content.



The mix is subsequently dried, sterilized and aired in large piles on top of perforated grids placed on top of covered trenches with engineered orifice plate covers that help circulate compressed air from blowers through the piles. (Please see the diagram below.)



After three months of processing the cured compost can be sold to greenhouses and plant nurseries.

Financing: Speed and Commitment

The concession contract was awarded on the basis of sole-source contracting. U.S. Filter financed the US$20 million project directly, using part of a convertible bond offering issued on Wall Street. Although this required greater risk to U.S. Filter, it is an example of taking the necessary steps to move a project forward. Moreover, in November 1993 U.S. Filter obtained a guarantee for its revenues from Banobras, Mexico's national development bank.

By investing directly, U.S. Filter also avoided the time-consuming process of putting together a non-recourse finance package, speeding up the process considerably. In the case of Cuernavaca, speed was of utmost importance. Raw sewage was flowing through the ravines crossing the city, which had caused a cholera epidemic in the early 1990s. Hence, the state government was strongly committed to find a speedy solution.

U.S. Filter's direct investment eliminated the need to assemble a debt-package with private and development banks, and gave it a strong competitive edge. In addition to speedy action U.S. Filter's ability to address local concerns was crucial to its winning the concession. The main issues addressed were energy efficiency and sludge treatment.

Energy Efficiency

U.S. Filter calculates that over the 25-year life of the plant, the energy savings will total US$8 million compared to conventional activated sludge (using 1995-1996 power rates). This is due to the fact that the biological RBC-filters rotate very slowly. Hence, the plant in Cuernavaca has a continuous electric power requirement of only 600 horsepower, compared to 1,300 horsepower for a conventional activated sludge plant of the same size.

In addition, U.S. Filter's process virtually eliminated odors, allowing it to be placed next to residential areas and a country club on the banks of the Apatlaco River.

Integration with the Local Economy

Not only is the plant virtually odorless, but it produces fertilizer and consumes agricultural waste from nearby sugar mills. The wastewater treatment plant in Cuernavaca managed to generate significant local support for its operations because these advantages provide benefits to the economy as well as to the quality of life.

The sludge treatment process employed at the Cuernavaca plant transforms the sludge into organic fertilizer which can be sold to local plant nurseries and farmers, a significant segment of the local economy. The sludge offers a replacement for forest humus used by local farmers which, in the

Cuernavaca area, is generally produced by poachers who illegally strip the Mexican National Forest. Hence, there is no necessity to fill up unpopular landfills with sludge. High-grade fertilizer is brought to the market, replacing an environmentally detrimental product.

In addition to producing a commercially useful product, the sludge treatment plant consumes sugar cane bagasse, a waste product produced by local sugar mills. By buying this waste product and turning it into fertilizer after mixing it with sludge, U.S. Filter brought more business to the local economy, bolstering support for its plant.

The elimination of odors, the generation of growth in the local economy, and the provision of energy efficiency, were all important factors when U.S. Filter negotiated its contract with local authorities. Additionally these factors added value by improving public opinion and further reduced public opposition to the location of the plant.

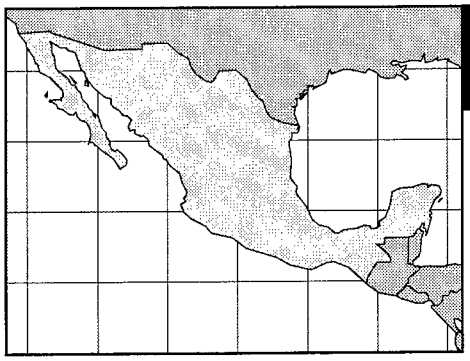
Importance of Existing Infrastructure

U.S. Filter encountered a very favorable situation in Cuernavaca in terms of existing infrastructure. Wastewater treatment concessions are often burdened with substantial network construction and rehabilitation which can be two to three times the cost of the actual treatment plant. The Water Commission of Cuernavaca and the local authorities expanded and rehabilitated the collection network, a project 90 percent financed by the World Bank. This demonstrated commitment on the part of the local authorities. It also relieved potential significant pressure on the financial position of the concession by limiting the initial investment to the plant itself.

Conclusion

U.S. Filter's successful market entry depended on the fact that it acted quickly and provided a complete package with financing, project management expertise, and technology. However, Cuernavaca's commitment and preparation of the area for wastewater treatment were also essential in offering a favorable framework for the concession to succeed.

U.S. Filter's effort has clearly paid off. Because the company established a solid track record in Mexico, offered a complete package, and acted quickly, it was able to win a second Morelos concession in the town of Yautepec. In December 1995, it was awarded a concession for a US$6 million wastewater treatment plant.



Case Study

NEXTEL: Meeting North America's Mobile Radio Needs

In 1995, Nextel, a Virginia-based provider of mobile radio services, made a bold move into the Latin American telecommunications market. Like many U.S. companies, Nextel was lured by the promise of NAFTA, shaken by the peso devaluation and recession, and is now getting its operations in Mexico back on track.

US Upstart Meets Mexican Giant

Nextel formed a partnership with Tricom, Mexico's largest provider of mobile radio service to truck fleets. Tricom is owned by Grupo Valladares, which is involved in the steel, radio, publishing and construction businesses. Tricom's licenses allow it to serve truck fleets on the highways that cross the border, one of Mexico's most lucrative markets for specialized radio services. Today Tricom serves over 20,000 subscribers with radio dispatching primarily for trucking and car rental fleets.

Nextel, which was founded in 1987 and went public in 1992, was one of the first companies to provide mobile radio service using a digital network in the United States in addition to its conventional analog system. Unlike analog systems, a digital system allows mobile customers to package a number of services — such as dispatch, paging, and telephone interconnections — into one system. Nextel's service area covers 50 percent of the United States, and the company has over 800,000 radio units in operation. Its digital service has 129,000 subscribers. For Nextel, one of the attractions of the NAFTA markets was their potential to offer customers the ability to communicate throughout North America using the same dispatch unit. With that goal in mind, Nextel became a minority shareholder in Clearnet of Canada and Corporación Mobilcom S.A. de C.V., now called Tricom.

In the deal worked out late in 1994, Nextel took only a small percentage of Tricom stock, but provided Tricom with a loan of US$42.5 million, and pledged US$107 million in future investments. However, the onset of the Mexican peso crisis and Nextel's own troubles at home, caused it to reevaluate the situation. Nextel changed the US$42.5 million loan into equity, giving it an 18 percent stake in Tricom and an option to increase its share to 40 percent. It also gave Tricom an additional US$15 million loan.

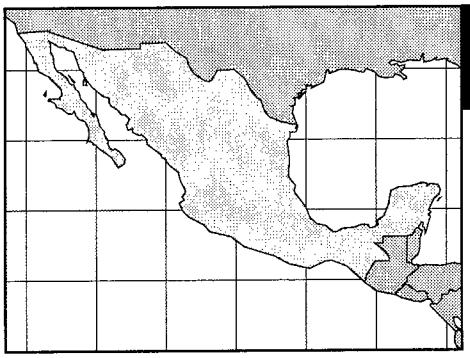
Lessons Learned and Other Trends

Nextel's initial expectations of the Mexican market have to be tempered to fit the economic reality. Nevertheless, Nextel is optimistic that the Mexican economy will rebound, in spite of last year's troubles. There is still a strong need to build up country's telecommunications infrastructure, and the demand for mobile radio services is great. While its partnership with Tricom has not been without problems, Nextel appears to be in the Mexican market for the long term.

A Look to the Future

Nextel wants to take advantage of the strengths of both partners to expand its operations into new markets. To enter the long distance market, Nextel is considering adding fiber optic lines to the wireless infrastructure it already has in place. Another option for the company is to pursue a concession for fixed wireless service.

At the same time, Nextel wants to improve service in Mexico, as it is doing in the United States. It wants to upgrade analog mobile radio service to a type of digital system called digital platform. The digital platform will allow users to have the advantages of cellular telephony, alphanumeric paging, and instant conference capability all within one handset. The company's goal is to have an integrated and fully digitalized system in place in all three NAFTA countries within the next three years.



Case Study

TIM: Providing Intermodal Equipment and Services Through a Joint Venture

Terminales Intermodales Mexicanas, S.A. de C.V. (TIM) is a joint venture between the Mexican transportation logistics firm Cargamex and In-Terminal Services Corporation (ITS). ITS is a division of Mi-Jack Products, a U.S. intermodal and cargo equipment manufacturer.

In recent years, the federal government and Mexican National Railways (FNM) have entered into a commitment to improve and modernize the existing rail system. This commitment to modernization has led several private sector contracts and concessions to provide services in the rail sector. This process will continue with the program to privatize FNM's principal lines: the Chihuahua-Pacific, Northeast, Pacific-North and Southeastern lines in addition to several short lines.

In 1991, FNM bid a contract to operate the Mexico City Pantaco intermodal facility, with the objective of providing efficient railroad cargo transfer services. Later that year, TIM won the contract and began operations in the terminal using its U.S. partner's technology and equipment.

Expanding Intermodal Services

TIM is currently the largest intermodal service provider in Mexico, accounting for more than 120,000 container movements per year, a volume similar to that handled in major Mexican seaports.

Since its creation in 1991, TIM's operations have expanded aggressively to other regions of the country including Monterrey, Nuevo León; Ramos Arizpe, Coahuila; Chihuahua, Chihuahua; Derramadero, Coahuila; and Topolobampo, Sinaloa.

TIM has expanded its line of services to a complete array of logistics solutions including: inventory control, cargo monitoring, freight dispatch and equipment maintenance. This enables ITS and Mi-Jack to provide their U.S. clients with quality services outside the United States. Currently TIM provides intermodal services at the following terminals:

Mexico City Pantaco Terminal

The Mexico City terminal is the single most important cargo train terminal in Mexico. In this FNM-owned facility, TIM operates three container frame cranes manufactured by Mi-Jack and six patio tractors which transfer cargo from ten railroad tracks ranging in size from 300 to 600 meters. Other services provided in the terminal include: inventory control, chassis rentals, complementary cargo movements, equipment repair and maintenance, and overall cargo logistics through the use of sophisticated monitoring and telecommunications technologies.

Some of the most important clients currently using TIM's services in this terminal include: APL, Hanjin, Evergreen, Nedlloyd, Schneider, K-Line, Mitsui, NYK, Columbus Line and Sea Land. Additionally, TIM operates the FNM automobile ramp for Chrysler. TIM is responsible for loading cars, undertaking physical inspections, and dispatching trucks coming from Chrysler's Lago Alberto manufacturing plant in Mexico City.

Other Terminals in Mexico

Monterrey

The Monterrey intermodal terminal is also owned by FNM and operates in the same fashion as the Pantaco Terminal. Cargo handling at the terminal uses one container crane, one patio tractor and a pool of 50 container chassis.

Ramos Arizpe

General Motors concessioned this terminal to American Presidents Line (APL) which subcontracted TIM to operate GM's terminal movements. At this terminal, TIM is responsible for maintenance of the two Mi-Jack manufactured container cranes. Additionally, TIM operates four patio tractors.

Chihuahua

The Chihuahua intermodal terminal is operated by the South Orient Railroad with one piggy packer crane owned by the Railroad and one patio tractor owned by TIM. In this terminal, TIM is in charge of providing inspection, inventory control, and maintenance services for South Orient's rolling stock.

Topolobampo

At the Port of Topolobampo, TIM provides maintenance services for a Mi-Jack manufactured crane. Additionally, TIM monitors cargo movements from the port to Chihuahua and the U.S. border.

Derramadero

In Derramadero, TIM provides a range of services for the Chrysler manufacturing plant, including loading automobiles onto trains, operation of one trackmobile, and operation of the intermodal terminal with one of Chrysler's container cranes and four of its own tractors. TIM is also responsible for maintaining a crane manufactured by Mi-Jack.

Sales Through Joint Venture

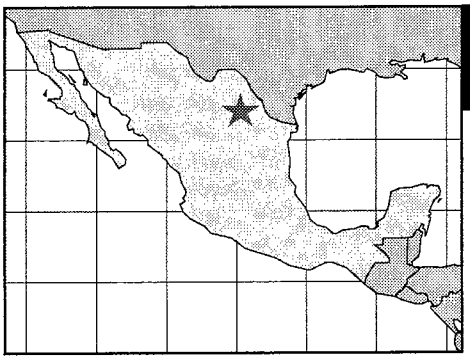
TIM has not only provided the opportunity for ITS to expand its operations outside the United States, but it has also permitted Mi-Jack to sell equipment in Mexico. Already Mi-Jack has sold four container frame cranes to TIM which are operating in Mexico City, Monterrey, Derramadero, and Ramos Arizpe. Additionally, Mi-Jack is currently leasing another two cranes to South Orient Railroad facilities in the Port of Topolobampo and the terminal of Chihuahua.

TIM alone has purchased more than US$1.5 million dollars worth of equipment from Mi-Jack. As TIM's expansion continues, Mi-Jack will continue to supply equipment in Mexico.

Ex-Im Bank Equipment Finance

Mi-Jack's equipment sales strategy has been based on its joint venture with TIM, and also on its ability to obtain financing for these deals. An important part of Mi-Jack's equipment sales have used financing from the Export-Import Bank of the United States.

ITS and Mi-Jack have proven successful in the Mexican market as a result of their ability to select the right Mexican partner in a joint venture to expand operations, provide their experience and technology, and to supply top-of-the-line equipment accompanied by financing.



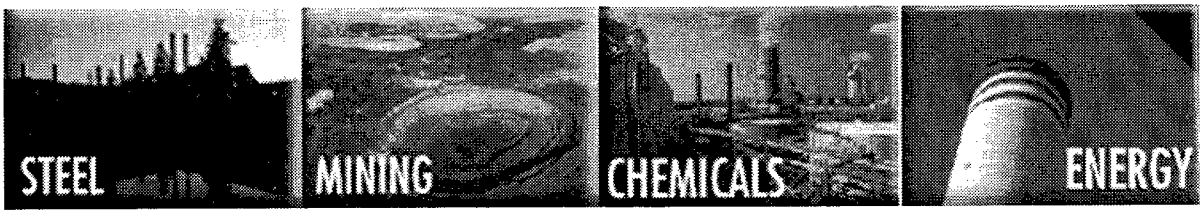
Case Study

U.S.TDA and AHMSA: Environmental Modernization

Privatization of AHMSA

Altos Hornos de México S.A (AHMSA) was founded in 1942 by the federal government as the country's first steel producer. The company's main complex is in the City of Monclova, located about 200 kilometers northeast of Monterrey in the northern state of Coahuila.

In December 1991 AHMSA was acquired by Grupo Acerero del Norte (GAN) and is the largest producer of liquid steel and ferrous metals in the country. Through diversification and acquisitions, Grupo GAN has divisions in: fertilizers, chemicals, electric power, and by 1997, municipal wastewater treatment. At the end of December 1995, 73.75 percent of AHMSA's shares were held by GAN, 1.44 percent by Hoogovens and 24.81 percent were traded on the market. In 1992, the company began a modernization and expansion program that is still underway.



Role of the U.S. TDA

The U.S. Trade and Development Agency played an instrumental role in assisting AHMSA to modernize its environmental controls. In December 1990, UEC Environmental Systems (UES), now owned by Chester Engineering of the United States, initiated a World Bank-funded environmental assessment of the Altos Hornos de México S.A. (AHMSA) plant in Monclova, the country's largest integrated steel plant. In preparation for privatization, AHMSA was interested in reducing emissions and treating its wastewater. UES's findings recommended a full feasibility study to design a comprehensive environmental modernization program for the plant. In 1991 TDA funded a US$500,000 study of air and water pollution at the steel complex in Monclova.

Excessive Air and Water Emissions

UES began working with AHMSA under the World Bank Steel Sector Restructuring Project. UES provided training for AHMSA personnel and an initial environmental needs assessment. Initial phases of this program included training of AHMSA personnel in an air and water sampling program, assisting AHMSA in screening-type sampling of all plant wastewater discharge points, and assisting it in establishing air monitoring stations throughout Monclova and its surrounding towns. This program identified many environmental problems, including wastewater contaminants that exceeded Mexican standards, as well as air emissions at all of the monitoring stations that exceeded the Mexican 24-hour maximum particulate standard of 256 micrograms per cubic meter.

The Shutdown

Following this initial screening, UES assisted AHMSA in conducting a more extensive wastewater sampling to identify operating plants that discharged significant amounts of contaminants. The two major contributors of wastewater contamination were determined to be the two continuous pickling lines. The two by-product coke plants were found to be major sources of particulate emissions, as well. In May 1991, the environmental situation at the plant became critical when the Mexican environmental authority (then SEDUE) ordered the shutdown of the polluting Siemens Martin furnaces.

Recommendations

This feasibility study recommended the establishment of new environmental systems in three major areas. First, it proposed construction of a regeneration plant to treat the contaminated hydrochloric acid from the Number 2 and 3 pickling lines. These lines had been recently converted from the use of sulfuric acid to hydrochloric acid, but no steps had been taken to regenerate the acid. Second, it proposed biological treatment and ammonia removal for the wastewater from the coke plant. AHMSA's practice of disposing of coke plant Number 2's wastewater by utilizing it to quench coke, had resulted in the release of particles and toxic gas into the atmosphere and the emission of contaminated water into the Arroyo Frontera river. Third, it recommended the use of specialized coal charging cars and a negative pressure (steam aspiration) offtake system to capture air emissions. AHMSA had been using a coal charging system which released dense pollution plumes into the air.

1996: New Plants On Line

Since 1991, a number of events have transformed the company. At the end of 1991, at the same time as the TDA study was being concluded, AHMSA was sold to Grupo Acerero del Norte (Grupo GAN). Now in private sector hands, AHMSA quickly returned to profitability and began to put a more serious emphasis on environmental pollution prevention and control. First, it implemented air pollution controls to get its plants within compliance. In addition, it began to address the treatment of wastewater. AHMSA followed up on the recommendations of the TDA study by contracting the Southwest Research Institute in San Antonio, Texas, to conduct an environmental audit.

AHMSA has a number of ambitious water projects in the works, including two new wastewater treatment plants. The first plant (estimated cost of US$8 million) will treat industrial wastewater produced by sulfuring acid pickling lines and other production facilities. AHMSA has requested bids for this plant. Before a concession can be awarded, however, it will need to conduct additional tests due to changes in the composition of the waste stream.

The second plant is an innovative project to provide municipal wastewater treatment service to the City of Monclova. As Monclova currently has no wastewater treatment, this project (US$8.5 million) will improve the quality of life for its residents, many of whom work at the AHMSA plant. AHMSA has opened bids on the design and installation of the plant. Once in operation, the municipal sanitation company will pay AHMSA for the wastewater that is treated.

AHMSA will award the plant and begin construction in early 1997. For both plants, AHMSA has received bids from ten major consortia from Mexico, France, Canada, and the United States.

Grupo Alfa, S.A. de C.V.

Company Description

Headquartered in Monterrey, Grupo Alfa is a multi-billion dollar industrial conglomerate with substantial holdings in the chemical, petrochemical, refrigerated foods, and steel sectors. The company has holdings in most major industrial sectors and has diversified its asset portfolio aggressively. Alfa has become increasingly involved in infrastructure development in the energy and telecommunications sectors. The company is currently strengthening its market position in all sectors.

History and Business Strategy

Since its inception, Alfa has aggressively targeted the Mexican heavy industrial market, pursuing a position of leadership in each of the sectors it entered. The group diversified to create horizontal synergies and to avoid dependence on any particular industry or vulnerability to the volatility of market demands.

The company's business strategy is to establish a leading position in a number of targeted markets. To achieve this, Alfa invested US$450 million in 1995, which has resulted in a 27 percent increase in production capacity as well as in many technological improvements.

Key Financial Data

Figures in US$ Millions	1994	1995	Change (1994-1995)
Revenues	2,845.4	2,799	-1.6%
Net Income	-433.2	271.8	-162.7%

Alfa's financial strategy has been to reduce its dependence on industrial cycles by rapidly growing noncommodity companies with market differentiation and higher value- added products and services.

Major Infrastructure Projects

Alfa has a particular interest in developing infrastructure, since it is already one of the top two consumers of both electricity and natural gas in Mexico.

The company has occupied the lead role in the construction and operation of the Alfa-PEGI power generation facility, a 180-megawatt facility in Monterrey serving industrial users, that has been in operation for more than fifty years.

In conjunction with a U.S. firm, CSW, Alfa is building a 120-megawatt cogeneration facility in Altamira. Investments in this project amount to US$75 million and will be developed through a new subsidiary called Enertek. This is going to be the first major cogeneration project built in Mexico under the new legal framework regulating power generation. Enertek has agreed to the interconnection, backup and transmission of energy with Federal Electricity Commission (CFE), and has agreed to the supply of natural gas with Pemex. The company reports that it will be involved in eight additional cogeneration projects in Mexico during the next 12 to 18 months.

Alfa is also involved in telecommunications through a partnership with AT&T to provide long distance services in Mexico, by creating the Onexa group. The company is aggressively pursuing opportunities in the telecommunications sector and plans to be a major player in the development of the Mexican telecommunications infrastructure.

Contact Information

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Bufete Industrial, S.A.

Company Description

Bufete Industrial, S.A., Mexico's leading provider of integrated Engineering-Procurement-Construction (EPC) services, serves both public and private sectors in Mexico and other parts of Latin America, as well as in the United States, Europe, and Asia. Headquartered in Mexico City, Bufete is Mexico's third largest construction firm and enjoys an excellent technical reputation.

Bufete is involved in all stages of the construction process from design and engineering to site development, construction and modernization, and expansion. The company's areas of operations include: manufacturing plants, industrial process plants, power generation plants, environmental projects, infrastructure projects and urban development projects. Bufete actively pursues major infrastructure projects and seeks U.S. partners and contractors.

Bufete's total revenues for 1995 were US$304 million, approximately 45 percent of which were derived from its two largest clients, both from the Mexican public sector: Petróleos Mexicanos (PEMEX) and Comisión Federal de Electricidad (CFE). Other public sector clients include the Mexican National Water Commission, the Mexican Commission for Urban Transportation, the Mexico City Directorate General of Construction and Hydraulic Operation, the Federal District Water Commission, several Chilean public sector enterprises, and the City of Houston. The company has a diverse private sector client base including the Mexican subsidiaries of Ford Motor Company, Kimberly Clark, Proctor & Gamble, Dupont, and Scania.

History and Business Strategy

Founded in 1949 by the engineer José Mendoza Fernández, Bufete began as a small engineering consulting firm catering to private clients. The company's ability to provide its clients with a full range of integrated EPC services led to sustained growth over the following decades. Bufete maintained an aggressive strategy to expand internationally, which has been assisted by its alliance with the M.W. Kellogg Company begun in 1971. M.W. Kellogg is a world leader in providing engineering and construction services, and owns 14 percent of Bufete's capital stock. Bufete furthered its international activities through the purchase of Ovalle, a Chilean construction company in 1994. Ovalle was responsible for 23 percent of Bufete's revenues in 1995.

Bufete today maintains a leading position as an EPC provider and has been the first Mexican firm to be awarded the ISO 9001 certificate. The company is playing an active role in Mexican infrastructure development through the provision of integrated EPC style contracts. Bufete expects to further exploit business opportunities resulting from the privatization and deregulation policies of the Mexican government.

Bufete maintains the ability to provide comprehensive packages for its clients, including financing and operating through associations with other companies, since Bufete typically invests little or no equity.

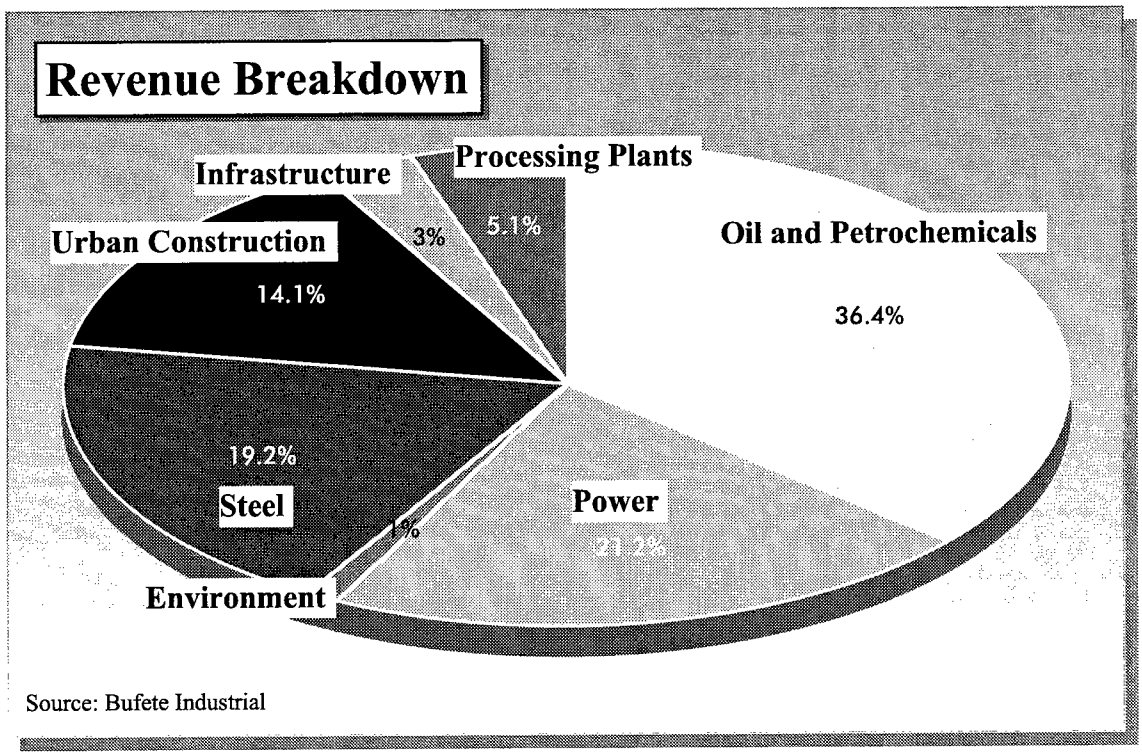
Key Financial Data

The company experienced substantial sustained growth during the 1990-1994 period. In 1995, however, the Mexican economic crisis resulted in a contraction of 48 percent in the Mexican construction industry, which is also reflected in Bufete's performance.

	1992	1993	1994	1995	Change (1994-1995)
Revenues (US$ millions)	644.7	649.4	537.3	304.4	-43.4%
Net Income (US$ millions)	25.2	55.9	0.95	-60	-6412.6%
Employees	12,723	12,317	11,088	8,426	-24.0%

The acceleration of the privatization process should result in new opportunities for Bufete, culminating in renewed growth through its international associations.

Below is a percentile breakdown of Bufete's revenue by activity for 1995. Eighty percent of Bufete's revenues are attained through a competitive bidding process.



Source: Bufete Industrial

Major Infrastructure Projects

Bufete has been the lead firm on numerous CFE projects including Topolobampo, Zimapán and Carbon II among other significant power generation turnkey projects. On the Carbon II coal fired power plant, for example, Bufete provides 40 percent of the integrated EPC services to the project. It is part of an international consortium with Foster Wheeler and Mecánica de la Peña, a leading Spanish equipment manufacturer, in this venture.

In 1993, Bufete was awarded a service agreement by the Mexico Water Commission to modernize and operate the water distribution system for almost one quarter of Mexico City, services which are being provided through a joint venture with the French Lyonnaise des Eaux Duméz. The project is now in its second phase. Steady progress is being made in meter reading and billing, customer services and new connections.

Furthermore, Bufete has participated in the evaluation, engineering, design, construction and start-up of water treatment plants in Mexico City and the State of Veracruz.

Contact Information

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Cementos Mexicanos, S.A. de C.V.

Company Description

Based in Monterrey, Cemex is Mexico's largest cement producer, generating annual revenues of US$2.5 billion. The company has holdings throughout Latin America and recently concluded the purchase of a Spanish cement producer. Cemex's core business has made the company the largest producer of cement, ready-mix concrete, and building aggregates, in the Americas, and one of the largest in the world.

The cement industry in Mexico comprises 31 plants throughout the country. Of these, 18 belong to Cemex, which today has an installed capacity of 27.8 million metric tons per year.

Cemex is one of the top two consumers of electricity in the country. Hence, it has become active in developing power plants to meet its own demands. The company also has huge water and pollution control needs which are also being addressed.

History and Business Strategy

Cementos Mexicanos was created in 1931 with a merger of Cementos Hidalgo (founded in 1906) and Cementos Monterrey (founded in 1920). Over the following decades, Cemex aggressively positioned itself in the Mexican and international markets through mergers and acquisitions with companies in its core industry. In 1966, Cemex acquired Cementos Mérida and in 1976 the company acquired Cementos Guadalajara. This was also the milestone year when the company began an aggressive program of exports. Since then, Cemex has continued to focus on its core competence, and has expanded its operations throughout Mexico and internationally.

Geographic diversification has played, and will continue to play, a key role in Cemex's development strategy. Currently, international operations account for 55 percent of total assets, 63 percent of consolidated revenues and 54 percent of cash flow. Cemex has direct operations in 22 countries.

Key Financial Data

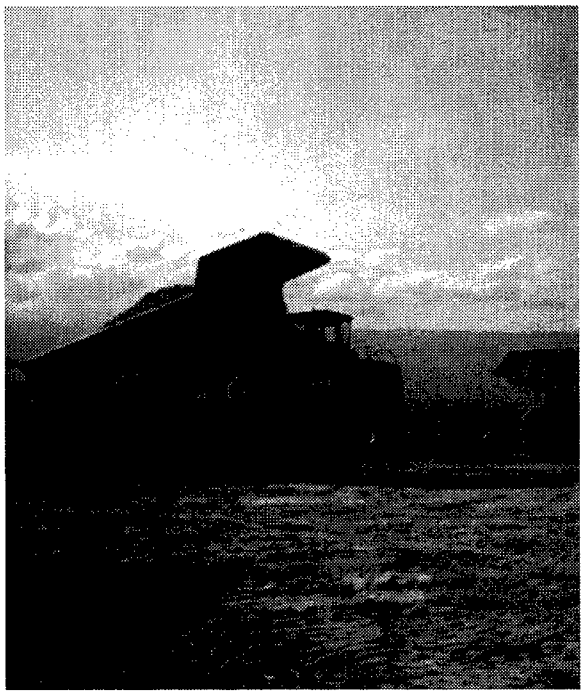
Figures in US$ Millions	1992	1993	1994	1995	Change (1994-1995)
Revenues	2,210	2,971	2,100.8	2,564.2	22.1%
Net Income	6,280	96	735.2	815.3	10.9%

Cemex's performance in 1995 underscored the strength of its multinational diversification strategy. Despite the Mexican economic crisis, the company achieved excellent consolidated results, supported by its operations in Spain, Venezuela, the U.S., Panama and the Caribbean, as well as trading activities.

Major Infrastructure Projects

Though Cemex is not an infrastructure developer per se, due to its sheer size the company generates significant infrastructure demands. The company is addressing its own energy, water and pollution control needs. Cemex will soon begin construction on a 250 megawatt coke fired electric generation plant and is in the process of evaluating and developing other energy projects associated with its production facilities.

The company's financial strength and aggressive growth projections make Cemex an attractive partner in developing infrastructure.



Contact Information

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Empresas ICA Sociedad Controladora, S.A. de C.V.

Company Description

ICA is the largest construction company in Mexico with 1995 revenues of US$575 million. The company is engaged in a full range of construction of infrastructure facilities as well as industrial, urban and housing construction for Mexico's private and public sectors. ICA is actively involved in the construction, operation, and maintenance of highways, bridges, and tunnels, and in the operation of seaports, water supply systems and waste treatment facilities concessioned by the Mexican government.

Construction accounts for approximately 77 percent of ICA's revenues, an area in which the company continues to strengthen while diversifying its revenue base by expanding internationally. Revenues from ICA's foreign operations in Spain, Portugal, U.S., and Latin America have increased from five percent in 1994 to 17 percent in 1995.

Historically, ICA has operated solely as a contractor. However, the decrease in availability of government and third party finance in Mexico, resulting from the recession, has required the company to participate in arranging the financing and taking smaller equity investment positions. Generally, ICA contributes equity to a project by accepting deferred payment of a portion of its construction contract price.

History and Business Strategy

ICA was founded in 1947 with the incorporation of Ingenieros Civiles Asociados, S.A. The company's core business was providing services for infrastructure construction catering to the Mexican public

sector. The company expanded rapidly and diversified its operations, emerging as Mexico's largest engineering, procurement and construction service provider to both public and private sector clients. The company began its manufacturing operations in 1948, and its hotel operations in 1971.

With the increased role of the private sector in infrastructure development, ICA is aggressively seeking foreign partners and joint venturing with international firms to provide equity financing in projects. ICA is also pursuing concessions and is currently participating in ten concessioned highway, bridge and tunnel projects, with an aggregate length of approximately 920 miles. ICA's equity participation for these projects ranges anywhere between 2 percent and 100 percent. During 1995, ICA's concession operations accounted for nine percent of its combined revenues.

Beginning in 1995, a decline in demand for large infrastructure projects has compelled ICA to participate in smaller projects to which it is able to bring significant equity. The company is increasing its real estate development activities in an effort to improve its competitive position in urban construction markets.

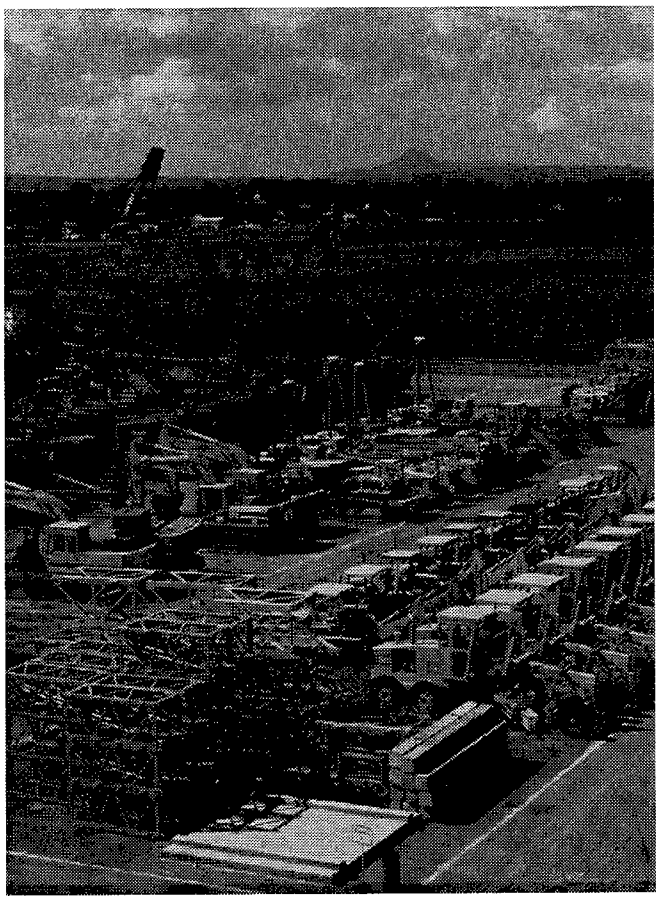
Key Financial Data

ICA established an austerity plan immediately after the December 1994 peso devaluation, aiming to restructure the company to meet reduced demand for its services. This entailed selling assets, restructuring personnel, and reducing overhead.

Figures in US$ Millions	1993	1994	1995	Change (1994-1995)
Revenues	2,527	1,811	577.5	-68.1%
Net Income	296.5	1.6	78.5	4,806.2%

By the end of 1995, ICA had 20,000 employees, of which approximately one-third were full-time workers.

Major Infrastructure Projects



ICA provides design, engineering, construction services as well as some financing for its projects. The following is a list of infrastructure facilities in Mexico which ICA has executed as a primary contractor:

- Bridges: Belisario Domingues, Fernando Espinoza Tampico and Mezcala.
- Dams: Apulco, Comedero, El Novillo, El Caracol, Cajón de Peña, and Aguamilpa.
- Highway Concessions: Morelia-Tiripetio, Guadalajara-Colima, Baja-Transpeninsular, Mazatlán-Culiacan, León-Lagos-Aguascalientes, Guadalajara-Tepic, and Torreón- Saltillo.
- Tehuacán-Oaxaca and Salamanca-Irapuato federal highways.
- Tampico bypass.
- Mexico City Airport Control Tower.
- Mexico City sewage system.
- Mexican gas pipeline.
- Seaport at Alvarado.

Contact Information

Company	**Empresas I.C.A. Sociedad Controladora, S.A. de C.V.**
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Transportación Marítima Mexicana, S.A. de C.V.

Company Description

Headquartered in Mexico City, TMM is the country's largest shipping company, grossing in excess of US$880 million. The company's principal lines of business are liner services and other maritime transportation services -- tankers, carriers, etc. -- which account for approximately 34 percent of TMM's aggregate revenues. Non-shipping services -- railroad, storage, auto freight, etc. -- account for eight percent. The company operates five distinct liner services with a total of 74 vessels, valued at US$450 million.

TMM's shipping line sails to the Far East, Northern Europe, the Mediterranean, Brazil, and to Central and South America. For some of these routes, TMM has established joint ventures with American President Line and Hapag-Lloyd.

Besides its shipping lines, the company also operates port services under the Mexican concession program, as well as trucking, multimodal, and rail services.

History and Business Strategy

Since its inception, TMM has expanded aggressively, maintaining a distinct leadership position in the Mexican transportation industry. The 1990s have been a decade in which the company has committed to modernizing its fleets and facilities and expanding into new lines of business, such as specialized liquid warehousing and multimodal transportation.

TMM has diversified while keeping transportation as its core competence. The company is also responsible for between 70 and 80 percent of the Mexican tourism market for shipping through a fully owned shipping agent subsidiary.

Key Financial Data

TMM experienced sustained real growth during the 1990-1994 period. With the projected surge in Mexico's international trade, TMM should experience strong growth, given its existing leadership position. Acceleration of the port privatization process should result in new opportunities for TMM in the infrastructure domain. Partnerships with international companies will play a key role in the company's future development.

Figures in US$ Millions	1992	1993	1994	Change (1994-1995)
Revenues	466.9	473.6	698.1	47.4%
Net Income	42.8	40.3	-65.2	-261.8%

Major Infrastructure Projects

In 1991 TMM won one of the first private port operating concessions in Mexico. In that year, TMM began to provide stevedoring services at the Port of Veracruz. More recently, TMM started providing similar services at the Ports of Tuxpan and Coatzacoalcos. Together with its partner Stevedoring Services of America, TMM won the concession to operate the container terminal at Manzanillo.

In July 1996, TMM won a bid to control the Integrated Port Authority of Acapulco, making Acapulco the first privately owned port authority in Mexico. At the same time, the company won a 50-year concession to operate the port.

In other transportation services, TMM has formed a partnership with J.B. Hunt of the U.S. to provide truck freight service. Additionally, the company has formed a joint venture with Kansas City Southern Industries to participate in the upcoming railroad privatization. TMM is currently co-owner of the Texas Mexican Railway.

Contact Information

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Grupo Carso, S.A. de C.V.

Company Description

Headquartered in Mexico City, Grupo Carso is a major Mexican industrial conglomerate with approximate annual revenues of US$2 billion. As the lead stockholder in Teléfonos de México (Telmex), Carso is the largest private sector player in the Mexican communications field.

Carso is a highly diversified conglomerate, active in several industry sectors besides telecommunications: industrial construction, commercial activities such as franchises of Denny's and Sanborns Café, consumer products manufacturing, and distribution of products such as cigarettes and aluminum foil, as well as for the mining industry and automobile industries.

Grupo Carso also maintains very active financing operations for internal and external finance.

History and Business Strategy

Grupo Carso, led by Carlos Slim, has diversified rapidly and continues with such strategy. This strategy should hold true particularly in light of the pending opening of the Mexican long distance services.

Despite the industrial breadth of the group, Carso is concentrating its efforts in the telecommunications sector. Grupo Carso recently bought a stake in privately held International Wireless, which in turn bought the computer on-line company, Prodigy.

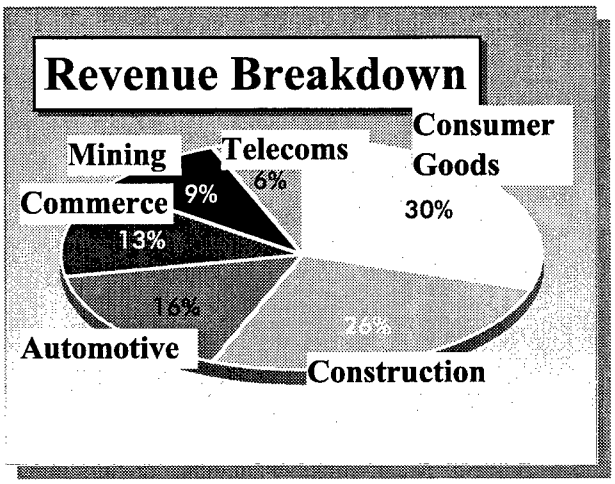
Key Financial Data

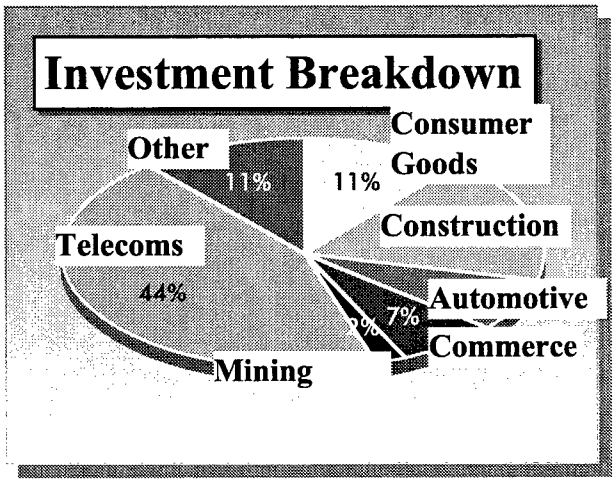
Grupo Carso

Figures in US$ millions	1992	1993	1994	1995	Change (1994-1995)
Revenues	4,536	5,149	5,120	2,783	-45.6%
Net Income	638	776	768	352	-54.2%

Like most major industrial conglomerates, Grupo Carso was adversely affected by the Mexican economic crisis in 1995. Nevertheless, the group has maintained an aggressive investment schedule and should resume growth over the following year.

Below find the percentile breakdowns by participation of industry sectors for 1995.





Source: Grupo Carso

As illustrated above, Grupo Carso is investing aggressively in the Mexican telecommunications sector. Below find revenues and net earnings specific to Telmex.

Telmex

Fiscal Year	1992	1993	1994	1995	Change (1994-1995)
Revenues (US$ m)	11,773	12,869	13,174	6,492	-50.7%
Net Income (US$ m)	4,535	4,710	3,545	1,450	-59.1%

Major Infrastructure Projects

With controlling ownership in Telmex, Grupo Carso is directly involved and in great part responsible for the Mexican communications infrastructure. Telmex has been aggressively expanding both its conventional and cellular services. The company is in the process of creating a fully digital network and implementing a national center for the supervision of long distance service.

Grupo Carso has also started an energy division and is actively seeking participation in the independent power and cogeneration markets. The group is also looking to play a role in the railway and port privatization process for which it is considering partnerships and associations.

Contact Information

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Grupo Mexicano de Desarrollo S.A. de C.V

Company Description

Grupo Mexicano de Desarrollo, S.A. (GMD) is actively engaged in the construction of a broad range of infrastructure projects, including highways, toll roads, tunnels, bridges, water works, dams, airports and port facilities. GMD also participates in industrial, housing and commercial construction projects.

Since 1990, GMD has been an active participant in the Mexican government's program to modernize its highway network by granting concessions to operate toll roads to companies with access to private sector financing. Despite diversification into other areas, GMD's principal source of income remains activities in the Mexican infrastructure construction industry. In the period from 1990 to 1995, the construction of concessioned toll roads represented more than 70 percent of the company's revenues.

GMD's performance is directly related to public sector spending, which in turn is tied to the performance of the Mexican economy. Hence, in order to remain ahead of the curve, GMD has become actively involved in arranging financing for infrastructure projects, which it has typically done through Mexican commercial and development banks. Following the Mexican financial crisis, GMD has been searching for international alliances and joint ventures to capitalize projects.

History and Business Strategy

GMD's predecessor was Constructora Ballesteros, S.A., founded in 1959. GMD was organized under Mexican Law in 1975. Since then, the company has successfully completed over four hundred construc-

tion projects in Mexico. During this period, GMD has created an outstanding and innovative track record and has developed engineering expertise, project management skills, a large and modern heavy equipment fleet, and a series of technological innovations through joint venturing with international companies.

The company's heavy reliance on public sector projects has been a steady trend in its business activities. GMD has been a key player in the development of the concession model for toll roads and municipal water works, and is working with state and federal governments in the design and implementation of new privately financed projects.

Key Financial Data

GMD's reliance on government projects has resulted in a strong setback since the devaluation of the peso. In order to diversify its revenue stream GMD is actively seeking foreign partners and additional projects outside Mexico.

Figures in US$ Millions	1992	1993	1994	1995	Change (1994-1995)
Revenues	601.7	802.5	930.5	184.7	-80.2%
Net Income	10.7	-27.2	-147.5	-93.9	-36.3%

Major Infrastructure Projects

GMD is currently involved as a contractor and investor in the following Mexican toll roads: Cuernavaca - Acapulco, La Venta - Punta Diamante, Córdoba - Veracruz, Atizapan - Venta de Carpio, Mozimba - Pie de la Cuesta, Acayucan - Cosoleacaque, La Tinaja - Acayucan, Mexico City - Guadalajara - City Morelia. The company's involvement in toll road projects typically also entails construction of bridges in order to cross Mexico's mountainous terrain.

Together with joint ventures and partnerships, GMD also controls the operations and construction contracts of over fifteen waste water treatment plants throughout Mexico, with a total capacity of 323.6 million gallons per day. Among these projects are: Tampico, Morelos, and San Juan de Aragón Water Treatment Plants; and the Chimalhuacan, Atizapan and Cancún Water Works.
GMD's involvement in dams is purely on a contractual basis, meeting Mexico's need for both power and irrigation. The company is involved in the Miel I Hydroelectric Dam in Colombia and the Luis Donaldo Colosio Dam in the Sonora desert. Among GMD's other current projects are the Eastern section of Puebla's solid waste collection, in which it has a fifteen- year concession together with Benito Roggio.

Contact Information

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Corporación GUTSA, S.A. de C.V.

Company Description

Headquartered in Mexico City, GUTSA is among Mexico's five largest construction companies. GUTSA is a key player in urban development, highway construction and municipal potable water concessions.

In 1993, the company created an energy division focused on independent power plants, industrial cogeneration facilities, and natural gas transmission and distribution. GUTSA is actively pursuing several such projects and is a bidder on the Mérida III plant.

Currently, GUTSA has the capacity to build mega projects, as has been the case with the World Trade Center in Mexico City which it built, co-owns, and operates.

The company maintains a partnership with the U.S. based firm, Lockwood Green, for engineering projects.

History and Business Strategy

Founded in 1944, GUTSA has been involved primarily in construction. Since then, the company has expanded into most major sectors of the Mexican economy, playing an important role in industrial construction, urban development and highway construction.

The company has been active in the Mexican road concession program and been an active bidder on municipal water projects in partnership with the UK-based Northwest Water. GUTSA is actively seeking partners for new projects, as it pursues opportunities in the energy and urban development areas.

Key Financial Data

Since GUTSA is a privately held group, no financial information has been disclosed.

Major Infrastructure Projects

Besides actively participating in commercial, industrial and urban construction, GUTSA has been involved in the following infrastructure projects:

- Winners of the public bid to operate one quarter of the potable water services for the Federal District, an area encompassing approximately 4 million people. The service will involve managing 4,799 gallons per second of potable water.
- Construction of the Churubusco river bridge in Mexico City.
- Construction of the access road to the principal highway in Puerto Vallarta.
- Construction of the tunnels in the Paseo de la Reforma in Mexico City.
- Construction of the 363-kilometer Puebla- Oaxaca highway.
- Construction of the 116-kilometer León- Lagos- Aguascaliente highway.
- Construction of the 31-kilometer Texmelucan- Tlaxcala highway.
- Construction of the bridge between El Paso and Ciudad Juárez.

Contact Information

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Grupo Protexa, S.A. de C.V.

Company Description

Headquartered in Monterrey, Grupo Protexa is a construction-based industrial conglomerate which is particularly strong in Northeastern Mexico. Protexa has significant operations in the chemical and petrochemical sectors. In terms of infrastructure, Protexa is active in the construction of highways, oil and gas pipelines, railways, ports and sewage systems. In addition, the firm is also involved in the telecommunications sector through a cellular concession. Under the Mexican concession system, the company has built several highways, residual water treatment plants, and motorized vehicles gas verification centers, among other projects.

Protexa has immediate plans to branch out into the energy sector by participating in the development of independent power plants, and actively seeks partnerships and strategic alliances on a per project basis.

The various construction companies which today comprise Grupo Protexa are full service market players, providing Build-Operate-Transfer (BOT) and Engineering-Procurement-Construction (EPC) projects as well as organizing financing.

History and Business Strategy

Grupo Protexa was founded in 1945 by Humberto Lobo Villareal who established a small factory to produce roofing materials. In 1955, Protexa commenced construction activities with oil and gas ducts construction contracts. The group's international experience commenced in 1963 when it began exporting roofing materials to Chile and Costa Rica and opened fiber glass production facilities in

Argentina, Brazil, Italy and Panama.

The group experienced a rapid surge in growth during the 1970s, a time in which the company diversified into offshore drilling, marine engineering and heavier construction work such as dams, waste facilities, hydroelectric power plants, and gas power plants. For the past 25 years, Protexa has diversified internationally and maintained a keen interest in local public bids.

Key Financial Data

Since Protexa is a privately held group no financial information has been disclosed.

Major Infrastructure Projects

Protexa has worked on numerous important infrastructure projects in Mexico. Examples of such projects are the first Metropolitan Light Train in Monterrey; the Nuevo León and Zimaplan Hydroelectric Dam in Nuevo León and Zimaplan, Hidalgo; construction of the "18 de Marzo" oil refinery in Mexico City; and the construction of systems for the confinement, disposal, safe handling and ecological control of the PEMEX terminal for oil distillates in Azcapotzalco in Mexico City.

The company has also been very active in developing infrastructure in the international arena, ranging from offshore drilling in India to a 480-kilometer gas pipeline in Bolivia.

Contact Information

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Grupo Tribasa, S.A. de C.V.

Company Description

Grupo Tribasa is the second largest heavy construction firm in Mexico. The company is involved in all aspects of infrastructure including power, gas transmission, sewage and potable water, ports and airports. Headquartered in Mexico City, the group's 1995 revenues were US$400 million. Since 1989, Tribasa has specialized in highway construction, in response to emerging opportunities resulting from the Mexican government's highway concession program.

The group acts not only as a construction contractor, but also as an equity investor, as a direct result of the Mexican concession programs. Through a subsidiary, the company operates and maintains all the highways of its consolidated concessionaires. Tribasa is in the process of diversifying its operations to better compete in the concessioned projects. One example of such diversification is the joint venture with Ensearch Corp. (June, 1995) to pursue power generation, thermal energy, and gas transmission within Mexico. The company also has been diversifying internationally, with two concession awards in Chile and in Ecuador in which Tribasa is the lead player.

History and Business Strategy

Tribasa was founded in 1969 under the name Triturados Basálticos y Derivados (TBD), S.A. de C.V. The company was a joint venture among three construction companies to produce construction aggregates and asphalt concrete. It was only in 1974 that TBD began construction, starting with road and drainage construction. The company later expanded into railway and other civil works. In 1989, while the company was seeking a partner to increase its chances of success

in the Mexican concessions program, Tribasa merged with Cimentaciones y Edificaciones, S.A. de C.V. (Ciesa). The new company expanded aggressively into highway concessions and other related construction work. The company's equity in such projects ranged between 5 and 30 percent.

The company actively seeks new partnerships and alliances. Tribasa is also among the few Mexican companies which has the capacity to engage in complex industrial projects and is seeking to amplify this aspect of its business.

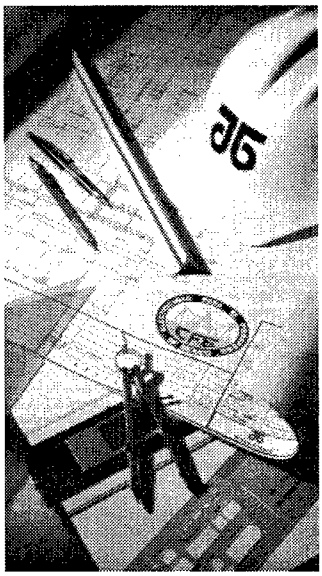
Key Financial Data

In light of the Mexican economic crisis, Tribasa has taken aggressive measures to reduce its personnel costs and overhead as well as restructuring its Peso-denominated debt. Nevertheless, its management understands that the company's predicament rests on macroeconomic issues and the availability of financing.

Figures in US$ Millions	1992	1993	1994	Change (1993-1994)
Revenues	662.9	743.6	615.3	-17.3%
Net Income	110	132.5	37.5	-71.7%

Major Infrastructure Projects

Tribasa is participating in and/or promoting several infrastructure projects. The most significant include winning the concession for a multipurpose terminal in the port of Altamira, bidding on railroad concessions, promoting the new international airport in Mexico City, electricity generation and natural gas distribution projects, and water treatment and distribution projects.



The company's recent activities have focused primarily on the construction of roads and highways. Between 1990 and 1994, the company participated in the development, financing, construction and operation of 585 kilometers of Mexican roads. Highways built by Tribasa include: Tenango - Ixtapan de la Sal, Champa - Lechería, Cuernavaca - Acapulco, Chamapa - La Venta and Peñón - Texcoco.

Other projects include: Zacatal Bridge, repaving runways at the Mexico City airport, Presa - Paso Real dam in the state of Mexico, and construction of the Los Querendes tunnel.

Contact Information

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U.S. Trade and Development Agency: Latin American and Caribbean Region

The U.S. Trade and Development Agency (TDA) is a small, independent federal government agency that assists in the creation of jobs in the United States by helping U.S. firms pursue overseas business opportunities. TDA creates export opportunities for U.S. firms by providing project planning assistance to major infrastructure and industrial projects in developing and middle-income countries. TDA provides funding for feasibility studies, technical assistance, orientation visits, training programs and other project planning services.

Since TDA's inception in 1981, the agency has been associated with approximately $7 billion in exports—or nearly $30 in exports for every dollar invested in TDA activities. Because of TDA's size and management style, it responds quickly to assist U.S. companies in capitalizing on overseas business opportunities and responding to foreign competition.

In Fiscal Year 1996, TDA will obligate $43.6 million in 39 strategically targeted developing and middle-income countries in the following regions: Latin America and the Caribbean; Africa and the Middle East; Asia/Pacific; Central and Eastern Europe; and the New Independent States (NIS).

TDA activities cover a wide range of sectors of high priority to host governments and international development efforts. They include, but are not limited to Energy (Power, Oil and Gas), Telecommunications, Transportation (Aviation, Urban Transit, Rail, Highways, Ports) and Environment (Water and Wastewater, Hazardous and Solid Waste, Industrial Remediation).

Increasingly in recent years, as the private sector has taken on a greater role in infrastructure development, TDA has facilitated the development of priority private projects with U.S. export potential.

In the case of both public and private projects, TDA provides grants to host country project sponsors for studies or consultancies to determine the technical, economic and financial feasibility of the projects. Public and private sector project prospects come to TDA in a variety of ways. A foreign government or private sector entity may approach TDA directly with a funding request. The commercial staffs of U.S. Embassies or Consulates also frequently play a crucial role in project identification. U.S. firms are invited to refer prospective projects to TDA (with the caveat that TDA-funded contracts are normally awarded on a competitive basis—unless the U.S. firm plans to invest in the project or there is a strong justification for a sole-source award due to the company's significant role in project development).

While there is no formal TDA application form, a full description of the anticipated project and the anticipated study scope submitted with the official letter of request may facilitate and expedite the TDA review process (a model proposal format is available upon request). Because of its focused mission, TDA only considers projects that have the potential to mature into significant business opportunities for U.S. firms. To be considered for funding, projects must: (1) represent a development priority for the host country; (2) have identified likely sources of financing for project implementation; (3) represent significant potential for U.S. exports during project implementation (at least $20 million dollars); and (4) face stiff foreign competition.

Typically, TDA sends a mission of technical specialists (the Definitional mission) to the country to gather additional information on the project, work with local authorities to develop a scope of work and budget for an appropriate feasibility study or consultancy, and make a recommendation concerning TDA support of the study. If reliable project data is adequate, TDA may also engage technical specialists to assess the data without travel to the host country (desk study). If TDA determines that all funding criteria have been met, it may make a grant offer to the applicant for support of the study. If the offer is accepted, TDA signs the grant agreement with the relevant host government agency or organization (the Grantee).

The Host Country Grantee (rather than TDA) selects the U.S. firm to conduct the study under approved competitive bidding procedures. Normally, this entails advertisement of a request for qualifications in the *Commerce Business Daily*, and invitation to the top ranked firms to submit detailed proposals. The successful U.S. firm negotiates a contract governing study services directly with the Grantee. Up to 20 percent of the grant is available, when needed, to enlist the participation of host country private sector expertise through sub-contractors. As the study is implemented, the U.S. contractor submits its invoices to the Grantee for endorsement and transmittal back to TDA for direct payment.

From time to time, TDA will entertain applications for feasibility studies where approval of a pre-selected U.S. firm is requested by the project sponsor. Generally speaking, these may be approved when the proposed pre-selected firm can demonstrate that it has already expended considerable effort developing the project, where there is no evidence of significant interest on the part of competing U.S. firms, or when that firm has an investor relationship the project. TDA routinely requires **cost sharing** for the feasibility study in these cases. In addition, in appropriate cases, TDA may require the firm carrying out the study to **reimburse** part or all of the TDA funding if the project is implemented and the firm reaps an economic benefit.

In cases where neither a feasibility study nor a consultancy is appropriate, or as a complement thereto, TDA may provide funding for bid-related training programs, bidders briefings, technical seminars, technical assistance, conferences, or orientation visits to the United States. TDA frequently presents the results of positive feasibility studies to U.S. industry at TDA-sponsored bidders briefings. Selected feasibility studies may be ordered through NTIS. For ordering information, please contact the TDA library at (703) 875-4357.

Manufacturers, service providers, engineers and consultants may best monitor TDA's project pipeline in all regions through the *TDA Pipeline* (updated biweekly on TDA's website: http://www.tda.gov or for delivery, subscription information can be obtained by calling 703-875-4246). The definitional mission and desk study consulting opportunities are listed weekly on the TDA Definitional Mission Hotline (703-875-7447). Questions related to TDA Latin American programs may be addressed at 703-875-4257 to Albert W. Angulo, Regional Director, John Herrman and Anne McKinney, Country Managers, and Sally Roever, Project Analyst.

TDA Projects in Mexico

The following list of TDA-funded activities in Mexico indicates the amount of the TDA contribution, the name of the contractor or status of the contractor selection process and the fiscal year (FY) of TDA funding. The (FY**) designates the fiscal year in which TDA approved the project.

Air Pollution - TDA funded studies costing $625,000 related to the Mexico City air pollution project. Radian Corp. and Sierra Research conducted the studies. (FY 90)

Monterrey Water - TDA funded an orientation visit and project opportunities briefing on the Monterrey IV Water project. The American Water Foundation coordinated the visit and briefing. (FY 90)

Mexico City Subway - TDA funded an orientation visit for officials of the Mexico City subway. (FY 90)

Coal Mining Training - TDA funded a $225,000 training program on surface coal mining for MICARE. Utilities Fuel Inc. conducted the training program. (FY 91)

AHMSA Air and Water Pollution - TDA funded a $500,000 study of air and water pollution at the AHMSA steel complex. US Engineers and Consultants conducted the study. (FY 91)

Chihuahua Waste Water Treatment - TDA funded a $700,000 study on a waste water treatment project in Chihuahua. Woodward-Clyde Associates conducted the study. (FY 91)

Power Plant - TDA funded an orientation visit to the United States of CFE officials to look at U.S. power plant equipment and technology. Bechtel coordinated the visit. (FY 92)

Tijuana Light Rail - TDA funded a $450,000 study on a light rail project for the city of Tijuana. Barton Aschman Associates conducted the study. (FY92)

Lago Guadalupe - TDA funded a $589,000 feasibility study of a water environmental/supply project for Cuautitlan Izcalli County in the State of Mexico. A consortium led by Harza Engineering Company International conducted the study.(FY 93)

Vehicle Conversion - TDA funded a $490,000 economic study and demonstration project for a gasoline to alternative fuels vehicle conversion program in Mexico City for the Mexico City Metropolitan Commission for the Prevention of Pollution. PDI Gas & Equipment Inc. conducted the study.(FY 93)

Chihuahua GIS - TDA is funded a $72,000 study for a geographic information systems project in the state of Chihuahua. AGT carried out the study. (FY93)

Environmental Debriefing Conference- TDA provided funding for a conference to brief U.S. industry on the results of three previously funded TDA projects (Vehicle Conversion, Mexico City Hazardous Waste, and Lago Guadalupe), Consultants Group/Latin America coordinated the conference. (FY94)

Cogeneration Project- TDA partially funded ($130,000) a study for the Ecatepec Paper Mill Cogeneration plant. Tazcogen, the private sector developer, conducted the study.(FY94)

Mexico Health Sector Conference- TDA partially funded ($68,000) a Mexico Health Sector Definitional Mission and Conference organized by the Institute of the Americas and Scripps Institutions of Medicine and Science. (FY94)

Cogeneration Project- TDA is partially funding ($620,000) a study for a cogeneration project for PEGI, a cooperative formed by Monterrey industrialists. (FY94)

Chihuahua BOT Wastewater Project - TDA partially funded ($558,000) a study to plan various BOT wastewater treatment plant concessions in the State of Chihuahua. Freese & Nichols carried out the study. (FY 94)

Saltillo BOT Wastewater Project - TDA funded $375,000 for studies to plan and concession three wastewater treatment plants for the city of Saltillo. Freese and Nichols conducted the study. (FY 94).

Hazardous Waste Recycling Facility - TDA funded ($475,000) a feasibility study on a hazardous waste recycling facility in Mexico City for the Metropolitan Commission on Pollution Prevention and Control. Radian Corporation is conducting the study. (FY 94)

Valsequillo Reservoir Restoration- TDA funded ($300,000) a study on a reservoir restoration project in Puebla, Mexico. ASI conducted the study. (FY 95)

Industrial Cleanup— TDA approved funding $700,000 for a study on a waste management project for Industrias Unidas Sociedad Anonima (IUSA), a private sector industrial group based in Toluca, Mexico. A definitional mission report on this project is available. Advanced Sciences, Inc. is conducting the study. (FY 95)

Mexico City Subway System - TDA funded an orientation visit for officials from the Mexico City Metro to visit U.S. systems manufacturers. The OV was organized by the Institute of International Education. (FY 95)

Railroad Waste Disposable Facility— TDA is funding ($487,000) a study on waste disposal facilities for the national railroad of Mexico, Ferrocarriles Nacionales de Mexico (FNM). Brown and Root was selected to carry out the study. (FY 95)

Tecamachalco Irrigation Project- TDA is funding ($160, 000) a feasibility study for the Angelopolis Regional Development Program on an irrigation project in the state of Puebla. ASI is carrying out the study. (FY 96)

Veracruz Hazardous Waste Recycling Plant- TDA is partially funding ($280,000) a feasibility study on a hazardous waste recycling plant in Coatzacoalcos, Veracruz. Molten Metal Technology is carrying out the study. (FY 96)

CG/LA Infrastructure

CG/LA Infrastructure (CG/LA) facilitates and develops major energy, environmental, telecommunications and transportation projects in Latin America. Founded in 1987, the firm works on projects independently and in partnership with leading U.S. corporations. CG/LA works in four principle areas:

1) **Project Development**: by identifying solid and financeable projects in all areas of infrastructure, and especially in power and water;

2) **Market Assessment**: by providing information, advice and problem-solving to firms working in Latin markets;

3) **Washington Services**: by providing information and access on multilateral and guarantee agency decision-making in Washington, leading to project identification, or project and trade financing.

4) **LAIC Internet Services**: by the operation and maintenance of a proprietary site on the Internet; the Latin America Infrastructure Center (LAIC).

The firm's principals include highly motivated U.S. and Latin American professionals from business, economics, legal, finance, engineering and policy backgrounds. CG/LA devotes experienced multinational and multi-disciplinary teams to the development of all major projects. In addition to its offices in Washington, DC and Boston, CG/LA maintains offices in Latin America's two principal business centers - São Paulo, Brazil and Mexico City, Mexico. CG/LA is also established in Asunción, Paraguay, and Brasília, Brazil, and has prospecting and development capability—through strategic business alliances—in all major markets of Argentina, Chile, Peru, Colombia and Venezuela.

Project Development

CG/LA works in all areas of infrastructure project development, with a focus on power and water projects. CG/LA performs this work for its own account, and in partnership with equipment companies, EPC firms and financial institutions. Currently we are structuring development companies, in power and water, for Mexico and Central and South America.

"I've worked with CG/LA for many years and I continue to appreciate the outstanding market research work that they provide for my company in Latin America. What I appreciate most is that the work they produce is always on target—and on budget. I directly attribute their solid work to helping me expand my sales throughout Latin America. I would highly recommend CG/LA and its capable staff to any U.S. firm attempting to enter or expand its presence in Latin American markets."
Dr. Jamie P. Monat, Vice-President, Koch Membranes Systems, Inc., September 12, 1996.

Our focus is on early stage project development, in large and small projects. The mode of operation ranges from straight equipment sales, through EPC sales, to full project development. The business concept is based on a volume business, maximizing opportunities for U.S. investors and equipment suppliers. Latin American investment in this area is estimated to be in the $15 billion per year range over the next ten years.

Market Assessment

CG/LA provides information, advice and problem-solving to firms working in Latin markets. This work is proprietary, and ranges from channel identification, through to full-scale business plan development and execution management. CG/LA's Market Assessment work is divided into four areas:

1) **Market Analysis:** This product provides basic market and channel information for U.S. firms seeking to export to Latin American countries. CG/LA performs this work in all sales areas, from major project censuses to infrastructure components and consumer products. We have recently carried out assignments in wastewater equipment, industrial filters, specialty papers, digital entertainment products, and many other areas.

2) **Strategic Trade Consulting:** This product assures that not only market information is made available to management decision-makers — but that all necessary information is made available to get products to Latin markets as quickly and efficiently as possible.

> *"I want to express my appreciation for the excellent work your group performed for our Mexican Market Study. The results were very complete and accurate...." Edward P. Foote, Jr., President and CEO, Coastal Paper Company, May 28, 1996.*

3) **Latin American Start-Up:** This product provides a more in-depth look at what a firm must do as it enters a South American market; CG/LA provides all the information necessary for business establishment and initial operation. Recently we have undertaken assignments in: industrial site selection (auto parts), in Central America; subsidiary establishment (industrial filters), in Brazil; and business planning (energy O&M), in Brazil.

4. **Business Trouble-Shooting:** This product provides solution to urgent and 'unique' problems faced by businesses dealing in Latin American business and cultural environments. Examples include: embargoed funds; local prohibitions against doing business; and imported materiel blocked at customs.

Washington Services

This is a new product for CG/LA Infrastructure — at least as stand-alone service. The focus is on assisting both U.S. and Latin American businesses in best utilizing Washington resources for the creation of privately financed infrastructure projects. Washington's role in this area has increased and changed for two reasons. First, the infrastructure revolution in Latin America means that private resources need to be organized to build financeable projects. Second, many of these resources are available, in whole or in part, from the multilateral and guarantee agency decision-makers.

CG/LA Washington Services provides three types of services: CG/LA focuses on specific issues for clients, like the early identification of feasible projects within the multilateral bank system, and/or funding for specific projects sponsored by Latin American countries, firms or individuals. It also provides basic information on "how Washington works," and organizes and solves specific financing "problems" for firms in the U.S. and Latin America.

LAIC Internet Services

The LAIC (http://www.laic.com) is the first Internet site dedicated exclusively to Latin American infrastructure. It is accessible to companies in the U.S. and around the globe via the World Wide Web, an increasingly important medium of communication for identifying current business opportunities. The LAIC focuses on three areas of Latin America: Brazil, Mercosul, and Mexico. These contain a variety of information:

- Project Summaries & Assessment: New Project Opportunities and Case Studies
- Infrastructure Personality Profiles: People Who Move Infrastructure Forward
- The Marketplace: International Import and Export
- Latin America Infrastructure News: Information that Impacts Business
- Updated Statistics/Graphs: Daily Exchange Rates and Latin Stock Market Indices
- Hot Contacts: Links to Other Major Internet Sites

CG/LA is a pioneer in the use of the internet for advertising the capabilities and needs of Latin American firms to U.S. investors and equipment manufacturers. The Latin American Infrastructure Center (LAIC) was launched in June 1996. The site contains the following types of information: major projects, special projects (advertisers can post one per month), equipment sales opportunities, and "hot links" to other infrastructure sites. This is a traditional product in a new medium. We hope that you will join us at the Latin America Infrastructure Center, and let us know what this product can do for you.

CG/LA is currently working with the Multilateral Investment Guarantee Agency (MIGA) and the International Finance Corporation (both members of the World Bank Group) to create the first on-line data base of infrastructure projects worldwide. Features include investment opportunity searches, equipment sales opportunities, and other pieces of information useful to high level infrastructure decision-makers.

Institute of International Education

The Institute of International Education (IIE), founded in 1919, is a not-for-profit educational exchange organization dedicated to fostering international cooperation and economic development through professional and academic exchanges, conferences, training, publications, and other services. IIE administers 285 programs in which more than 10,000 men and women from 170 nations participate. These programs include the Fulbright student exchange programs, the Hubert Humphrey Fellowship program and the International Visitor Program all sponsored by USIA.

IIE employs a staff of 340 in the United States and 40 abroad. IIE's world headquarters are located in New York City, with other U.S. offices in Chicago, Denver, Houston, San Francisco, and Washington, D.C. Offices overseas are in Mexico City, Bangkok, Budapest, and Hong Kong. IIE project management offices are located in Manila, Moscow, and Sri Lanka.

Professional Exchange Programs (PEP) is IIE's rapid response team. The staff design one to five week travel programs tailored to the professional goals of individuals or groups, the development needs of countries, and U.S. trade promotion objectives. When an opportunity must be seized quickly, PEP staff can design a program in two to five days and implement it in a matter of weeks. PEP develops programs for a variety of public and private sponsors, including the U.S. Information Agency (USIA), the U.S. Trade and Development Agency (TDA), the German Marshall Fund, and individual corporations, such as Amoco and General Electric. A project example is:

- A three week study tour focused on Inter-American Trade, Investment, and Business Development. It brought together government officials, economists, academics, journalists, and trade association representatives from 19 Western Hemisphere countries as well as Ghana, India, Spain, Uganda, and the United Kingdom. Through a series of site visits and meetings, the group explored the economic potential of NAFTA, the world's largest market with 300 million people producing nearly $8 trillion in goods and services.

IIE has held an Indefinite Quantity Contract with the U.S. Trade and Development Agency for the development of Orientation Visits and Conferences since June 1994. Both activities are designed to acquaint foreign project sponsors with the quality of U.S. technology and services and U.S. companies with the extent of opportunities for U.S. firms in middle income and developing countries. Under this contract, IIE's PEP staff have conducted ten orientation visits for such diverse groups as:

- Mexico City Subway officials on U.S. technologies for their subway expansion, fare collection, and car purchase/rehabilitation projects.

- Thai education officials on U.S. equipment and models for modernizing their university science and engineering laboratories and developing an "information superhighway" to link government, educational institutions, and the private sector domestically and internationally.
- Indonesian environmental officials and mill managers concerned with increasing the use of clean technologies for their wood and paper industries.

IIE/PEP has implemented TDA-sponsored conferences to acquaint U.S. businesses with opportunities in the African power sector, the Southeast Asian power sector, and the power and surface transportation sectors in Central and Eastern Europe and the New Independent States.

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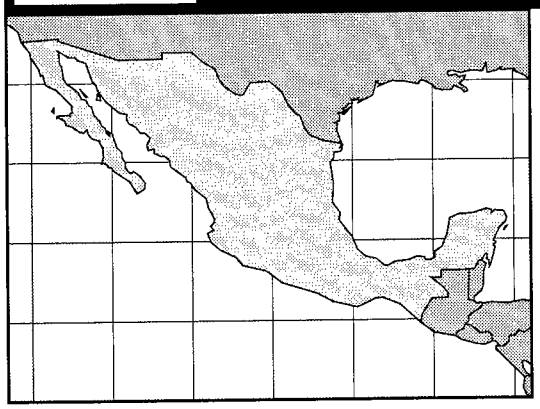

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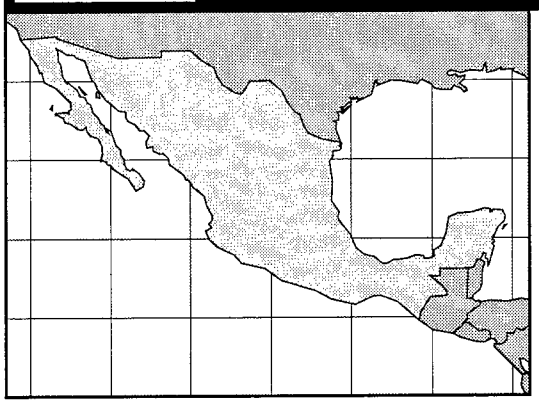

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