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Mexico

Infrastructure Public Expenditure Review (IPER)

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Colombia Mexico Country Management Unit
Finance, Private Sector and Infrastructure Unit
Latin America and the Caribbean

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AFORES	Mexican private pension funds
ANEAS	National Association of Water and Sanitation Companies, (<i>Asociación Nacional de Empresas de Agua y Saneamiento</i>)
APAZU	Water Supply, Sewerage, and Sanitation Program in Urban Areas, (<i>Programa de Agua Potable, Alcantarillado y Saneamiento en Zonas Urbanas</i>)
APIs	Port Authorities Administration, (<i>Administraciones Portuarias Integrales</i>)
BANOBRAS	National Development Bank for Public Works and Services, (<i>Banco Nacional de Obras y Servicios Públicos</i>)
BLT	Build–lease–transfer
BOT	Build–operate–transfer
CAMMESA	Electric Wholesale Market Company of Argentina, (<i>Compañía Administradora del Mercado Mayorista Eléctrico, S.A. de Argentina</i>)
CAPUFE	Federal road and bridges, (<i>Caminos y Puentes Federales</i>)
CAS	Subordinated Contribution Agreement, (<i>Compromiso de aportación subordinada</i>)
CCA	Water Advisory Council, (<i>Consejo Consultivo de Agua</i>)
CCP	Puebla Public toll roads, (<i>Carreteras de Cuotas Puebla</i>)
CEA	State Water Commission, (<i>Comisión Estatal de Agua</i>)
CEMCAS	Training Mexican Center of Water and Sanitation, (<i>Centro Mexicano de Capacitación de Agua y Saneamiento</i>)
CENACE	National Energy Institute, (<i>Centro Nacional de Control de Energía</i>)
CEPAL	Latin American National Economic Commission, (<i>Comisión Económica para América Latina</i>)
CFE	National Electric Commission, (<i>Comisión Federal de Electricidad</i>)
CNA	National Water Commission, (<i>Comisión Nacional del Agua</i>)
CNBV	National Banking and Securities Commission (<i>Comisión Nacional Bancaria y de Valores</i>)
CNSF	National Bonds and Insurance Commission, (<i>Comisión Nacional de Seguros y Fianzas</i>)
COFEPRIS	Federal Commission for the Protection of Sanitary Risks (<i>Comisión Federal para la Protección contra Riesgos Sanitarios</i>)
CONAE	National Commission on Energy Conservation, (<i>Comisión Nacional Ahorro de Energía</i>)
CONSAR	National Commission on the Retirement Savings System (<i>Comisión Nacional del Sistema de Ahorro para el Retiro</i>)
COPLADEs	State planning committees, (<i>El Comité de Planeación para el Desarrollo del Estado</i>)
CPS	Country Partnership Strategy
CRE	Energy Regulatory Commission, (<i>Comisión Reguladora de Energía</i>)
DGCC	General Directorate of Road Maintenance
Egresos	Subsecretariat of Spending
EPA	Environmental Protection Agency

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FAIS	Fund to support social infrastructure (<i>Ramo 33</i>)
FARAC	Trust Funds to Recover Roads Concessions, (<i>Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas</i>)
FINFRA	Infrastructure Investment Fund, (<i>Fondo de Inversión en Infraestructura</i>)
FISM	Municipal Social Infrastructure Fund, (<i>Fondo de Infraestructura Social Municipal</i>)
FSA	Financial Security Assurance
GDP	Gross domestic product
HDM	Highway Design and Maintenance Standards Model
ICT	Information and communication technology
IDB	Inter-American Development Bank
IEM	Internal energy market
IIE	Electricity Research Institute, (<i>Instituto de Investigaciones Electricas</i>)
IMCO	Mexican Competitiveness Institute, (<i>Instituto Mexicano de la Competitividad</i>)
IMD	International Institution for Management Development
IMF	International Monetary Fund
IMP	Mexican Petroleum Institute, (<i>Instituto Mexicano del Petróleo</i>)
IMTA	Mexican Center for Water and Sanitation Training, (<i>Instituto Mexicano de Tecnología del Agua</i>)
INDEVAL	Securities Institute, (<i>Instituto para el Depósito de Valores</i>)
INEGI	National Institute of Statistics, Geography and Computer Science, (<i>Instituto Nacional de Estadística, Geografía e Informática</i>)
INTERAGUA	International Water Services
IPER	Infrastructure Public Expenditure Review
IPP	Independent power providers
IRR	Internal rate of return
LAC	Latin America and the Caribbean
LFC	Power and Electricity of the Center, (<i>Luz y Fuerza del Centro</i>)
MDGs	Millennium Development Goals
MIGA	Multilateral Insurance Guarantee Agency
MW	Megawatt
NAFIN	National Financing, (<i>Nacional Financiera</i>)
NAFTA	North American Free Trade Agreement
NPV	Net Present Value
NRW	Non-revenue water
NSC	New Concession Scheme
NSIP	Public Investment New System, (<i>Nuevo Sistema de Inversión Pública</i>)
O&M	Operation and maintenance
OCALFA	Alfa Highway Operator, S.A., (<i>Operadora de Carreteras Alfa, S.A. de C.V.</i>)
OECD	Organization for Economic Co-operation and Development
OOs	Water Utilities, (<i>Organismos operadores</i>)
OPF	Financed Public Works, (<i>Obra Pública Financiada</i>)
PAHO	Pan-American Health Organization

PEMEX	Mexican Petroleum, (<i>Petróleos Mexicanos</i>)
PER	Public Expenditure Review
PIARC	World Road Association
PIDIREGAS	Projects with Deferred Impact in the Budgetary Registry, (<i>Proyectos de Impacto Diferido en el Registro de Gasto</i>)
PMI	International Mexican Petroleum, (<i>Petróleos Mexicanos Internacional</i>)
PND	National Development Plan, (<i>Plan Nacional de Desarrollo</i>)
PNH	National Hydraulic Plan
POAs	Annual Operative Programs
PPI	Private sector participation in infrastructure
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Public-private partnership
PPPs	Public-Private Projects, (<i>Proyectos para la Prestación de Servicios</i>)
PRODDER	Water Rights Return Program, (<i>Programa de Devolución de Derechos</i>)
PRODES	The basin restoration program
PROMAGUA	Program for the Modernization of Water Utilities, (<i>Programa para la Modernización de Organismos Operadores de Agua</i>)
PROPIMI	Pilot Program for Integral Maintenance, (<i>Programa Piloto de Mantenimiento Integral</i>)
PROSSAPYS	Program for Sustainable Drinking Water and Sanitation Services in Rural Communities, (<i>Programa para la Sostenibilidad de los Servicios de Agua Potable y de Saneamiento en Comunidades Rurales</i>)
PSBR	Public Sector Borrowing Requirements
PSP	Private sector participation
SAGARPA	Ministry of Agriculture, Rural Development, Fishing and Food, (<i>Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación</i>)
SCT	Ministry of Communications and Transport, (<i>Secretaría de Comunicaciones y Transportes</i>)
SEDESOL	Ministry of Social Development, (<i>Secretaría de Desarrollo Social</i>)
SEMARNAT	Ministry of Environment, (<i>Secretaría de Medio Ambiente y de Recursos Naturales</i>)
SENER	Ministry of Energy, (<i>Secretaría de Energía</i>)
SFA	Water Financial System, (<i>Sistema Financiero del Agua</i>)
SHCP	Ministry of Finance and Public Credit, (<i>Secretaría de Hacienda y Crédito Público</i>)
SIPPI	Investment Projects Information System, (<i>Sistema de Información de Proyectos de Inversión</i>)
SNGs	Subnational governments (states and municipalities)
SOAPAP	Water Utility Company of the State of Puebla, (<i>Sistema Operador de los Servicios de Agua Potable y Alcantarillado del Municipio de Puebla</i>)
SPP	Ministry of Budgeting, (<i>Secretaría de Programación y Presupuesto</i>)
SPV	Special purpose vehicle
SSE	Vice-Ministry of Expenditures, (<i>Subsecretaría de Egresos</i>)
SSI	Vice-Ministry of Income, (<i>Subsecretaría de Ingresos</i>)

SUIBA	Unified Basic Water System, (<i>Sistema Unificado de Información Básica del Agua</i>)
SVV	(<i>Santiago–Valparaiso–Viña</i>)
TAPSA	Water Treatment of Puebla, S.A., (<i>Tratamiento de Agua de Puebla, S.A. de C.V.</i>)
TEU	Twenty-feet equivalent unit
UDIs	Inflation-Linked Units
UNICEF	United Nations Children’s Fund
U.S.	United States
WDI	World Development Indicators
WEF	World Economic Forum
WSS	Water Supply and Sanitation
WHO	World Health Organization
WWTPs	Wastewater treatment plants

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PREFACE

Over the past five years, the World Bank has actively supported Mexico's public finance reform agenda with lending and technical assistance. The main areas of support have included tax and fiscal reform, fiscal sustainability, and fiscal management under decentralization. The Bank has also supported reforms in infrastructure through analytical work, which assessed the status and performance of key infrastructure sectors, as well as the policy, regulatory, and institutional environment for involving the private sector in those sectors. A Public Expenditure Review, which analyzes the benefit incidence across households at different income levels and the geographic distribution of federal spending in the states, was completed in 2004. This study was the initial piece of programmatic analytical work on public spending in Mexico, as set forth in the Country Partnership Strategy (CPS) and continued with the present study.

The previous studies gave some attention to public investment in infrastructure, but not in-depth analysis. Given the need to substantially improve the access to and quality of infrastructure services in a context of tight public resources, a more thorough analysis of public expenditures in infrastructure and other potential sources is warranted. Therefore, the World Bank and the Ministry of Finance and Public Credit (SHCP) agreed to prepare this Infrastructure Public Expenditure Review (IPER) and, for this purpose, a close collaboration between the Bank team and the Investment Unit of SHCP has been established.

The IPER supports three of the four pillars of the Mexico Country Assistance Strategy: Institutionality, Competitiveness, and Poverty Reduction. As part of the analytic work on public finance, it is geared at improving the understanding of critical governance and expenditure-allocation issues. Finally, given the multisectoral linkages of infrastructure with poverty reduction, competitiveness, and growth, the study is meant to help clarify the agenda for the government's strategy in all these subjects.

The main objective of the IPER is to present options for addressing infrastructure services needs in Mexico, including (a) improvements in program design and budget allocations, (b) efficiency gains in service provision, and (c) increased private sector participation and financing in a manner consistent with the government's goals for economic growth, and within its fiscal constraints.

Three infrastructure sectors—water supply and sanitation, transport, and electricity—have been selected for inclusion in this IPER for the following reasons:

- Impact on growth, trade, and competitiveness
- Social importance in terms of poverty reduction
- Importance in the Government's stated policy priorities.

The study has been structured in five interrelated chapters as follows:

Chapter 1 presents an overview of the infrastructure sectors—agencies and aggregate spending—which sets the stage for the assessment of the sectors’ performance and an in-depth analysis of budgeting processes, planning, and coordination presented in subsequent chapters.

Chapter 2 reviews the levels of spending on the selected infrastructure sectors in Mexico, and existing cost-recovery mechanisms, and the related outcomes: quality and efficiency of service, and extent of coverage being offered. To explain these outcomes, Chapter 3 analyzes the processes of planning, spending allocation, and coordination within and across subsectors. The role of local governments and the nature of incentives they face are also discussed.

Chapter 4 discusses the effectiveness of the existing programs in Mexico to encourage private participation and financing in the selected infrastructure sectors. The challenges for infrastructure development will require new and different uses of private sector financing and operations, and refined credit enhancement schemes to attract financiers, investors, and operators to Mexico’s infrastructure market, without placing unwarranted contingent liabilities on the government.

Chapter 5 presents a series of conclusions and recommendations to improve the efficacy of Government’s interventions in the provision and financing of infrastructure.

Finally, since the study focuses principally on issues of infrastructure spending and finance, it does not address all facets of infrastructure service delivery, nor does it provide detailed roadmaps for implementation. Rather, this study should be viewed as a point of departure for dialogue and consensus building on ways to better and more fully use current and potentially available resources in the provision of basic infrastructure services.

Mexico: Infrastructure Public Expenditure Review (IPER)

Executive Summary

1. In 2003, the Government of Mexico spent about 1.2 percent of gross domestic product (GDP) on infrastructure investment and maintenance (electricity, transport, water supply, and sanitation), and provided 0.7 percent of GDP on untargeted consumption subsidies for the electricity sector. This is a substantial amount of resources, although not high by world standards, and yet the overall impact has been mixed. Mexico has a reasonable level of coverage relative to Latin America (as it should, given that it is one of the richest countries of the region); rail and port performance are reasonable by international standards, and some water utilities are well run. The quality and reliability of infrastructure services, however, are generally below what could be expected of an upper-middle-income country, and many poor Mexicans still lack access to basic services. In addition to hurting the standard of living of Mexican citizens, the poor quality of infrastructure impedes competitiveness.

2. Looking forward, present spending levels may be sufficient for Mexico to achieve universal coverage in water and sanitation and electricity, to modernize and complete its major transport corridors, and to improve the overall quality and reliability of service. But this will require substantially improved expenditure efficiency, a much more strategic use of the private sector, and better targeting of subsidies. Maintaining current government spending levels between 1 percent and 1.25 percent of GDP, Mexico would remain around the Latin America average in both infrastructure coverage and expenditures, but it would not reach the level of infrastructure per capita of the other OECD countries or faster-growing East Asian countries (such as Korea, which just a few decades ago trailed far behind Mexico in terms of infrastructure endowments).¹

3. A central message of this report is that the resources Mexico spends on infrastructure could and should be better used. How the government uses its own resources is one area for potential improvement: Public investment could be better focused on areas where private participation is not likely to be forthcoming. Also, the public investment would generate higher social and economic returns if the process of selecting and designing were improved. This would include focusing on relieving bottlenecks in the existing infrastructure networks and on creating new linkages. Greater expenditure efficiency could be achieved through improved coordination across agencies and levels of government, the introduction of multiyear planning and budgeting, and greater emphasis on regular maintenance (as opposed to costly rehabilitation required because of foregone maintenance). Better-targeted subsidies to help the poor would not only reduce the overall fiscal burden, but also avoid inflating demand (which in turn raises the need for further investments). A second area for potential improvement is private sector participation in service delivery—increasing its volume, expanding its scope to include core utility services beyond the current confines of greenfield up-stream production, and reducing its cost to Mexican tax payers by limiting the government

¹ In 1960 Korea had less than half Mexico's paved road density; today it has 11 times more. In 1969, Korea had one-third the power infrastructure per capita of Mexico; today it has about three times as much.

guarantees to risks that private investors cannot control or predict (such as political intervention in the tariff-setting process). Finally, the resources of both the public and private sector would have greater impact with the deployment of mechanisms to foster greater transparency and accountability, including increased reliance on arms length regulation of monopoly service providers.

Coverage, Quality, and Efficiency: The Current Status of Infrastructure Services

4. Mexico has made steady progress in increasing the coverage of roads, electricity, and water and sanitation over recent decades, reaching levels among the highest in Latin America. While there are still some gaps in access, notably in poor, rural, and indigenous communities, the main infrastructure challenges are in improving service quality and operating efficiency. Large industrial users ranked the average quality of Mexico's infrastructure somewhat below that of most major Latin American and East Asian economies in a World Economic Forum survey (2004). The gap was widest for the quality of electricity supply, and narrowest for ports and railroads (Table 1).

Table 1: Comparative Survey on the Quality of Infrastructure, 2003, Selected Countries

Country	Overall Infrastructure Quality*	Port Infrastructure Quality	Railroad Infrastructure Quality	Electricity Supply Quality
Argentina	3.6	3.6	2.7	4.2
Brazil	3.5	3.1	2.1	4.9
Chile	4.9	4.8	2.7	5.7
Colombia	2.9	3.0	1.4	4.7
Mexico	3.4	3.3	2.5	3.9
China	3.4	3.6	3.9	4.2
Thailand	4.6	4.2	3.4	5.5
Malaysia	5.7	5.6	5.0	5.7
Philippines	2.5	2.6	1.4	3.5
Indonesia	4.2	4.4	4.1	4.1
Sample average	3.9	3.8	2.9	4.6
U.S.A.	6.4	6.0	4.8	6.2

* "Overall Infrastructure" includes quality indicators from other sectors not shown above (that is, air transport and information and communication technologies).

Note: Survey-based subjective evaluation on a scale from 1 – "underdeveloped and inefficient" to 7 – "as developed and efficient as the world's best." The higher the score, the better the quality.

Source: WEF (2004).

Electricity

5. The service quality of Mexico's main electricity provider, the *Comisión Federal de Electricidad* (National Electric Company, CFE), has improved but still lags behind international standards and client expectations.² For example, when annual interruptions and distribution losses are compared to Latin American private distribution companies,

² As measured by service interruptions and the number of customer complaints.

the CFE's performance is poor³ (Table 2 and Figures 1 and 2), and the service quality and operating efficiency of the other electricity provider, *Luz y Fuerza del Centro* (LFC), are even worse.

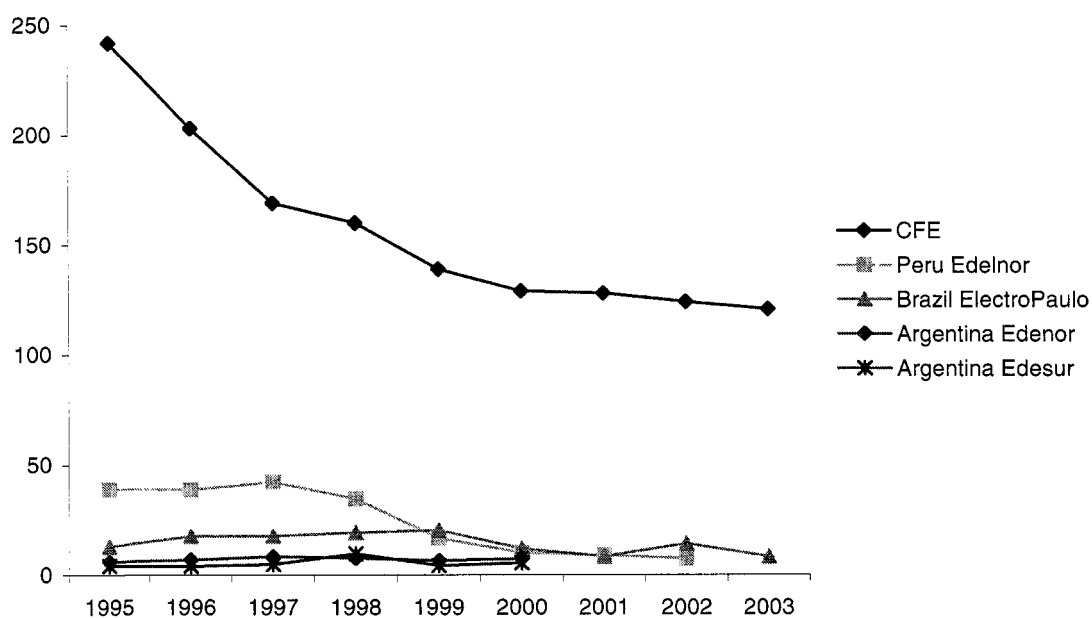
Table 2: Quality of Electrical Service, 1995-2003

		1995	1998	2002	2003
Interruption of Service (min/customer)	CFE	242	225	124	121
	LFC	—	374	144	135
Complaints (no./1,000 customers month)	CFE	14	10.7	4.2	4.1
	LFC	—	6.7	4.4	4.3
Connection time, new customers (days)	CFE	2.3	1.4	1.2	1.1
	LFC	—	10	5.5	6

— Not available.

Sources: Data provided by CFE's Subdirección de Control Financiero, and LFC's Subdirección de Finanzas.

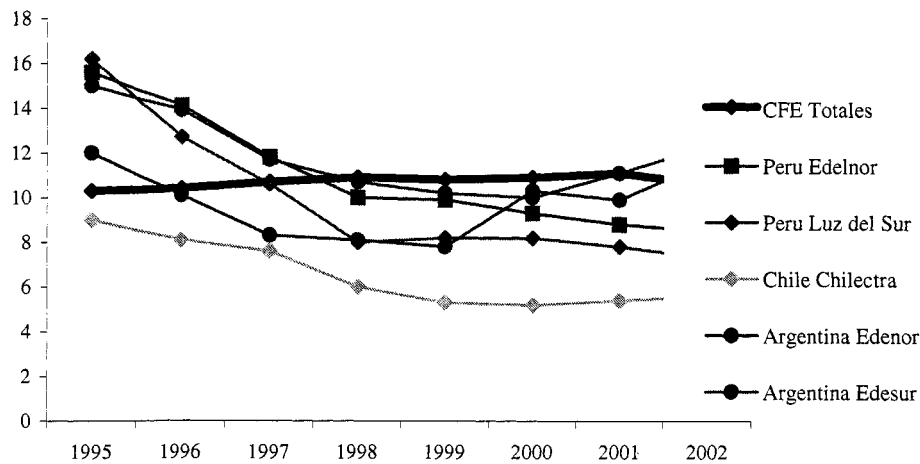
Figure 1: Annual Interruptions (minutes) per Electricity Connection



Sources: CFE financial data; and Andres, Foster, and Guasch (2005).

³ No data on annual interruptions have been reported for public utilities or public distribution companies.

Figure 2: Electricity Distribution Losses (%)

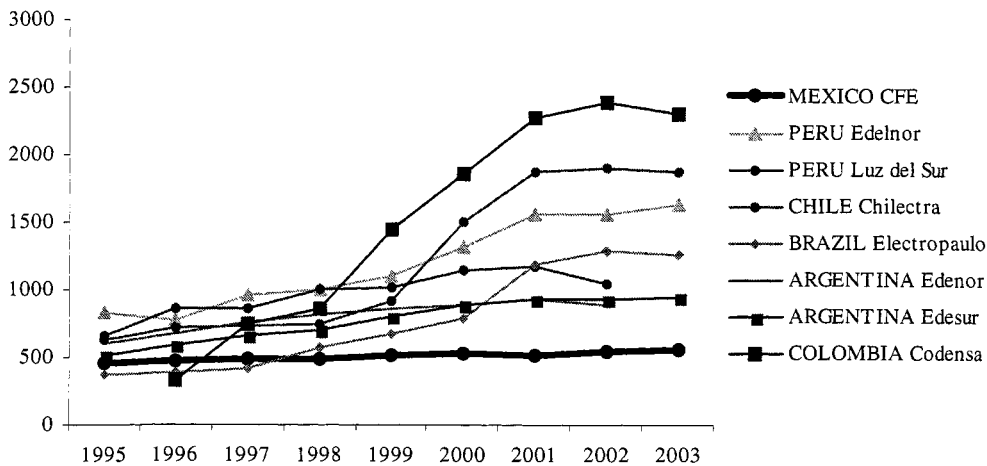


Note: CFE's data do not include natural phenomena, in which case values would be higher. Reliable comparative data for public utilities in other developing countries were not available.

Sources: CFE financial data; and Andres, Foster, and Guasch (2005).

6. Labor efficiency indicators for electricity in Mexico have also slightly improved, but remain below international benchmarks. The total number of permanent employees (including *de confianza* [managerial and thus nonunionized] and *sindicalizados* [unionized]) has remained almost constant, while electricity demand and production have grown. When compared to selected Latin American privatized distribution companies, however, CFE has still performed poorly (Figure 3).

Figure 3: Number of Electricity Connections per Worker in Distribution Segment



Sources: CFE financial data; and Andres, Foster, and Guasch (2005).

Water Supply and Sanitation

7. Access to water and sanitation in Mexico has steadily increased over recent decades, reaching levels significantly beyond the average of the region and of other developing countries (Table 3). Approximately 90 percent of the population now has a water connection either in the house or nearby.⁴ Ninety percent had access to sanitation, including 63 percent that were connected to a sewer, 12 percent that had a septic tank, and another 15 percent that used sanitary latrines or evacuated their sewage through sewers discharging into the nearby environment. The poor and the extreme poor also benefited from the increase in coverage: 58 percent of the extreme poor had access to a safe water supply in 2002, up from 38 percent in 1992.⁵ However, the coverage level drops sharply from more developed urban areas through the urban periphery and smaller towns to the more remote rural areas.

Table 3: Mexico's Water and Sanitation Coverage is comparatively High

National Coverage (%)	Mexico	Argentina	Braz	Chile	Colombia	LAC Avg.	Philippines	Thailand	Indonesia
Water Supply*	90	94	87	93	91	86	86	84	78
Sanitation*	90	82	76	96	86	77	83	96	55

Sources: Data from WDI (2003a) and CNA Water Statistics in Mexico (2004b). Sanitation data for Mexico are from the 2000 census. East Asia data are from World Bank (2004).

8. Service quality and operating efficiency clearly fall short of the levels achieved in other OECD countries and upper-middle-income countries. The share of municipal wastewater that receives some degree of treatment is more than twice as high as the Latin American average (30 percent compared to 14 percent),⁶ but it remains far below levels in OECD countries, and an unknown share of treatment plants do not comply with norms for effluent discharge. According to the 2000 census, only 45 percent of households connected to the water distribution network received a continuous supply; the remaining 55 percent experienced various degrees of interruption to supply.⁷ The incidence of intermittent supply is higher in smaller municipalities and for the poor⁸ (Figure 4). This phenomenon puts Mexico clearly behind other OECD countries, where continuous water supply is the norm.

⁴ Improved water supply includes four categories: households with a piped supply in the house; households with a piped supply on the plot, but outside the house; public standpipes; and households that bring water from another house with a piped supply.

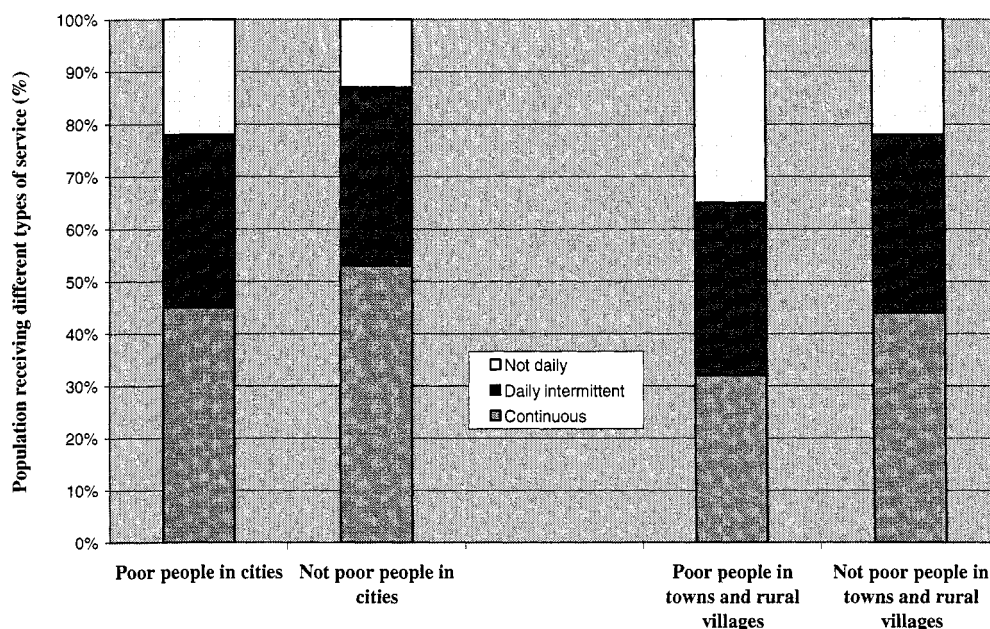
⁵ World Bank (2004a), Poverty Assessment.

⁶ CNA (2004a), "Situación del Sub-Sector," p. A-76 for Mexico. For Latin America average, see PAHO/WHO (2001:24, 81).

⁷ Own calculation, based on census data quoted in Avila (2004), spreadsheet named Anexo I.CC_Agua.

⁸ Avila (2004) based on census data

Figure 4: Quality of Water Service in Mexico



9. Using non-revenue water⁹ as an indicator, operating efficiency levels in Mexico are far below the average level attained in developed countries, and below the level attained in the best-performing quartile of utilities in developing countries, and even the levels of the best performers in Mexico (such as Monterrey, Tijuana, Leon, and Mexicali, among others). For example, while non-revenue water averaged between 20 and 30 percent in these better utilities, the average is about 44 percent non-revenue water for all Mexico,¹⁰ (Table 4). Water staffing levels vary broadly in Mexico. The average staff per 1,000 connections among a sample of 35 large Mexican utilities was 4.5 in 2000, ranging between 2.8 and 19.6.¹¹ These data imply ample scope for reducing excess staff at many water utilities.

⁹ Non-revenue water is the difference between water supplied and water sold as a percentage of water supplied.

¹⁰ CNA (2004a), "Situación del Sub-sector," p. 42. Calculated based on a sample of 157 service providers with reliable data.

¹¹ The average for 38 utilities in the State of Guanajuato was 4.4 in 2002. The average for a larger sample of utilities at the national level may be higher, since smaller service providers tend to have a higher staff ratio.

Table 4: Non-Revenue Water in Mexico compared to other countries

Country (city)	Year	Non-revenue Water (%)
United Kingdom (average)	2000	14
United States	1996	16
Tunis (Tunisia)	2002	20
Mexico (Mexicali)	2000	22
Best-performing quartile of 246 developing country utilities		<23
Asian cities (average of 18)	2001	34
Brazil (Sabesp: Sao Paolo)	2000	38
Latin America (average)	1998	42
Mexico (average)	2002	44
Mexico (Acapulco)	2001	69
Mexico (Oaxaca)	2001	80

Sources: CNA (2004b:42) for Mexican average; data on Mexican cities are from CNA: Ciudades Estratégicas (2000) and Barocio (2004); for the Brazilian National Water Information System Diagnóstico 2000; Malaysia and Asian cities from ADB Water in Asian Cities (2004); U.K. and U.S. from IB-Net (International Benchmarking Network); Latin American average from WHO/UNICEF (2000:25). Developing country sample average is from Tynan and Kingdom (2002).

Transport

10. In the transport sector, the need to improve quality is most evident for roads. Under pressure from growing traffic volumes, Mexico's aging road network, particularly where run by states and municipalities, is in poor condition and badly in need of repair. Expenditure on maintenance is far lower than necessary, often resulting in the need for costly rehabilitation works. In contrast, structural reforms in Mexico's railways and ports have permitted increased investments and improvements in the quality of service.

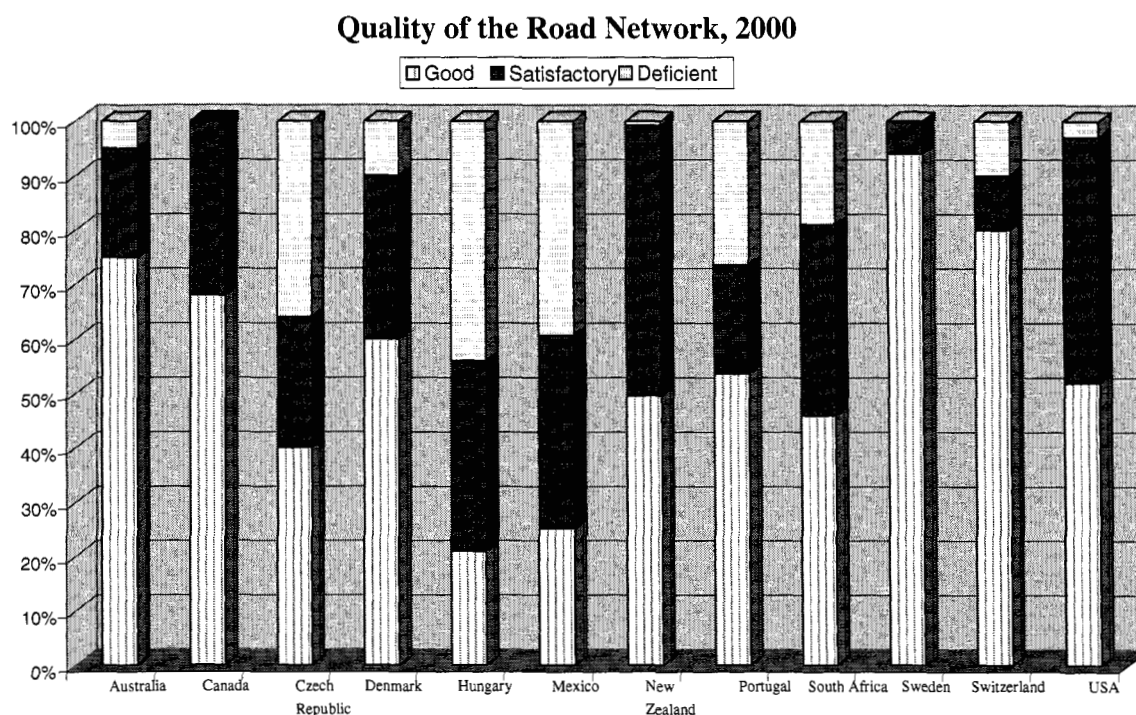
11. As a result of insufficient investment in maintenance and modernization, the condition of many assets is not satisfactory. Many federal, state, and local roads are old and require either renovation or replacement, particularly with steadily increasing traffic. Road use has risen significantly over the last decade, with road transport by bus and truck currently accounting for 99 percent of domestic commercial passenger traffic and more than 78 percent of surface freight cargo. Following trucking deregulation in 1989, and the advent of the North American Free Trade Agreement (NAFTA), trucking activity has grown by 32.5 percent, and the authorized weight of vehicles was raised from 34 tons in 1960 to 66.5 tons in 1997.¹² The number of personal vehicles (mostly cars) is growing at 7.6 percent per year, adding to the road infrastructure demand.

12. Considering 20 indicators of road quality—including operational standards, traffic, design features, security, and maintenance—only 61 percent of the highway

¹² The trucking industry has a relatively aged fleet (17.5 years on average). In addition, the large number of owner-operators leads to inefficiencies and limits economies of scale, while at the same time providing only modest service quality and efficiency.

system can be considered modern, with 39 percent requiring improvements.¹³ Only one-fourth of roads are in good condition, well below the almost 60 percent average for other OECD countries¹⁴ (Figure 5). Overall, the maintenance and improvement of main federal corridors, although showing a positive trend, still lag behind demand. State and municipally controlled roads are in particularly bad condition, especially in rural areas.¹⁵

Figure 5: Quality of the Road Network, 2000



13. Structural reforms, including privatization, have enhanced the quality and efficiency of service of Mexico's railroads and ports, although they still fall short of international best practice. The rail industry shows a diminishing a number of accidents per kilometer, better use of assets (as shown by the higher number of tons per locomotive), improved service quality (as indicated by the lower number of losses and claims), and a more efficient use of fuel (Guerrero 2004). However, efficiency still falls short of levels achieved in the United States and other OECD countries. The port industry has posted significant increases in containers per ship transferred per hour, reducing the time ships need to stay in port. One problem for ports is the delays still experienced in moving cargo from terminal to rail or truck transportation. This is due not

¹³ Communications and Transport Sector Program 2001–2006.

¹⁴ See Guerrero (2004). The source of data is the PIARC.

¹⁵ There is very little data on the quality of roads at the subnational level, which might be symptomatic of larger issues of quality in the sector at that level.

only to a shortage of physical infrastructure in port terminals, but to weak trade facilitation procedures and user/agent behavior in managing their logistics chains.¹⁶

Tariffs, Subsidies, and Cost Recovery

14. Mexico lacks a coherent national policy framework for setting—and linking—infrastructure tariffs, subsidies, and cost-recovery goals. An office in the SHCP Undersecretariat of Revenue sets the electricity tariffs and the water abstraction charges owed by the local water operators and those enterprises drawing water from the source. The office strives to follow technical considerations of each sector in setting the rates, but political factors loom large in the final determinations, and there is no multisector strategy to assure that an adequate package of safety-net programs reaches the poor and not many of the non-poor, and that the rates give appropriate incentives for conservation. Pursuit of cost-recovery tariffs, which reduces the strain on public finances and facilitates private participation, would be more feasible if subsidies and tariffs were targeted to low-income groups. Moreover, although socially directed tariffs and subsidies can contribute to poverty reduction, through expanding access to basic services and reducing charges, such subsidies are not usually the optimal way to help the poor. As more efficient antipoverty programs, such as *Oportunidades*, widen their coverage, Mexico could consider phasing out generalized utility tariff subsidies (as they already did with food subsidies) and shift to poverty targeting cash transfers.

15. The absence of overarching subsidy policies—and the multiplicity of federal, state, and municipal stakeholders involved—produces a wide variation in the degree of cost recovery and subsidies across sectors and regions. Tariffs are set well below costs for some areas and users—even those who could pay. The most common form of user subsidy in Mexico is through low tariffs for certain consumer categories in electricity, water supply, and sanitation. These are usually financed directly or indirectly from the federal budget, but some subsidies are funded by states and municipalities. One of the major subsidies—in electricity—is financed through the nonpayment of *aprovechamientos* (levies) due by CFE to the Federal Government. Subsidies through the *Fondo de Inversión en Infraestructura* (Infrastructure Investment Fund, FINFRA) are indirectly paid by the Federal Government in the form of foregone dividends for subordinated equity.

16. Subsidies for infrastructure services absorb significant public resources in Mexico and encourage inefficient resource use, but do not effectively target the poor. For example, subsidies (for operations and consumption) in the electricity sector amount to about 1.1 percent of GDP and are highly regressive. Federal programs in the water and electricity sectors disproportionately benefit richer states, municipalities, and households, for which improved cost recovery and tax revenue mobilization could easily finance part of their infrastructure.

¹⁶ For details, see *Diagnóstico General sobre la Plataforma Logística del Transporte de Carga en México*, Instituto Mexicano del Transporte, (2003, SCT).

17. The Mexican Government has incorporated a modest degree of poverty targeting in its transfers to subnational governments, mostly through a fund to support social infrastructure— FAIS (a budget category of *Ramo 33*).¹⁷ In 2002, 44 percent of the investments funded by FAIS was used in the sectors considered in this report. About half of it went to water and sewerage, with the remainder split equally between rural roads and electricity distribution to rural and marginal areas (with wide variation in the pattern across municipalities). However, the majority of federal infrastructure spending, subsidies, and transfers are not targeted for poverty reduction, and the distribution strongly favors the wealthier states and localities. Non-FAIS federal spending for water and sanitation in the wealthiest eight states in 2003 was two and a half times higher per capita than in the poorest eight states (Barocio 2005:71).

18. In the transport sector, toll-road tariffs are high by international standards, despite recent reductions on federal routes. This diverts too much traffic to free roads and contributes to growing congestion problems. Toll setting has been based mostly on financial needs, for which FARAC debt weighs heavily, rather than economic considerations which incorporate demand patterns and country competitiveness concerns; the FARAC technical committee is currently looking at an overall review of toll levels and structure.¹⁸ At major ports, which are commercial enterprises, and railways, which are largely privatized, charges cover the full costs of good-quality service, demonstrating that such models can work in Mexico.

Electricity

19. In electricity, average tariffs still fall short of covering costs, despite steady nominal increases over the past 15 years. Substantial subsidies are applied in varying proportions to different categories of users. Tariffs for commercial and industrial users are set near levels allowing full recovery of the cost of supplying these consumers. However, average residential and agricultural tariffs covered only 42 percent and 28 percent of cost, respectively, during 1997–2003. The incidence of residential subsidies stemming from current tariff structures is regressive, benefiting mainly the upper-income households and richer states.

20. Residential tariffs are well below the OECD average, while industrial tariffs are higher than the average of OECD countries and the United States. Independent sources indicate that peak industrial electricity tariffs are more than four times higher than the costs of producing electricity on-site with diesel-based thermal plants.¹⁹ High industrial tariffs have led to an increasing trend toward self-supply by industries during peak hours. Compared with the electricity tariffs in other Latin American countries, commercial tariffs are among the highest tariffs in the region, while industrial and residential tariffs are close to the regional average.

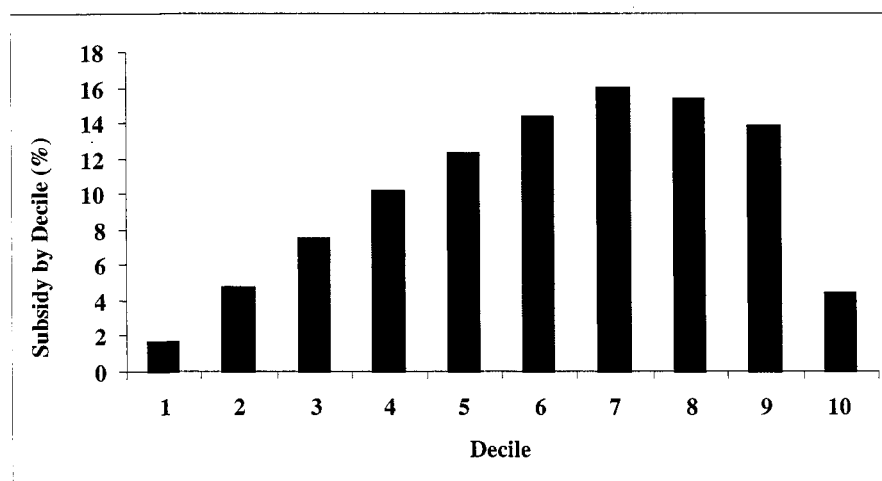
¹⁷ *Ramo 33* is a budget allocation that aggregates all the earmarked transfers to subnational governments.

¹⁸ For an analysis of road toll-setting criteria, see R. Carruthers and R. Basu, “The Theoretical and Practical Basis for Setting Road Tolls,” World Bank, Transport and Urban Development Department, 2004.

¹⁹ Instituto Tecnológico de Estudios Superiores de Monterrey (2004), quoted in Samaniego-Breach (2005:24).

21. Residential electricity subsidies are highly regressive: Upper middle income households (income deciles 6, 7, and 8), receive the majority of the consumption subsidy (Figure 6). The electricity subsidies also go mostly to the regions that are already more economically developed. The vast majority of the subsidy—over 90 percent—is not a lifeline for the poor and encourages inefficiency, especially in the hot areas in the summer, which benefit from highly subsidized rates. Poverty criteria are absent in the determination of regional electricity tariffs, unlike in water, where some municipalities set lower tariffs in poorer neighborhoods. International evidence suggests that tariffs that are geographically differentiated on the basis of even crude assessments of marginality are mildly progressive, while increasing-block tariffs,²⁰ which are common in Mexico and in many other developing countries, benefit mainly the better off because the middle blocks are also subsidized and non poor households tend to consume more than the poor.

Figure 6: Distribution of Electricity Subsidies by Household Decile



Source: World Bank (2004c,d).

Water

22. Water service providers also typically charge industrial and commercial users tariffs that are close to full cost recovery, and cross-subsidize residential users. The average tariff across users is only about half the Latin America and the Caribbean (LAC) average (US\$0.32 per cubic meter compared to US\$0.65 per cubic meter). About 69 percent of connections are metered and charged through increasing-block tariffs that charge reduced rates to low-volume users, but also large volumes of subsidized water to upper-income users.

²⁰ With an increasing-block tariff, consumers face a low volumetric per-unit price up to a specified quantity (or block), and then for any amount consumed over this quantity, they pay a higher price up to the limit of the second block, and so on.

23. There are no reliable figures on total water and sanitation revenues in Mexico. Water tariff collections have been estimated at MxP14.5 billion (US\$1.54 billion) in 2002. Billed revenues were estimated by various sources at between MxP20.2 billion (US\$2.14 billion) and MxP26.9 billion (US\$2.9 billion) in the same year.²¹ On average, it seems that the sector generates only a very modest cash surplus, which is well below the financial performance achieved by the top quartile of utilities in developing countries (Tynan and Kingdom (2002:3). Moreover, this apparent modest surplus among Mexican utilities in part reflects shortfalls in essential spending on maintenance and modernization rather than financial viability. The aggregate figures also mask substantial variations in performance among service providers that depend on municipal subsidies for recurrent costs and those that self-finance substantial investments. This suggests that some service providers in Mexico achieve or exceed international good practice.

24. The level of collection efficiency in Mexico has been estimated at 72 percent, far below the levels achieved in developed countries, and even in many developing countries (Table 5). The wide variations within Mexico again show that high levels of performance are achievable in the country. An increase in collection efficiency to 95 percent—close to the best utilities in Mexico—would mobilize more than MxP5 billion annually, without any increase in tariffs. This is more than all federal subsidies outside Ramo 33 provided to the sector in 2003.

Table 5: Water-Tariff Collection Efficiency

Country	Year	Collection / Billing (%)
Mexico (Monterrey)	2004	98
OECD average	1996	95
Asian cities (average of 18)	2001	88
Brazil (average)	2000	87
Mexico (Hermosillo)	1999	85
Mexico (average)	2002	72
Mexico (Matamoros)	1999	45
Mexico (sample of small cities)		20

Sources: CNA, *Situación del subsector agua potable, alcantarillado y saneamiento a diciembre 2001*; SMAPA (Tuxtla Gtz. O.O.) interviews (2004); Capitol Advisors Ltd. Hermosillo Case Study (1999); IDB, the Brazilian National Water Information System, and OECD, *Ciudades Estratégicas* (2000).

25. Thirty-one percent of water customers are not metered and are charged a flat rate (*cuota fija*) independent of consumption. In a few instances, flat rates are differentiated by neighborhood, and sometimes sharply so. For example, in the Federal District the flat rate in the highest cadastral category is 20 times higher than in the lowest. Since the level of water consumption does not vary that much among income groups, this type of water tariff may have a progressive incidence. Geographically differentiated tariffs that are

²¹ The lower figure is taken from CNA (2003), "Situación del Sub-sector," p. 38, and is calculated from a sample of 437 localities in all states. The higher figure is taken from Barocio (2004), based on extrapolations made from a sample of 192 localities from states for which data was deemed reliable.

even crudely based on poverty levels may reach the poor more effectively than increasing-block tariffs (Foster and Yepes 2005).

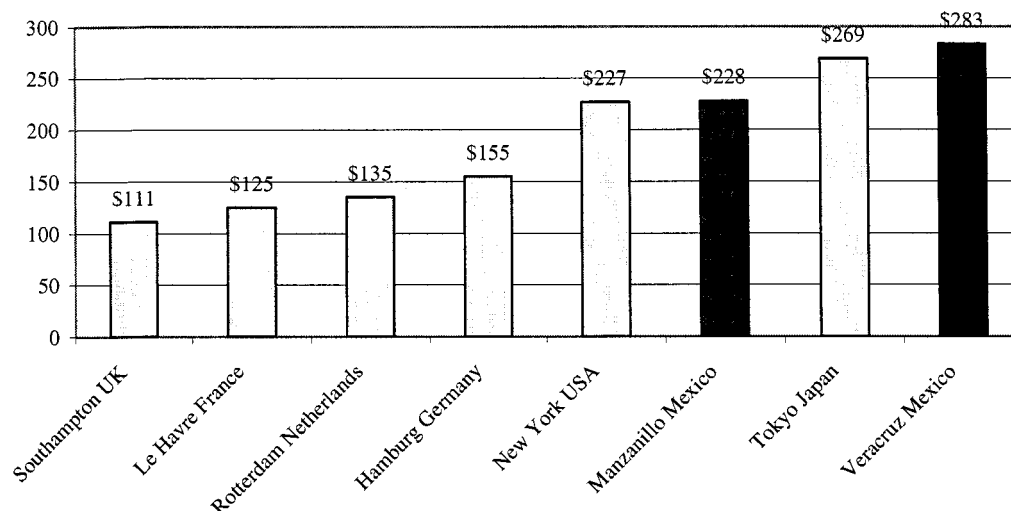
Transport

26. Despite reductions in the late 1990s, high fares have kept the use of many toll roads below capacity. Estimates suggest that toll tariffs would have to be reduced significantly to have a real impact on traffic patterns. This is largely due to many free roads that compete with toll roads for freight and passenger traffic. After the substantial reductions of the 1990s—from 12 to 2 Mexican pesos per truck and kilometer in constant prices in the case of roads owned by *Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas* (FARAC)—tariffs have been stable since 1998.

27. Costs for railway services are higher in Mexico than in Brazil or the United States, which is partly explained by cargo characteristics: in the United States and Brazil, minerals account for a majority of the cargo that can be transported at a lower unit cost. In Mexico, due to the relatively low share of cheap bulk cargo and the scattered origin and destination patterns, train operation is necessarily more costly. Nevertheless, the lack of competition among concessionaires, due to the ineffectiveness of interchange rules and insufficient intermodal competition, also contribute to high tariff levels.

28. Port tariffs are generally higher than international benchmarks when all charges are considered. Tariffs for port infrastructure use include two main categories: charges to vessels and charges to cargo. International comparisons are of limited value, since these two concepts are not homogeneous across ports. Mexico charges low tariffs per transferred ton on ports (US\$1.4 in Veracruz compared to US\$6.68 in Los Angeles). However, tariffs are much higher when all charges are considered (like shore-to-terminal cargo handling or customs agent payments), as shown in Figure 7.

Figure 7: Post Tariff for a 2,800 Twenty-foot Equivalent Unit (TEU) Ship (thousand dollars)



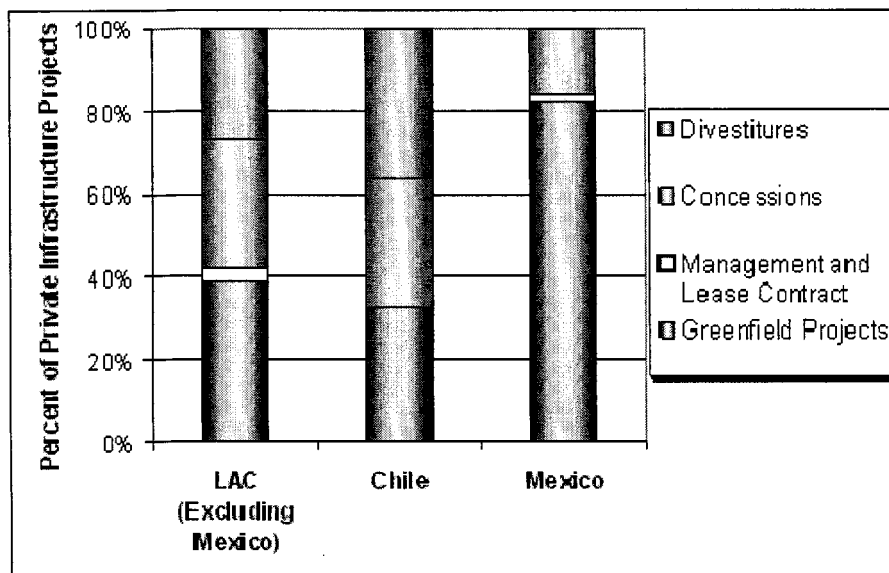
Source: Instituto Mexicano para la Competitividad (2003).

Private Sector Participation—Limited and Costly

29. Since 1994 private sector participation and financing in transport, electricity, water, and sanitation in Mexico while growing substantially over prior periods, remains lower than in its peers in Latin America (Argentina, Brazil, Chile, and Colombia). Mexico was one of the first countries in Latin America to attract significant private participation in infrastructure (PPI), but after the collapse of the road-concession program in the early 1990s, PPI decreased and has remained modest since. Compared to other relevant countries, Mexico has not had significant private investment in energy and water distribution services. The energy sector (electricity generation through the *Proyectos de Impacto Diferido en el Registro de Gasto* [Projects with Deferred Impact in the Budgetary Registry, PIDIREGAS]) has attracted the most private financing, followed by transport, especially for railroads and airports. The very modest private investments in water supply and sanitation concentrated mainly on build–operate–transfer (BOT) schemes for wastewater treatment plants.

30. In addition, the approach to PPI in Mexico—particularly for the segments that provide service directly to retail consumers—has limited the efficiency gains that normally arise from private participation. PPI in Mexico has mostly been in upstream activities such as electricity generation and water-treatment plants and highways. In contrast, in the rest of Latin America, PPI in roads, water and sanitation, and electricity has mostly taken the form of concessions or divestitures for *existing* infrastructure and expansion of networks to serve additional segments of the population (see Figure 8). Mexico’s lack of reform of existing service providers has limited the efficiency gains that usually occur from involving the private sector in the running of infrastructure services (improvements in commercial and technical efficiency). Moreover, PPI involvement has typically taken the form of “take-or-pay” agreements with substantial guarantees from the government. These implicit but costly forms of fiscal support have been necessary because private producers could not be enticed to sell their output to public utilities which were not, in and of themselves, financially viable purchasers or if creditworthy, were subject to government controls which raised risk of future payment capacity.

Figure 8: The Share of PPI Allocated to Greenfield Projects Has Been Particularly High in Mexico, 1990-2003



Note: Chilean projects traced back to 1985; water data extends through 2004.
Sources: World Bank PPI Database; Ada Karina Izaguirre, authors' calculations.

31. This is all the more surprising given Mexico's good sovereign risk and credit ratings, its macroeconomic stability and general success in attracting foreign direct investments, and the depth of local capital markets. Indeed, Mexico is probably one of the few developing economies today that could fairly easily attract substantial amounts of private capital for infrastructure.²² The new private sector participation schemes being developed and implemented provide an opportunity to increase efficiency and reduce the scope of sovereign guarantees provided by the Federal government.

Investment: How Much is Spent and Needed, for What, and Where?

Overview of Infrastructure Investments

32. Public investment in Mexico has fluctuated substantially with the federal political cycles, with peaks in years of Presidential elections (1994, 2000) and Congressional elections (1997, 2003), as shown in Table 6, although the cycle is less clear after 2001. Over and above the political cycle, public investment has increased some since the collapse after the 1994-95 crisis.

²² Private flows to infrastructure in Latin America have collapsed since the peak year of 1997, partly because of the economic crises in East Asia and Argentina, but also because much of the more attractive divestiture operations (mostly in telecommunications and power) have already taken place.

Table 6: Public Investment in Mexico, 1993-2003

	Billion 2003 Mx Pesos	% GDP	Annual Growth
1993	226.9	3.76	
1994	311.4	5.01	37.3
1995	214.0	3.75	-31.3
1996	182.4	3.00	-14.8
1997	200.8	3.10	10.1
1998	185.8	2.80	-7.5
1999	205.7	3.00	10.7
2000	257.6	3.59	25.2
2001	246.7	3.60	-4.2
2002	288.5	4.24	17
2003	313.0	4.53	8.5
2004	324.4	4.76	3.7

Note: Election years in ***bold italics***.

Source: INEGI, National Accounts.

33. It appears that infrastructure investment has not kept pace with the noted increase in overall public investment. In fact, the infrastructure share of public investment declined from about 39 percent to 28 percent (Table 7).²³ (PEMEX investments were increasing strongly.) Nevertheless, the absolute amount of resources invested in the sectors covered in this report increased from MxP64 billion (2003 pesos) in 1998 to MxP83 billion in 2003, or from 1.1 percent of GDP to 1.2 percent.

Table 7: Public Infrastructure Investment, 1998-2003

	Billion 2003 Mx Pesos	As a Share of Public Investment	As a Share of GDP
1998	64	39%	1.06%
1999	64	36%	1.02%
2000	69	31%	1.04%
2001	68	32%	1.02%
2002	84	34%	1.26%
2003	83	28%	1.23%

Source: World Bank calculations based on agency reports.

34. The modest increase in public infrastructure investment is mainly attributed to roads and water supply and sanitation. In electricity, direct public investment declined, while quasi-public investment through PIDIREGAS increased until 2002, but dropped significantly in 2003. Chapter 2 discusses investments in each sector in more detail.

²³ The report covers roads, ports, railroads, electricity, and water and sanitation. Schools, health infrastructure, urban transport, airports, irrigation, and gas are examples of sectors that are not included in this report.

Distribution of Spending

35. Across infrastructure sectors, public spending is heavily weighted toward new construction and upgrading, while regular maintenance activities are underprovided. In roads, federal maintenance expenditures have been insufficient to keep the network in good condition. In the electricity sector, the approved budgetary resources for maintenance, operation, and repair have been on average 30 percent below the amount requested by CFE. In water and sanitation, investment favors new construction, and insufficient maintenance affects the quality of service. This all points to substantial future investment requirements for rehabilitation, and highlights the need for better incentives and funding mechanisms to promote better management of existing assets.

36. The Mexican Government does not calculate total public investment in infrastructure, but estimates done for this report suggest that public spending on investment and maintenance in roads, water and sanitation, and electricity was around MxP82 billion in 2003, about 1.2 percent of GDP. This does not include the electricity subsidies, mentioned earlier, which are for consumption purposes, but it does include the quasi-public financing for the electricity sector done through the PIDIREGAS financing scheme. About half of this investment is for the electricity sector, and a quarter is for roads. The remainder is mostly for water, with a very small amount allocated to ports and rail.

Future Investment Needs

37. Making estimates of future investment needs is fraught with difficulties—it depends on sectoral goals in terms of quality and coverage, and requires assumptions about future prices and demand growth. Nevertheless, the report offers a series of estimates associated with different policy goals, building on Mexico's infrastructure agencies' estimates (see chapter 4 for details).

38. First, by modestly increasing expenditures on maintenance and investment, Mexico should be able to improve the quality of its infrastructure and achieve some key policy goals (such as universal coverage in water and sanitation and electricity, and the completion of major road transport corridors). Indeed, investment and maintenance needs estimated by Mexico's infrastructure agencies (*Secretaría de Energía* [SENER], *Comisión Federal de Electricidad* [CFE], *Secretaría de Comunicaciones y Transportes* [SCT], and *Comisión Nacional del Agua* [CNA]) for electricity, roads, water, and sanitation, respectively) are modest at around MxP83 billion for 2006–15. Adding sufficient resources to adequately maintain networks and slightly accelerate the completion of major policy goals (such as universal coverage in water and sanitation and electricity) increases this estimate somewhat to about MxP102 billion. Depending on GDP growth performance, this would represent 1 percent to 1.25 percent of GDP.

39. Such a rate of spending, however, would not allow Mexico to reach the level of infrastructure per capita of other OECD countries or faster-growing East Asian countries. Indeed, countries like the Republic of Korea, which trailed behind Mexico in terms of infrastructure coverage in the 1960s, invested over 3 percent of GDP per year on average

in infrastructure over recent decades—as have China, Indonesia, Thailand, and other competitors that are catching up rapidly with Mexico in terms of infrastructure quality and coverage. This highlights the urgency of reallocating untargeted subsidies—such as the 0.7 percent of GDP currently spent on electricity consumption subsidies—toward productive investment and maintenance, and of improving expenditure efficiency more generally.

40. Looking at individual sectors, the primary financing challenge for the road sector will be to ensure adequate funding for rehabilitation and maintenance of the existing network. While the new concession scheme and public–private participation program (known as the PPS) could hope to leverage private investment in the highway program, current annual levels of financing will have to increase by 30 to 40 percent in order to fund maintenance and rehabilitation needs and bring all roads in the primary federal and state networks to fair-to-good condition. Longer-term and performance-based rehabilitation and maintenance contracts might help achieve this goal in a cost-effective manner.

41. For electricity, the challenge is to find new financing instruments that will mobilize large amounts of money, given the shortcomings of the current PIDIREGAS scheme (which will probably decline as a source) and other structural constraints discussed below.

42. For water and sanitation, the highest priority will be to use existing funding more efficiently, by reducing unit costs and focusing more on rehabilitation and maintenance. Any new additional funds should be used to increase service coverage, especially for the poor. Given Mexico’s presently high unit costs for connecting and serving households, the level of resources and timing required to meet the social goals of universal coverage are sensitive to the prospect of improving (or not) the efficiency of the use of funds and the delivery mechanism for those resources.

43. Responding to the need for increased resources and, most important, increased efficiency in the use of these resources, will require new and different uses of private sector participation and refined credit-enhancement schemes to attract financiers, investors, and operators to Mexico’s infrastructure market in a more cost-effective manner. The principles that should be adhered to as the private sector is sought to close the gaps above are as follows:

- Government support—direct transfer of funds or guarantees—is a subsidy to providers and users of the infrastructure service from the taxpayer. If the subsidy benefits a connected consumer (through, for example, support to the construction of a water treatment plant) or a consumer with an automobile (through the building of a non-toll road), that portion of the subsidy transfer which is greater than the value of externality produced by the investment (for example, better public health, active commerce) is highly regressive. The rich use the services more and thus benefit more.
- In addition to its impact on equity, the setting of tariffs and user fees has both direct and indirect financing implications on infrastructure. Where average tariffs fail to

cover operations and maintenance—as in Mexico’s water and sanitation sectors—subsidies are required just to sustain financially unviable utilities. Also, lower charges often simulate higher demand, which entails higher investment requirements. Moreover, guarantees and off-take agreements become particularly blunt instruments for providing support in which a flat taxpayer subsidy benefits special groups of consumers.

- Efficiency gains can be realized through competitive bidding for the provision of sunk assets (such as electricity generation facilities) and for long-term arrangements for operations of commercial services. For any of these potential efficiency gains (due to lower operating costs and, possibly, capital costs), to be passed on to consumers by public or private monopolies requires proper regulation or oversight.

Institutional Challenges

44. Achieving better quality, access, and efficiency in infrastructure services will require stronger institutional arrangements, with increased coordination and planning within and across sectors, and greater accountability. The role of the Government in infrastructure planning has changed over time, shifting its focus from public investment programs to issues of strategic direction, decentralization, private sector participation, and financial support. Central coordination is essential, given the cross-cutting nature of these issues and their economic and political impacts. Disjointed decisionmaking about funding allocations has contributed to sector outcomes not linked with national development priorities. The process is least fragmented in the electricity sector, which is centrally managed. Central budget funding should be used to prioritize activities that pursue the government’s objectives of enhancing competitiveness and reducing poverty.

45. Closer coordination between the planning processes of national and state governments and the annual budget formulation process is necessary to set more realistic and attainable goals. Across all sectors and national and subnational government agencies, policy planning and coordination should be better linked, especially for water and sanitation, and for important aspects of transportation. One area to focus on is increasing incentives and assistance for subnational planning that is critical in the transport and water and sanitation sectors. There should also be better horizontal coordination among the various municipalities within metropolitan regions.

46. To strengthen planning and link it more closely to budgeting (centrally and within sectors), the government could build on what is already in the annexes of the budget that project the future year outlays for individual investment projects, particularly in electricity and transport. From this, one could project multiyear resource envelopes for programs and sectors (not just individual projects), which would include debt service and operations and maintenance.²⁴ Such envelopes would be indicative and need subsequent

²⁴ Annexes 4 and 6 of the budget give projections of investment outlays for several years of all electricity and road projects (hundreds) that are included in the budget for that year. Besides giving more detail than policymakers, Congress, or the public need to know, the annex tables do not give any indication of the expected flow of future investment totals, because most individual projects will end in the current fiscal year, so the future-year aggregates are always much less than half of the present year.

Congressional approval in each year's budget. CFE already follows this approach and the *Secretaria de Comunicaciones y Transportes* (Ministry of Communications and Transports, SCT) is moving in that direction. The use of multiyear resource envelopes also eliminates the need to divide larger projects into components that can be finished in a year or less, with the higher total costs that entails.

47. The government could also strengthen the authority of the secretariats for transport and energy to allocate indicative multiyear budget ceilings within their sectors and monitor and disclose compliance with performance targets for the key agencies that report to them, to improve coordination among national-level agencies. For the sectors that involve several levels of government, namely roads and water, experience in the United States and other federal nations in the OECD shows the value of using matching grants, with multiyear projections and dependence on meeting performance standards. The revolving funds programs for water and wastewater in U.S. states provide good examples.

48. Being accountable and meeting performance standards requires systems for the evaluation of large-scale federally funded programs, with respect to their efficacy and efficiency in achieving measurable quality and sustainability of service outcomes. An ex post evaluation would provide valuable information on what strategies work and why—informing the design of future programs. Such evaluations can also help establish incentives for good performance and lead to greater transparency.

The Way Forward—A Better Use of Public and Private Resources

49. Of the seven recommendations of this report, three apply to public sector funding, two to private financing, and two to the overall institutional environment. **First, public investment needs to make more effective use of taxpayer resources and to refocus on areas that the private sector cannot finance.** This means reducing the role of the government in financing the electricity sector and toll roads, which have made substantial fiscal demands (many of them off-budget or contingent) and for which there is significant scope for increased private participation. By the same token, it implies improving the efficacy of spending in traditional areas of public finance such as water supply, sanitation, and non-toll roads.

50. Three sets of policy instruments—competition, financial markets, and regulation,—could strengthen incentives for service providers to improve efficiency. Competition is notably absent from the electricity sector due to the statutory monopolies of CFE and LFC. It is precluded from the water and sanitation sector, due to the natural monopoly characteristics of localized services. In transport, there are substantive competitive forces through intermodal choice, directly competing ports, and the presence of “free” roads in toll corridors. Private finance has been permitted in a few segments of infrastructure, but the structure and coverage of federal financial guarantees have muted the incentive impact on operators' performance, as discussed below.

51. Several interim measures could improve efficiency and strengthen accountability for performance, without major changes in industry organization. These include

programs to enhance the autonomy and service orientation of public sector operators. For example, CFE's Corporate Transformation program would set up business units and transparent transfer pricing mechanisms, following on a prior pilot exercise. Municipal and state water companies in many localities also could be fully constituted as autonomous, commercial enterprises. In transport, efficiency gains could be obtained through better contracting of highway maintenance, competitively outsourcing FARAC's toll-road maintenance, and restructuring *Caminos y Puentes Federales* (CAPUFE).

52. Second, the incremental public funding released through greater resource efficiency should focus on three areas: maintenance and rehabilitation, strategic bottleneck infrastructure segments, and extension of basic services to the poor. Additional resources need to be allocated on an ongoing basis to preventive maintenance and renovation, particularly for highways and electricity distribution, where the rate of return to such spending is much higher than to new investments. Examples of strategic segments of networks include electricity transmission, bulk-water conveyance facilities, road links in the strategic corridors, and rail/highway urban bypasses. Such investments need not be large, but have important strategic value, and in some cases could be co-financed with the private sector.

53. Devoting a greater share of federal resources to infrastructure for poor households does not imply an absolute increase in spending. On the contrary, targeting retail subsidies in electricity and water to poor communities and poorer households in better-off urban areas would release substantial resources for other uses. Subsidies should focus in the first instance on facilitating access of the poor to the service and extending coverage in small localities. To the extent that consumption of these groups merits subsidization, it should be limited to satisfying minimum basic needs. Moreover, delivering service to the poor need not be costly, and relaxing technical norms governing choice of technology and billing methods have proven their worth in other countries. Examples include condominial systems for water and sanitation, and off-grid energy solutions for electricity. Finally, relaxing statutory monopoly rights of the large public sector operators to permit small-scale providers to serve isolated communities in partnership with the network utility (or the municipality), offers substantial benefits to both the utility and to households with little or no service at present.

54. Third, better design of investment programs and selection of projects would improve outcomes. To improve the cost-effectiveness of federally funded programs and thus reduce the magnitude of subsidies from budget, closer coordination is required along several dimensions: between sectoral agencies and the Ministry of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP) to keep long-term sector development plans in line with budgetary and broader fiscal realities; between the SHCP and sector ministries to weed out projects of questionable viability; among sectoral agencies to ensure balanced sector development (for example, gas-electricity in energy, and multimodal planning in transport); and across levels of government (for example, regional transport planning and coordinating planning, service standards, and oversight in water and sanitation). Policy coordination is crucial in water and sanitation, where local governments set most tariffs and governance conditions under which water companies

operate, while the Federal Government continues to provide the largest share of concessional resources for investment. Hence, Mexican taxpayers, largely outside the local jurisdiction, bear the cost of local pricing and investment decisions.

55. Even with limited competition, regulation, and financial market involvement, however, the government could still discipline operators' performance by making the size and type of transfer dependent on the progress in realizing genuine improvements in efficiency and service. Such performance-based allocation could be applied in sharing expected toll-road efficiency gains between the SCT and SHCP, and in setting up the *sistema financiero del agua* (water financial system), which was stipulated in the recent modifications to the national water law but is yet to be established.

56. For performance criteria to genuinely affect resource allocation decisions, future resource availability needs to be predictable, such as through multiyear resource envelopes and budget ceilings. This is already done to some degree for large individual electricity projects and to a lesser degree for transport, but should be applied to entire programs. Even in the interim, as procedures and systems are established for performance-based budgetary allocation, multiyear budgeting for infrastructure would permit more effective planning and efficient program execution.

57. **Fourth, private finance for infrastructure could be mobilized to a much greater extent to leverage public resources.** While the present outlook for rails, ports, and toll roads appears promising, this is not so for electricity and water supply and sanitation, even in segments that have historically attracted significant private finance, such as thermal power plants and wastewater treatment facilities. Concerns about operators' present and future creditworthiness, the Federal Government's future willingness to step in to cover subnational or public enterprise obligations, and the lack of arms-length regulation strongly limit investor interest. Rather than having taxpayers assume still greater risks to attract private finance (as has been the case in power generation with the substitution of Optimal Power Flow for IPP contracts), efforts should be directed at the source of the uncertainty: namely the likelihood of political interference in the capacity of the purchasing distributor to pay for the service. The new concession scheme for state highways goes some way in this direction. Similar innovation is needed in the electricity and water and sanitation sectors.

58. **Fifth, federal credit enhancements will be required to attract sizable sums of private funding from domestic and international sources, but their design and functioning need revision.** To date, projects under federal jurisdiction have generally been backed by full guarantees of cash flow (for example, PIDIREGAS for electricity and the New Concession Scheme for transport) or equity returns (FINFRA). This requires the government to take on more risks than necessary, and hence carry commensurately larger contingent liabilities. Since the Federal Government has an investment-grade rating on sovereign debt, it could offer narrower types of guarantees in the form of negative covenants, such as insurance against political and regulatory risk. For subnational projects, negative covenants may also reduce financing costs, but the enhancements will also require some kind of security based on assets or cash flow. These

could take the form of state-level revolving funds for water and sanitation, transport, and other local infrastructure services. Such risk insurance and backstopping facilities should also help shift private finance toward distribution networks that interface with consumers.

59. **Sixth, arms-length regulation of tariffs and service quality** is largely absent at present, and especially in electricity and water and sanitation it could improve the incentives for public sector providers and start creating the environment that would make good use of private investment as legal opportunities for that are opened. Improving sector performance will require greater clarity and coherency on policy goals and instruments, institutional responsibilities for establishing and regulating service providers, and pricing policies commensurate with those goals. The goals should make explicit the major policy decision, such as the desired levels of access and service quality, the required levels of investments and potential sources of financing, and how noncompliance with regulations would be sanctioned. Although municipalities have primary jurisdiction for Water Supply and Sanitation (WSS) services, they have little technical capacity for policymaking and regulation, so state agencies might need to take this role. This would offer the advantages of consistency in policy and investment planning across hydrologically and politically interdependent geographic areas, and of administrative and financial capacity and the ability to coordinate federal (and state) assistance. The *Comisiones Estatales de Agua* are well placed to carry out planning and policymaking functions, and key regulatory, monitoring, and oversight functions.

60. Other modifications of institutional arrangements should be considered. For investors and operators to take on some risks now borne by the government and Mexican taxpayers, they require greater predictability about future cash flows, which depend on how tariff and service standards are set and adjusted. For electricity, this implies empowering the Energy Regulatory Commission to function as a sector regulator, with oversight of retail tariffs, service quality, and contracts between CFE and service providers, including private generators and gas suppliers. For water and sanitation, this implies building the capacity of state water commissions and municipal agencies in performance monitoring, planning, and the revision of retail tariffs. For railways, the SCT should clarify the rules for service access among carriers. For highways, the SCT should expand the current pilot program for multiyear, standards-based contracts for maintenance.

61. **Seventh, moving forward on the above recommendations will require greater accountability and better information on performance outcomes.** There is little systematic information on whether projects have had good or bad results, and such information rarely has any budgetary consequences. While sectoral agencies and subnational governments are demanding greater autonomy in investment planning, execution, and financing, effective accountability should accompany autonomy. Indeed, without reliable, verifiable information on actual performance, it is risky to respond unconditionally to demands for more autonomy. Rather, increments to autonomy should depend on improvements in accountability.

62. Better performance tracking and information disclosure will require measures like the following: regular reporting by subnational governments on the use of federal transfers, especially Ramo 33/FAIS; standardized reporting on performance of water companies through an expansion of CNA's *sistema de información nacional* (national information system); and strengthening the *Centro Nacional de Control de Energía's* (CENACE's) and CRE's capabilities for measuring and reporting on service quality in the electricity sector. Such measures do not require large sums of money, yet they do require building institutional capacities among the concerned sectoral agencies and subnational governments, and sustained political commitment to transparency.

Proposal for a Short-Term Infrastructure Agenda

63. The immediate priorities for the government would be those measures that do not require new laws or additional resources, and preferably that will use existing funds more efficiently, save money, or bring in more. Improving the selection of public sector projects, shifting spending toward maintenance, setting up agencies (or granting autonomy to existing ones) for arms-length regulation, and improving transparency could all start immediately.

64. Improving institutions for transparency and accountability could also start immediately, but will take time to bear fruit. Bringing more money in and improving targeting of consumer subsidies by raising water and electricity rates (closer to costs) on consumption by non-poor households and putting more efficient tariff structures in place should be done as soon as politically possible, which might be immediately after the July 2006 Presidential election. However, significant efforts to improve collections of existing tariffs should start immediately.

65. Doing a multiyear financing plan for infrastructure (not just particular projects) will probably have to wait for the new government in 2007, incorporating this into the next National Development Plan so that it will be a more practical guide for infrastructure budgeting. With such a plan and more resources coming in, it would then be appropriate to organize a sustainable increase in infrastructure investment.

66. An improved regulatory framework will make it possible to attract more private sector participation without the sort of exorbitant guarantees that are common now, fully covering revenue projections. The Government may replace these with partial-risk guarantee schemes to ensure, on one hand, that the private sector has an incentive to be efficient and innovative and, on the other hand, that the Government fulfills its responsibilities as a partner of the private sector.

1. AN OVERVIEW OF INFRASTRUCTURE SECTORS IN MEXICO

1.1 Mexico's infrastructure sectors are in transition. In the past they performed two competing functions: first, to provide infrastructure services, and second, to distribute rents accruing to the public sector in a way that assured political support for the governing party. Now, Mexico is recognizing the need for more efficient provision of infrastructure services in order to generate economic growth, improve international competitiveness, and reduce poverty. This will require improving the efficiency of investment allocation and generation of additional resources through more effective institutional frameworks, efficient delivery of infrastructure services, and adequate pricing policies.

1.2 Over the past decade, several policy instruments have been put in place in Mexico, improving the supply of infrastructure with increasing private sector involvement. The outcomes still fall short of what is needed, however, and the programs in place have not proved to be the most efficient. As a result, building new and maintaining existing infrastructure in an efficient and sustainable manner have surfaced as important challenges for the Mexican Government. Moreover, the Government recognizes the need to review the institutional organization of the infrastructure sectors in order to develop more efficient ways to finance infrastructure.

1.3 The institutional framework for infrastructure services provision in Mexico consists of a complex set of formal rules and informal practices among a large number of organizations. These organizations often face constraints to their autonomy, and have widely different levels of capacity, resources, and influence. Many infrastructure agencies are politicized, and the division of roles and responsibilities among the different agencies is often not clearly defined.

1.4 The structure and roles of the agencies participating in infrastructure services planning, financing, and provision varies among sectors, and entail varying degrees of complexity that depend on the specific sector and the interrelations of functions and responsibilities at the three levels of government.

1.5 This chapter provides an overview of investments in infrastructure and describes the structure of agencies and institutional arrangements in the infrastructure sectors, setting the stage for the review of the sector performance and a profound analysis of budgeting processes, planning, and coordination carried out in the following chapters.

A. OVERVIEW OF INFRASTRUCTURE INVESTMENTS

1.6 Public investment in Mexico has fluctuated substantially with the federal political cycles, with peaks in years of Presidential elections (1994, 2000) and Congressional elections (1997, 2003), as shown in Table 1.1, although the cycle is less clear after 2001. Over and above the political cycle, public investment has increased some since the collapse after the 1994–95 crisis.

Table 1.1: Public Investment in Mexico, 1993-2003

	Billion 2003 Mx Pesos	% GDP	Annual Growth
1993	226.9	3.76	
1994	311.4	5.01	37.3
1995	214.0	3.75	-31.3
1996	182.4	3.00	-14.8
1997	200.8	3.10	10.1
1998	185.8	2.80	-7.5
1999	205.7	3.00	10.7
2000	257.6	3.59	25.2
2001	246.7	3.60	-4.2
2002	288.5	4.24	7
2003	313.0	4.53	8.5
2004	324.4	4.76	3.7

Note: Election years in **bold italics**.

Source: INEGI, National Accounts.

1.7 Information on investment expenditures in infrastructure was compiled for the purpose of this report based on data provided by sector agencies and on an estimate of infrastructure expenditures under FAIS (*Ramo 33's* fund to support social infrastructure).²⁵ A similar approach of aggregating data from sector agencies has been used for subsidies.²⁶ The reliability of the data thus is equal to the reliability of the underlying sector figures.

1.8 With these caveats in mind, it appears that infrastructure investments have not kept up with the noted increase in overall public investment. In fact, the infrastructure share of public investment declined from about 39 percent to 28 percent (Table 1.2).²⁷ Nevertheless, the absolute amount of resources invested in the sectors covered in this report increased from MxP64 billion to MxP83 billion, or from 1.1 percent of GDP to 1.2 percent.

²⁵ Public transport and airports are not included in the figures, since they are not covered by this report. In electricity PIDIREGAS were included, and in ports investments by Integral Port Administrations were included, since they are considered quasi-public investments. Maintenance and rehabilitation expenditures have in most cases been included by the Mexican sector agencies (SCT, CNA, CFE, LFC) in the investment figures. The increase for water investments in 2002 is partly due to the inclusion of investments outside CNA programs that were not available for earlier years.

²⁶ For roads, public investments are equated with subsidies. For water and sanitation, subsidies are equal to federal and state funding for investments as shown by CNA. For electricity, the subsidy figures are those shown in the financial statements of CFE and LFC.

²⁷ The report covers roads, ports, railroads, electricity, and water and sanitation. Schools, health infrastructure, urban transport, airports, irrigation, and gas are examples of sectors that are not included in this report.

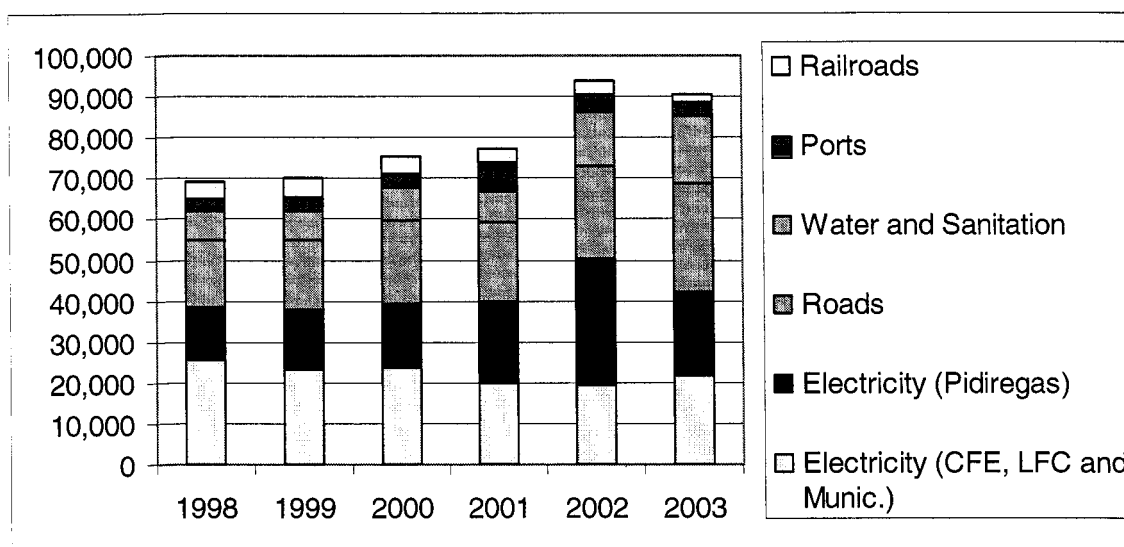
Table 1.2: Public Infrastructure Investment, 1998-2003

	Billion 2003 Mx Pesos	As a share of Public Investment (%)	As a Share of GDP (%)
1998	64	39%	1.06%
1999	64	36%	1.02%
2000	69	31%	1.04%
2001	68	32%	1.02%
2002	84	34%	1.26%
2003	83	28%	1.23%

Source: Bank staff calculations based on agency reports.

1.9 The modest increase in public infrastructure investment is mainly attributed to roads and water supply and sanitation. In electricity, direct public investment declined, while quasi-public investment through Projects with Deferred Impact in the Budgetary Registry (*Proyectos de Impacto Diferido en el Registro de Gasto*, PIDIREGAS) increased until 2002, but dropped significantly in 2003 (Figure 1.1). Chapter 2 discusses investments in each sector in more detail.

Figure 1.1: Public Infrastructure Investment, 1998-2003 in MxPm, by Sector



Source: World Bank estimate using data from Mexican sector agencies.

1.10 Subsidies for infrastructure services absorb significant public resources in Mexico and encourage inefficient resource use, but do not effectively target the poor. For example, subsidies (for operations and consumption) in the electricity sector amount to about 1.1 percent of GDP (Table 1.3) and are highly regressive (see Chapter 2, Figure 2.5). The most important source of subsidies is off-budget subsidies through CFE, financed primarily through the nonpayment of statutory dividends (*aprovechamientos*), amounting to MxP49 billion in 2003, or 0.7 percent of GDP.

Table 1.3: Estimate of Subsidies for Electricity, 2003

	Sectoral (Federal and State)	FAIS (2002 estimate)	Total	As a Share of GDP (%)
	(MxP billion)			
Consumption Subsidies financed by CFE (off- budget)	49	0	49	0.73%
Other Subsidies (LFC operation and FAIS)	21	2.9	23.9	0.35%
Total	70	2.9	72.9	1.08%

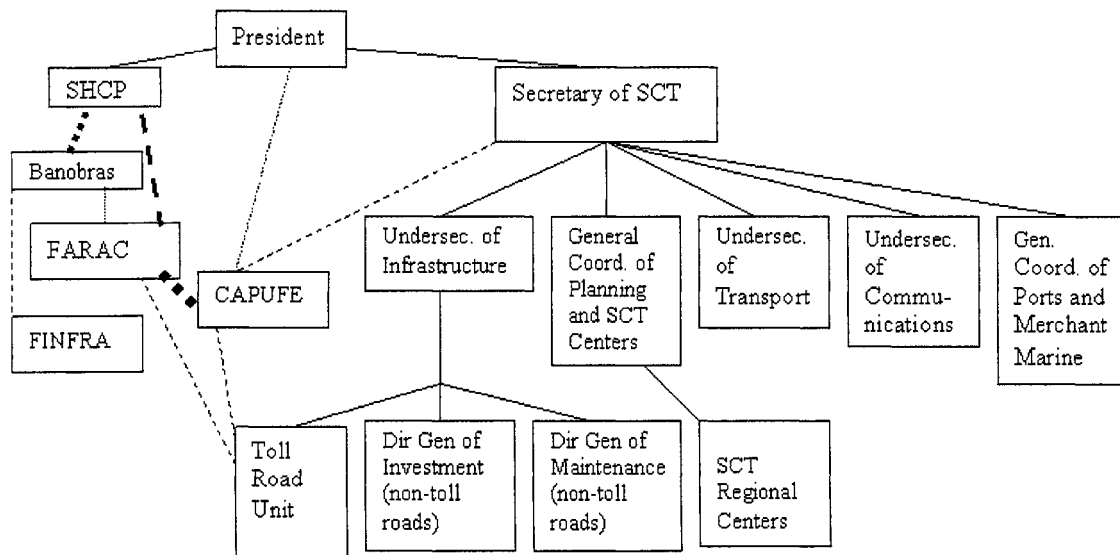
Source: Bank staff calculations from electricity sector report (Samaniego-Breach, 2005).

B. TRANSPORT

1.11 Transportation is the largest category of public investment funded from the central budget. The roads subsector is by far the largest, with almost 90 percent of the budgeted public investment at the federal level. Transport is partly decentralized, with participation from all three levels of government, but in roads the dominant actor is the Federal Government. It builds and maintains the main roads—toll and toll free—which are the skeleton and arteries of the network to which local roads connect. Many roads now classified as state and rural roads were originally constructed by the Federal Government and have been turned over to the states and municipalities in the past decade (World Bank 2003b).

1.12 The *Secretaría de Comunicaciones y Transportes* (SCT) handles the investment and maintenance of non-toll federal roads. While the toll road agencies—*Caminos y Puentes Federales* (CAPUFE) and the *Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas* (FARAC)—are nominally under Federal Government control—CAPUFE under SCT and FARAC under the Ministry of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP) via the *Banco Nacional de Obras y Servicios Públicos* (BANOBRAS)—they have considerable autonomy, and FARAC's expenditures takes place outside the budget framework of SCT, as explained below. The ports have been concessioned to Integral Port Authorities (*Administraciones Portuarias Integrales*, APIs) that raise much of their own revenue and financing, largely outside of the federal budget, and are owned by (and report to) the local and state governments and to federal representatives that comprise their boards of directors. Intercity railroads were almost all privatized in the 1990s, and SCT now acts as regulator. Public funds co-finance some urban-rail interfaces and operate a small public system (*Ferrocarril del Istmo de Tehuantepec*). New urban systems are being concessioned, and although no federal expenditure is yet linked to this initiative, it may have a future fiscal impact. Although airports and urban transportation are important parts of subnational public expenditure, they are not analyzed in the IPER.

Figure 1.2: Organization Chart of the Secretariat of Communications and Transport and other National Highway Institutions



1.13 Figure 1.2 shows the organization of SCT and other units that are relevant for the roads subsector. The *Undersecretary for Infrastructure* deals with federal highways and rural roads, including a directorate for road construction (*DG de Carreteras Federales*), another for road maintenance (*DG de Conservación*), and a special unit for toll roads (*Unidad de Autopistas de Cuota*). Three other agencies are relevant for roads²⁸: *SCT Regional Centers*, located in multistate regions across the country, implement projects (contracting and supervising works) and link SCT with the states and municipalities. These local governments also have their own agencies to deal with highways (including their own toll roads in a few cases), urban and rural roads, and passenger transportation services.

1.14 CAPUFE started in the 1960s and holds the titles to toll bridges (including international ones) and toll roads (eventually about 1,000 kilometers) that the government built up to the early 1980s, financed with a mix of oil revenue and general government borrowing. It had responsibility for maintaining and operating them (collecting tolls), and since it had no debt or capital cost, the collected tolls more than sufficed to cover expenses, and the remainder went to SHCP. This gave the agency incentives to collect money and perform good maintenance, but not to do it efficiently.

²⁸ Trucking, regulated by the Undersecretary of Transport, is an important complement to roads. Deregulation of the trucking industry at the federal level in the 1990s greatly widened the range of choices to haul cargo, and opened the way for rapid increases in the number of individual owner-operators. From 1993 (after the reform) through 2000, tons transported by the trucking industry increased by one-third. The new regulations permitted the use of bigger and heavier trucks, as well as a larger number. The Mexican Government is planning further reforms to facilitate the movement of the freight between the United States and Mexico.

1.15 In 1989, after recovering from the 1982 debt crisis, Mexico started building toll roads again (about 4,500 kilometers by 1994) under build–operate–transfer (BOT) agreements with private firms. Construction took place between 1989 and 1994, with guarantees from the Federal Government. During the crisis of 1995, they went bankrupt and the Federal Government took over the roads and the debt—worth almost US\$6,000 million. To keep the liabilities off the federal books, which were constrained by an International Monetary Fund (IMF) program at the time, a *fideicomiso* (trust) (FARAC) was created under BANOBRAS to take over the debt and title to the roads. FARAC had (and has) virtually no administrative structure or capacity, and hence it contracted CAPUFE to operate and manage its network, in return for a flat rate of 30 percent of tolls collected. Thus, as long as costs do not go above the generous slice of revenue, CAPUFE continues to lack incentives for efficiency.

1.16 With the general economic recovery since 1995, and especially the effects of NAFTA, FARAC’s network has generated more than enough revenue to service the original debt. Rather than paying down this debt ahead of schedule, however, FARAC has issued new debt to finance some new investment, and in 2002–03, to purchase the old network from CAPUFE.²⁹ With the latter transaction, FARAC acquired title to the total federal toll network, including the parts with highest traffic, and CAPUFE became specialized in operations and maintenance. The new investment by FARAC has been modest thus far—mainly doing clearly needed modernization and connections. If it gets more ambitious, however, it will face pressure to be linked with the wider technical and political process of investment allocation.

1.17 Having an autonomous agency in charge of toll roads is consistent with international best practice, as in Spain, Italy, and France, but FARAC will need more institutional capacity and appropriate institutional oversight if it is to fill this role. Also the system needs to give incentives for efficiency in operation and maintenance, including opening to competition and having a contract with better incentives for CAPUFE.

1.18 Railroads and ports are the two best-performing segments of Mexico’s transport system, in terms of quality and rate of improvement in service and in terms of service charges covering costs (see chapter 2 for more details). The restructuring of the railroad system in the late 1990s entailed regional segmentation, with three main railroads under vertically integrated concessions. The three main networks and a number of smaller lines were connected to shape the national system and rules for service exchange and rights to use different tracks established. Beginning in 1997, the government issued concession agreements that transferred responsibility for infrastructure and operation to vertically integrated companies. These private companies are in charge of the railroad’s sector investments, and must follow the commitments for investment laid out in each concession agreement. The results have been generally positive, although the lack of coordination among the companies prevents full interconnectivity among railroads. The

²⁹ The money to purchase the roads from CAPUFE went to Federal Government coffers (as capital income), essentially enabling it to borrow off budget, via FARAC, to finance spending other than toll-road investment.

United States, with a similar multiplicity of rail transport companies, has a good clearinghouse system that allows rail cars to move efficiently among networks owned by different companies.

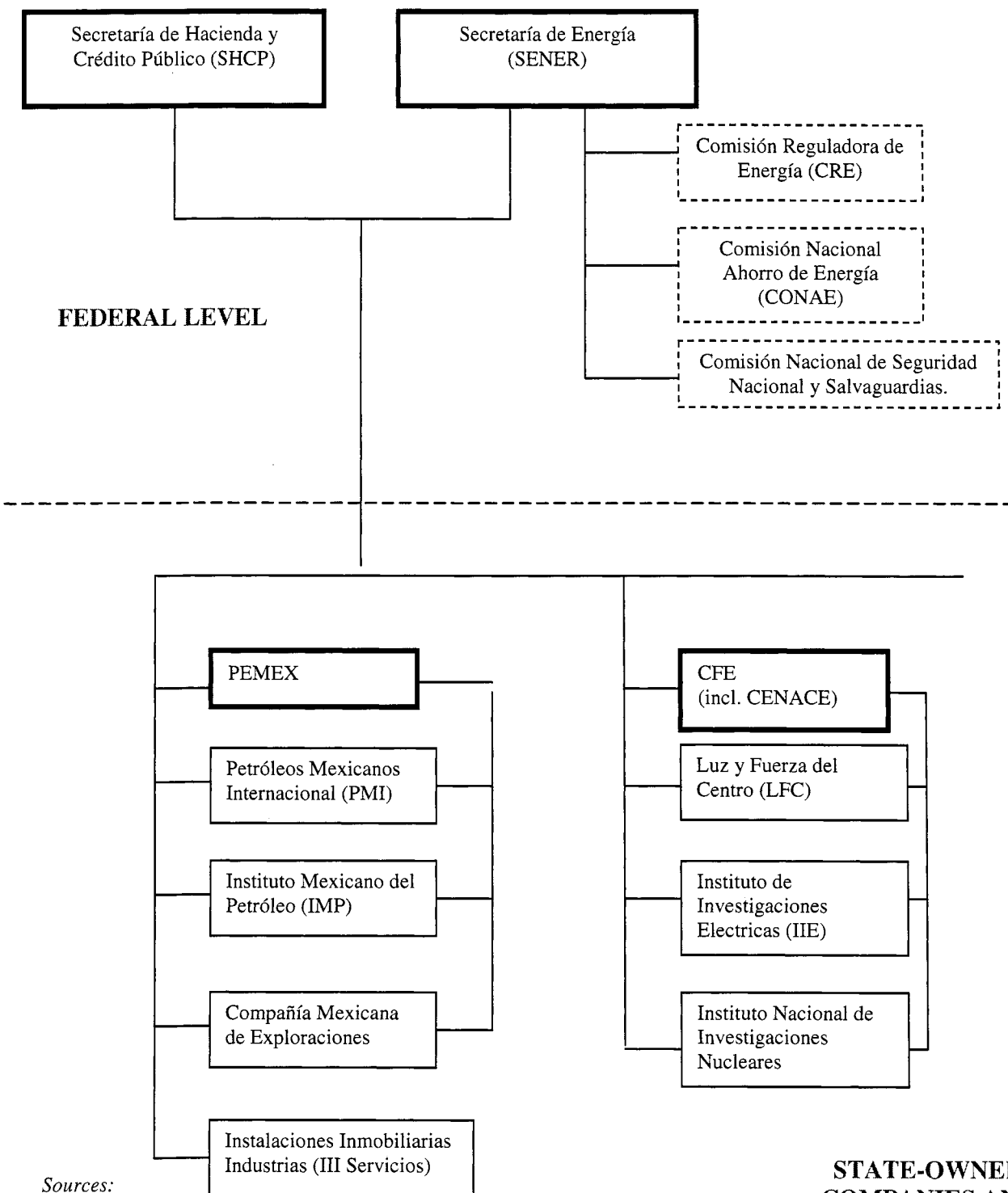
1.19 The amendment to the port law in 1993 made a profound reform in the port system following a landlord management structure by creating Integral Port Authorities (APIs), which are public entities that engage private operators within the ports. As the manager of the Veracruz port explained, “it is like a shopping mall, where the mall owner decides what range of services are needed and rents (concessions) space to the highest bidder.”³⁰ The arrangement opened the door for private investment in the construction and operation of new terminals and expanded the range of services provided. As with the railroad system, the result has been quite positive, with federal subsidies no longer required to support operation and maintenance: APIs cover their operation expenses, pay the government for the concession rights, and invest to improve and expand services.

C. ELECTRICITY

1.20 Mexico is the last major country in Latin America where one vertically integrated nationalized company, the *Comisión Federal de Electricidad* (CFE), controls essentially the entire sector. As required by the Constitution, the electricity sector is federally owned or controlled. Independent power producers and self-suppliers thus have to sell their (excess) output to CFE and cannot sell directly to users. The Metropolitan area of Mexico City is served by *Luz y Fuerza del Centro* (LFC), which accounts for 23 percent of national electricity distribution and 2 percent of generation. As shown in Figure 1.3, CFE, LFC, and *Petróleos Mexicanos* (PEMEX, the federal oil and gas company with a monopoly on that sector) report officially to the Secretary of Energy. However, their strong traditions, politically appointed heads, own revenues, and powerful unions give them significant autonomy.

³⁰ Interview 19 January 2005.

Figure 1.3: Structure of the Energy Sector



Sources:

Adapted from Manual de Organización General de la SENER, DF 19 Abril 2004, and www.sener.gob.mx.

**STATE-OWNED
COMPANIES AND
INSTITUTES**

1.21 Reforms passed between 1992 and 1995 allowed for private sector participation in electricity generation, provided that electricity is sold only to CFE. The same reforms introduced a regulatory agency, the CRE (*Comisión Reguladora de Energía*). However, CRE's main attributions are limited to specific functions related to the regulation of electricity generation and gas supply by the private sector. Unlike in many other countries, the regulator does not regulate utilities. CFE and LFC thus are outside the scope of CRE.

1.22 It is considered good practice in the electricity sector to have an independent system operator in charge of transmission and dispatching. In Mexico, however, CFE itself is in charge of the operation and administration of the National Power System through one of its departments, the *Centro Nacional de Control de Energía* (CENACE).

1.23 In 1998, the Board of CFE created the *Dirección de Modernización y Cambio Estructural* (the Modernization and Structural Change Unit) to undertake a Program of Corporate Transformation, which included the simulation of the functional separation of CFE's operating divisions—generation, distribution, and transmission—to create conditions of competition and to evaluate the economic and operational results of the main cost centers. After those units were defined, CENACE began to operate a virtual (simulated) internal energy market (IEM), which takes into account external variables (like the prices of fuels) and internal factors (like the thermal efficiency of plants). Statistics of the IEM have been constructed since 2000 and helped in evaluating the effect of potential bilateral contracts between divisions and CENACE on the stability of electricity prices. To give this analysis an operational effect, the idea was to reward administrators in proportion to their success in reducing losses, improving generation efficiency, and improving maintenance, relative to the alternative modeled. However, after seven years of operation, the Modernization and Structural Change Unit has not evolved as expected and today it is only a small unit without a clear role. Moreover, its work is hardly reviewed and taken into account by internal CFE units or government entities such as CRE. Indeed, since CENACE is not an independent entity, its capacity to provide with transparent reliable information is not clear under the current institutional arrangement. Likewise, the confluence of restrictive administrative norms and union resistance to rescaling of compensations based on unit's performance, have further prevented the implementation of the Program of Corporate Transformation.

1.24 An important arrangement in the energy sector is the PIDIREGAS scheme. This was created in 1997 as a way to increase economically necessary investment in an off-budget way, in order to stay within the IMF agreements of the time.³¹ Two variants of the scheme exist. The *Direct PIDIREGAS* scheme is a basic finance, build and transfer operation, whereby CFE commits to purchase a specified asset, such as a generating plant that has been built by a private contractor. During the construction phase, the contractor provides the financing required. Upon completion, CFE purchases

³¹ The IMF agreed to the arrangement. Although the budget deficit only includes PIDIREGAS when, in the future, actual payments are made, SHCP since 2001 has been publishing the Public Sector Borrowing Requirement, a broader measure that includes the direct PIDIREGAS investments and accrued interest, net of amortization. The PSBR does not include conditioned PIDIREGAS, although the payments to operators are counted as outlays in the current budget.

the asset with long-term financing mobilized by either the private contractor or by CFE itself. *Conditioned PIDIREGAS* are independent power production (IPP) projects, whereby the private partner keeps the plant, and enters into a long-term service contract with CFE. The government commits to purchase the plant only if the private partner breaches the service contract, or under specific circumstances of *force majeure*. Because of this, conditioned PIDIREGAS become contingent liabilities to the government. More than a contractual agreement, the PIDIREGAS scheme is a type of guarantee instrument that supports off-balance sheet financing.

1.25 An office in the revenue sub-secretariat of SHCP sets the electricity tariff schedules, which vary by sectoral usage and for the summer season by region according to temperature (air-conditioning demand). For industrial users there are technically sophisticated cost-recovery tariffs that take account of tension, interruptability, and peak-load demand. For residential and agricultural users, politics plays a large role in the setting of subsidized rates.³²

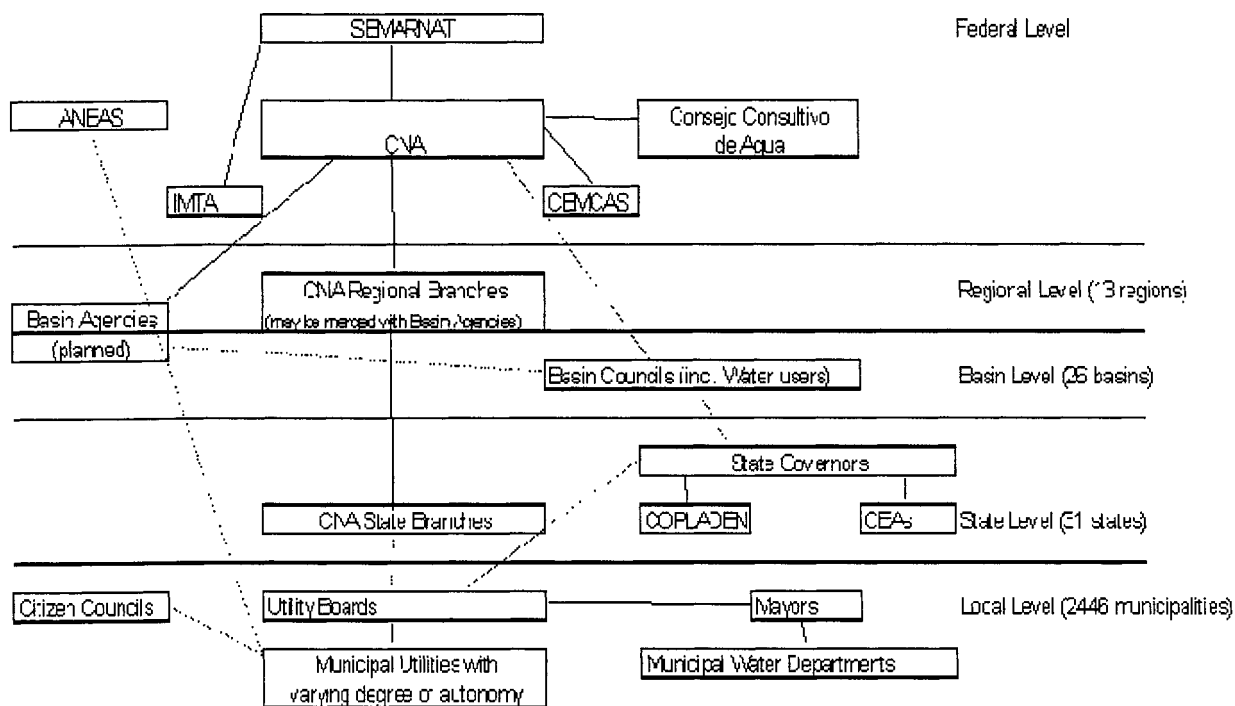
1.26 Since the reforms introduced under the *Nuevo Federalismo* in 1995, the responsibility for the planning and financing of grid extension and off-grid supply has been transferred from CFE and LFC to the states and municipalities. A substantial part of these investments is financed through FAIS. A similar share is financed by both the National Commission for Indigenous People and SEDESOL, focusing on grid extension. Once a system has been constructed, its assets and operational and financial responsibility are transferred to CFE. Today, rural electrification efforts are limited to non-economic costly grid extensions which are not accompanied by other programs or initiatives that ensure rural economic development. The implementation of sound economic and technical solutions such as off-grid solutions which integrate sustainability components and the participation of private service providers have so far been incipient.

D. WATER SUPPLY AND SANITATION

1.27 Although water, like all natural resources in Mexico, is constitutionally the property of the Federal Government, the water supply and sanitation sector is much more decentralized than electricity. According to the Mexican Constitution, since the decentralization of 1983 the primary responsibility for delivery of water supply and sanitation services rests with local government, comprised of 2,446 municipalities and almost 200,000 villages and hamlets. Municipalities and municipal water companies (*organismos operadores*, OOs) provide service to most customers, and state water agencies handle the rest, including in municipalities (about 1,000 out of 2,480) that are too small to have their own capacity. Other important sector responsibilities remain vested at the state and federal levels. A recent amendment of the National Water Law created the basin agencies (*organismos de cuenca*) with an important but yet undefined role in the sector. Thus, the functions of institutions at various levels of government overlap, as indicated in Figure 1.4.

Figure 1.4: Water Institutions

³² See chapter 3 and World Bank (2004a,b) for more details.



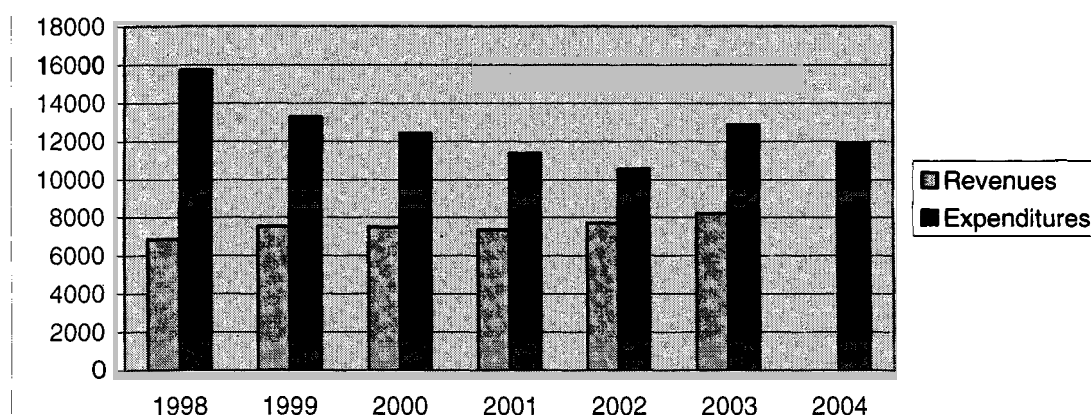
CNA - Comisión Nacional de Agua
 SEMARNAT - Secretaría de Medio Ambiente y de Recursos Naturales
 CEA - Comisión Estatal de Agua
 COPLADEM
 ANEAS - Asociación Nacional de Empresas de Agua y Saneamiento
 IMTA - Instituto Mexicano de Tecnología de Agua
 CEMICAS - Centro Mexicano de Capacitación de Agua y Saneamiento

1.28 The federal *Comisión Nacional del Agua* (CNA) is the apex institution of the sector. CNA is formally under the authority of the Ministry of Environment (SEMARNAT), but enjoys considerable *de facto* autonomy. Its Director General is nominated by the President of the Republic. Created in 1989 with a staff of 38,000 at the time, it now has 17,000 employees, most of who work in the agency's 13 regional branches and 20 state branches. CNA financed or undertook itself only about one-fourth of the investment in the sector, but it still plays a key role in administering the financial flows of the overall sector, including water resources management, irrigation, and water supply and sanitation.

1.29 CNA's budget in 2004 was close to MxP12 billion, of which about one third is allocated to water and sanitation, while the remainder is split between irrigation (hidroagricola), water resources management, flood protection and personnel services. Within the category water supply and sanitation, the largest spending item is the operation and maintenance of bulk water supply systems, accounting for MxP1.85 billion (the largest of which is the Cutzamala system serving the Mexico City metropolitan area). Although municipalities are required to pay for the bulk water supplied to them, most do not. As a result, CNA's expenditure on bulk water supply can be considered a recurrent subsidy, provided to one of the most affluent areas of the country. CNA's main source of

funding is payments for water rights, amounting to MxP5.9 billion in 2002. These payments originate mainly from industries (76 percent of payments in 2002) and from water service providers (17 percent) (CNA 2004b:87f.). The other key revenue item is the sale of bulk water (MxP1.2bn in 2003), complemented by several other minor revenue items. A comparison of total CNA expenses and revenues for 1998-2004 is shown in Figure 1.5 below. For details on the water rights system, see Box 3.6. It also gets revenue from federal budget transfers, external credits, and bulk water sales.³³

Figure 1.5: CNA Expenditures and Revenues 1998-2004 in MxP million



Source: CNA, National Water Statistics 2005.

1.30 The 2004 amendment of the National Water Law mandated the creation of Basin Agencies (*Organismos de Cuenca*) that would strengthen the planning function at the basin level. However, the implementing decrees for the amended law remain to be disseminated and enacted. The Basin Agencies are supposed to play a key role in the administration of the Water Financial System (*Sistema Financiero del Agua*, SFA) introduced through the recent amendment of the Water Law.³⁴ The directors of the Basin Agencies, which are supposedly autonomous, will be appointed by CNA. There is considerable uncertainty about the scope, form, and timing of the restructuring process and decentralization of CNA, the creation of Basin Agencies, and their role in administering the SFA.

1.31 State governments play an active role in the water and sanitation sector. They are involved in investment planning through six-year State Development Plans and the State Planning Committees, the *Comité de Planeación para el Desarrollo del Estado* (COPLADE), with representatives from various line ministries and agencies.

³³ Billed bulk water revenues were MxP1 billion in 2002. It is not clear how much has been collected. The revenues originate essentially from the operation of the country's two largest bulk water systems: the Cutzamala system serving the Mexico City Metropolitan area, and the Uspanapa-La Cangrejera system, supplying industries in the South of Veracruz State.

³⁴ The exact role of the basin-level institutions in the SFA remains to be defined through the operating rules of the new system.

Institutional arrangements for planning and service provision vary substantially among the 31 states.

1.32 Almost all states have created State Water Commissions (*Comisión Estatal de Agua*, CEA). The CEAs are autonomous entities that usually are under the authority of the State Ministry of Public Works. Their attributions differ widely among states. In 19 states the State Water Commission has an explicit mandate to support municipalities in the provision of services through technical assistance. In some states the CEA also monitors data on the performance of service providers, but seldom are these data aggregated into a comprehensive information system. The CEAs are not regulators, since they do not approve tariffs, which are set at the municipal level or in some cases by State Congresses. In at least 13 states, CEAs or state-owned public enterprises separate from the CEAs operate water distribution systems. In many states, the number of municipalities served by state-level bodies is limited and the localities are small. However, in some states, state-level bodies provide services to the entire state or almost the entire state, such as in Querétaro and Puebla. In a few states with important bulk water supply systems, the CEA also operates these systems. All CEAs also have some authority and responsibility for water resources management.

1.33 At the local level, as a result of different policies and programs, a variety of institutional arrangements for service provision can be found. Broadly, they can be classified into four different categories:

- Reformed service providers (*organismos operadores*), public or private utilities, defined as one that has achieved a significant degree of financial and legal autonomy from the municipality and the state government. Examples include Saltillo (Coahuila) and Hermosillo (Sonora).
- Unreformed but successful service providers defined as those that have achieved a level of performance that is close to best practice, using the standard technical and financial indicators (see chapter 2.)³⁵ Examples include the Public Service Commission of Baja California and *Aguas y Drenaje de Monterrey* serving the State of Nuevo León.
- Unreformed and largely unsuccessful arrangements with limited commercial orientation and limited autonomy from the municipality or the state—estimated to occur in about 80 percent of municipalities. This includes both service providers and direct provision by municipalities.
- Other arrangements, including cooperatives and private small-scale providers.

1.34 Most large cities and some smaller towns have created decentralized municipal service providers (*organismos operadores*) with varying degrees of independence. While service providers have their own legal personality and board, in practice most are closely linked to the municipality, which typically appoints most board members and the service provider's director. According to CNA estimates, general managers of service providers hold their positions for an average of 1.5 years (Kemper and Alvarado 2001:629), and

³⁵ This would consist of a collection efficiency of more than 90 percent, non-revenue water of less than 30 percent, a working ratio of less than 0.75, and a staff-per-1,000-connection ratio of less than 5.

most commonly do not survive political changes, resulting in frequent reorganizations and changes in strategy, which immediately undo the potential effectiveness of the previous strategy. There often are close financial links between service providers and municipalities, such as the contracting of debt and the payment of bills by the municipality on behalf of the service provider. Accounts are usually held on a cash basis, not on an accrual basis, and are seldom audited. There are usually no performance targets for the service providers.

1.35 Nevertheless, there are a few notable exceptions of service providers that are efficiently operated on a commercial basis. The best of these service providers self-finance a substantial proportion of their investments, have been rated by credit rating agencies, and at least one—the service provider of Tlanepantla—has even issued a local currency bond.

1.36 In most smaller municipalities, water and sanitation services are performed directly by a municipal department. The quality and efficiency of services in smaller municipalities tend to be lower than in larger municipalities. Intercity service providers, which are a common institutional arrangement in some other countries to exploit economies of scale in service provision among small towns or in large metropolitan areas, are almost nonexistent in Mexico. In rural areas, water services are provided directly by local government or by user groups, which sometimes take the form of cooperatives. In some cases, the state water commission provides services in rural areas at the request of villages or municipalities.

1.37 Many of the larger service providers are members of the *Asociación Nacional de Empresas de Agua y Saneamiento* (ANEAS), which represents its members at the national level. ANEAS plays an active role in discussing policies, and works in close collaboration with CNA.

1.38 Although the importance in the water sector of the actors at the state and local level has been increasing over the past two decades, CNA remains the sector's dominant actor in terms of determination of policies, subsidy programs, and norms in water supply and sanitation. The existence of such a strong national institution in the water and sanitation sector is unusual compared to most other countries, where functions of national or federal institutions in the water and sanitation sector are usually limited to certain regulatory and normative tasks and are often fragmented among various institutions.³⁶ The concentration of expertise and power in a single federal institution provides some advantages, but it also means that checks and balances are limited, due to the lack of expertise on the sector that is independent of CNA.

³⁶ Some smaller countries, in particular in Africa and Central America, do have single national agencies in charge of water and sanitation service provision, but nowadays these cases are exceptions.

2. PERFORMANCE OF INFRASTRUCTURE SERVICES

2.1 Mexico has made steady progress in increasing the coverage of electricity, water, sanitation, and roads in recent decades, reaching one of the highest levels in Latin America. While gaps remain, particularly in rural areas and among indigenous communities, the main infrastructure challenge is not coverage, but insufficient service quality and poor operating efficiency.

2.2 Quality of service and operating efficiency in the infrastructure sectors covered by this report lag behind other middle-income countries, as shown in a 2003 World Economic Forum survey among large industrial users (Table 2.1). The gap is lowest in ports and railroads, which have made the most improvements in recent years, followed by electricity. Interestingly, the quality of Mexico's infrastructure in all of these sectors does not match the infrastructure quality of China, one of its main competitors. Data in this report show that the gap in the quality of services in water supply and sanitation, which was not covered by the survey, may be even higher. The quality of services of roads—especially state and municipal roads—is estimated to be lower than in other Organisation for Economic Co-operation and Development (OECD) countries, since about 40 percent of roads are in poor condition. All this confirms the conclusion that quality of infrastructure services in Mexico does not match its achievements in the expansion of coverage.

Table 2.1: Comparative Survey on the Quality of Infrastructure, 2003

Country	Overall Infrastructure Quality*	Port Infrastructure Quality	Railroad Infrastructure Quality	Electricity Supply Quality
Malaysia	5.7	5.6	5.0	5.7
Chile	4.9	4.8	2.7	5.7
Thailand	4.6	4.2	3.4	5.5
Indonesia	4.2	4.4	4.1	4.1
Argentina	3.6	3.6	2.7	4.2
Brazil	3.5	3.1	2.1	4.9
Mexico	3.4	3.3	2.5	3.9
China	3.4	3.6	3.9	4.2
Colombia	2.9	3.0	1.4	4.7
Philippines	2.5	2.6	1.4	3.5
Sample average	3.9	3.8	2.9	4.6
U.S.A.	6.4	6.0	4.8	6.2

* "Overall Infrastructure" includes quality indicators from other sectors not shown above (that is, air transport and information and communication technologies).

Note: Survey-based subjective evaluation on a scale from 1 – "underdeveloped and inefficient" to 7 – "as developed and efficient as the world's best." The higher the score, the better the quality.

Source: WEF (2004).

2.3 Tariffs are below cost for residential users of water and electricity, but they are close to or above cost for industrial and commercial users. It is estimated that the share of the average electricity and water bill in expenditures of an average household does not exceed 2.5 percent and 1.8 percent, respectively, well below thresholds at which tariffs are deemed unaffordable. Expenses to compensate for poor service quality—cisterns for storage, and purchases from tankers and bottles in the case of water, and surge protectors in the case of electricity—are estimated to be substantial and, in the case of water, much higher than utility bills. It is likely that willingness to pay for a service of good quality is higher than current tariffs among most users.

2.4 All sectors exhibit a bias toward new construction and upgrading, while preventive maintenance is neglected. In roads, the high share of roads in poor condition is a consequence of insufficient maintenance. In the electricity sector, the approved budgetary resources for maintenance, operation, and repair have been on average 30 percent lower than the requested amount. In water and sanitation, assets are often deteriorated and investment is biased toward new construction.

2.5 There is no explicit policy to target subsidies for infrastructure services to poor households, or to target infrastructure investments at poorer regions. The 2004 *Public Expenditure Review* has shown that, overall, the poorest states receive as much federal transfers per capita as the average.³⁷ Many but not all transfers are formula based. Ramo 33, a formula-based transfer to municipalities and states, strongly favors the poorest of them. In 2002 at least 44 percent of Ramo 33-created FAIS investments were estimated to have been used in the sectors covered in this report. This is equivalent to 15 percent of total investments in these sectors, with a concentration in water and sewerage. However, the poverty orientation of FAIS is countered by the distribution of the 85 percent of infrastructure investments that are financed *outside* FAIS. For example, in the water and sanitation sector the eight states with the lowest marginality received 2.5 times more investments per capita than the eight states with the highest marginality, excluding FAIS. This is partly due to the nature of some formula-driven programs such as the Water Rights Return Program (*Programa de Devolución de Derechos*, PRODDER), which favors states with higher water scarcity, which are generally the states with the lowest marginality.

2.6 The primary problem of the poorest states, however, is not the volume of resources at their disposal, but how the resources are used. This is also one of the key findings of the World Bank study *Development Strategy for Mexico's Southern States*, which recommended increasing federal resources only after improvements in performance have been achieved (World Bank 2002:4).

2.7 The remainder of this chapter analyzes the performance of the five sectors covered in this report along a common analytical framework focusing, first, on outcomes (coverage, service quality, and operational efficiency); second, on tariffs and cost recovery; and third, on the level and composition of spending.

³⁷ World Bank (2004c:74). This includes all transfers, including earmarked *aportaciones*, non-earmarked *participaciones*, and sectoral programs.

A. ELECTRICITY

Outcomes

2.8 Access to electricity in Mexico has steadily increased over recent decades, reaching levels significantly above the average for the region and of other developing countries, with 95 percent of the population connected to the electricity grid (Table 2.2) (World Bank 2004d:48). This coverage expansion has favored the extreme poor and rural dwellers. For example, 90 percent of the extreme poor had access to electricity in 2002, up from only 63 percent in 1992 (World Bank 2004a).

2.9 Nevertheless, rural areas and indigenous communities remain underserved. For example, electricity coverage in the predominantly rural Southern States (Chiapas, Guerrero, Oaxaca, Veracruz) reaches only half to two-thirds of population centers. Unelectrified localities are mainly small indigenous communities, generally in extreme poverty, with populations below 1,000 inhabitants, located in remote rural areas.³⁸ The lack of both appropriate mechanisms and a formal operational rural electrification program, which consider off-grid solutions, rural economic development and sustainability issues, are contributing to the persistence of the low electricity coverage rate, especially in communities characterized by extreme poverty levels³⁹.

Table 2.2: Mexico's Electricity Coverage is Comparatively High

National Coverage (%)	Mexico	Argentina	Braz	Chile	Colombia	LAC Avg.	Philippines	Thailand	Indonesia
Electricity	95	95	95	99	93	88	80	82	53

Sources: World Bank (2004) East Asia report; data for Mexico in electricity coverage from INEGI (2002).

2.10 According to official data, the quality of electricity services has improved (Table 2.3). Customer interruptions caused by operating events and customer complaints declined, while connection time decreased for both the National Electric Company (*Comisión Federal de Electricidad*, CFE) and *Luz y Fuerza del Centro* (LFC). However, distribution losses increased moderately for CFE and massively for LFC—from 11 percent in 1994 to 27 percent in 2003.

2.11 Nevertheless, a gap remains between the major service providers, CFE and LFC, serving the metropolitan area of the capital. The gap is most marked in the connection time for new customers (1 day compared to 6 days) and distribution losses (27 percent compared to 11 percent) (Aburto 2004).

³⁸ There are still 2,600 localities of between 100 and 10,000 inhabitants without electricity in this region.

³⁹ Initiatives led by the Indigenous People Development Commission focus exclusively on costly grid-extensions which favor communities with more than 1,000 inhabitants. Essential factors such as cost-effectiveness; willingness to pay of the communities and sustainability are generally not taken into account.

Table 2.3: Quality of Electrical Service, 1995-2003

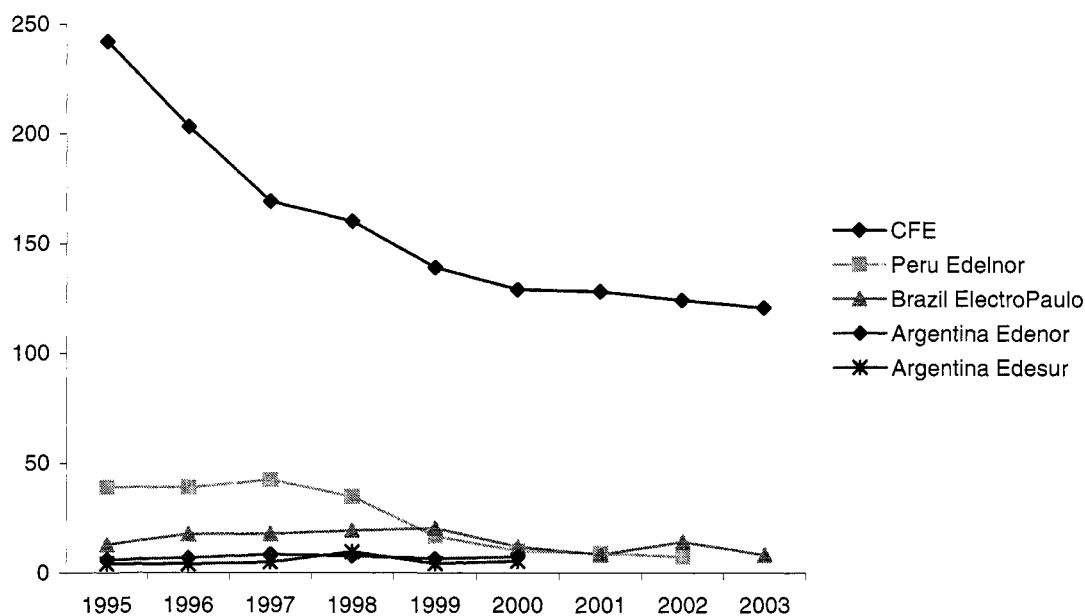
		1995	1998	2002	2003
Interruption of Service (min/customer)	CFE	242	225	124	121
	LFC	—	374	144	135
Complaints (no./1,000 customers month)	CFE	14	10.7	4.2	4.1
	LFC	—	6.7	4.4	4.3
Connection time, new customers (days)	CFE	2.3	1.4	1.2	1.1
	LFC	—	10	5.5	6

— Not available.

Sources: Data provided by CFE's *Subdirección de Control Financiero*, and LFC's *Subdirección de Finanzas*.

2.12 Despite the gradual improvements in service quality, it remains below the levels reached in many other countries in Latin America and East Asia. For example, when annual interruptions and distribution losses are compared to Latin American privatized distribution companies, the performance of CFE is poor⁴⁰ (Figures 2.1 and 2.2).

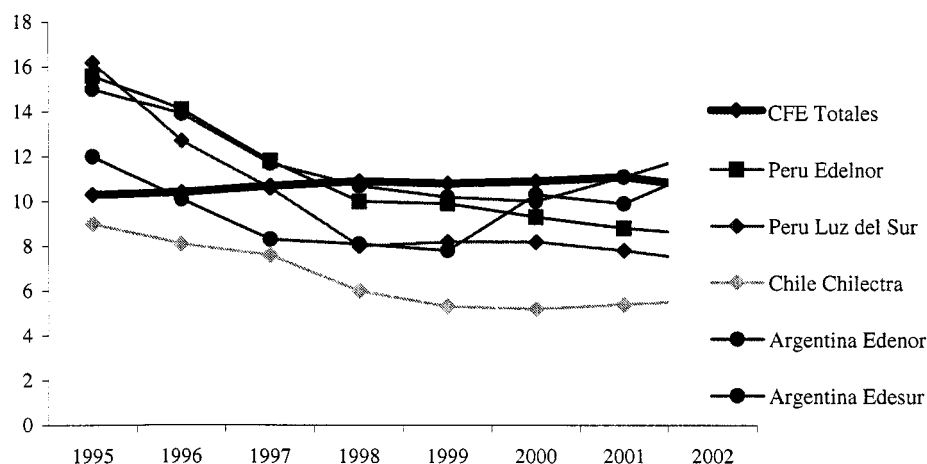
Figure 2.1: Annual Interruptions (minutes) Per Connection



Sources: CFE financial data; and Andres, Foster, and Guasch (2005).

⁴⁰ No data on annual interruptions have been reported for public utilities or public distribution companies.

Figure 2.2: Distribution Losses (%)



Note: CFE's data do not include natural phenomena, in which case values would be higher. Reliable comparative data for public utilities in other developing countries were not available.

Sources: CFE financial data; and Andres, Foster, and Guasch (2005).

2.13 There is no independent verification of the quality of service and operational performance data provided by CFE and LFC. Independent verification increases the reliability of data and is of great importance for regulatory purposes, for a balanced and transparent relationship between independent power producers and buyers of electricity and for increasing the confidence of investors in the sector.

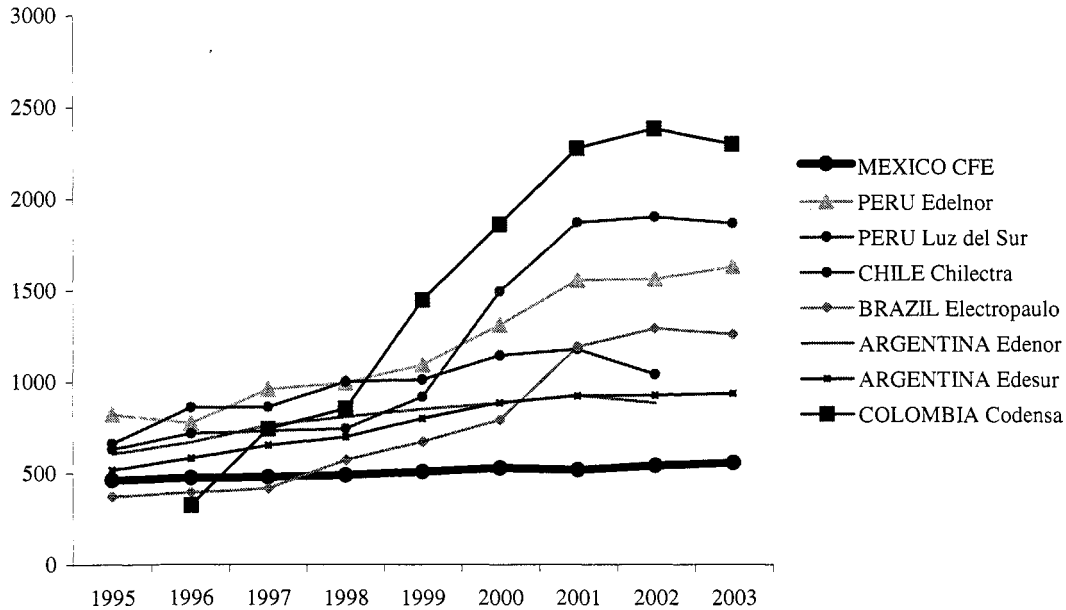
2.14 Insufficient investment in maintenance and modernization makes it difficult to further improve service quality. The approved budgetary resources for maintenance, repair, and refurbishment of assets are on average 30 percent lower than the level that CFE executives think is required (and reflected in the amount requested initially by CFE management every year)⁴¹. Neglect of aging plants and distribution lines makes it hard to maintain and almost impossible to further improve levels of service quality and efficiency.

2.15 Labor efficiency indicators have also slightly improved, but remain below international benchmarks. The total number of permanent employees (including *de confianza* and *sindicalizados*) has been maintained almost constant, while electricity demand and production have grown. When compared, however, to other Latin American companies, the performance of CFE is still poor (Figure 2.3). It is evident that the influence of the unions has an effect on the overall economic and technical performance of both CFE and LFC⁴².

⁴¹ Interview with CFE management.

⁴² For instance, the confluence of restrictive administrative norms and union resistance to rescaling compensation based on the performance of different operative units across segments has impeded improving the labor efficiency parameters.

Figure 2.3: Number of Connections per Worker in Distribution Segment⁴³



Sources: CFE financial data; Andres, Foster, and Guasch (2005).

Tariffs and Cost Recovery

2.16 CFE and LFC are required to provide electricity at tariffs set by the Federal Government, including at tariffs below cost for certain categories of users (Table 2.4). The subsidy implied in these tariffs is financed in different ways in the case of CFE and LFC. CFE does not receive transfers to finance the subsidies. Its subsidies are primarily financed by nonpayment of a statutory rate of return (*aprovechamientos*) of 8 percent on CFE's net fixed assets. In case *aprovechamientos* exceed user subsidies, CFE's capital base is strengthened through retained earnings, as was the original intention of the government. However, CFE's capital base is currently being eroded because subsidies have exceeded *aprovechamientos* since 2000. User subsidies have been estimated by CFE at MxP49 billion in 2003 (0.7 percent of GDP), while *aprovechamientos* stood at MxP44 billion (0.6 percent of GDP). The subsidized tariffs cause a loss of federal revenues through the nonpayment of *aprovechamientos*. In the case of LFC, which is not subject to *aprovechamientos*, the Federal Government transfers finance the excessive operational cost and the subsidy to consumers, totaling MxP21 billion (0.3 percent of GDP). Total subsidies to the electricity sector thus amount to MxP70 billion, about 1 percent of GDP, or 175 percent of investments in the electricity sector in 2003.

2.17 According to CFE, the average tariff charged to residential customers in 2003 covered just 42 percent of costs, and the average tariff for agricultural use covered 28 percent of costs. Industry paid 88 percent of costs (Table 2.4).

⁴³ In the case of CFE, data includes only workers in the distribution segment

Table 2.4: CFE: Degree of Cost Recovery, Price to Cost Ratios (%)

	1997	1998	1999	2000	2001	2002	2003	Average
Residential	40.0	43.4	39.9	40.7	41.6	48.9	42.1	42.4
Public Lighting System	79.3	93.7	89.8	87.4	88.5	89.3	93.2	88.7
Agriculture	27.6	26.7	27.4	27.9	28.5	29.2	27.5	27.8
Industrial	91.5	92.7	88.4	85.5	85.7	88.6	88.3	88.7
Commercial and Others	92.3	100.0	100.0	76.1	78.7	80.6	78.8	86.7
Overall	66.9	69.4	66.3	64.4	64.4	68.7	65.9	66.6

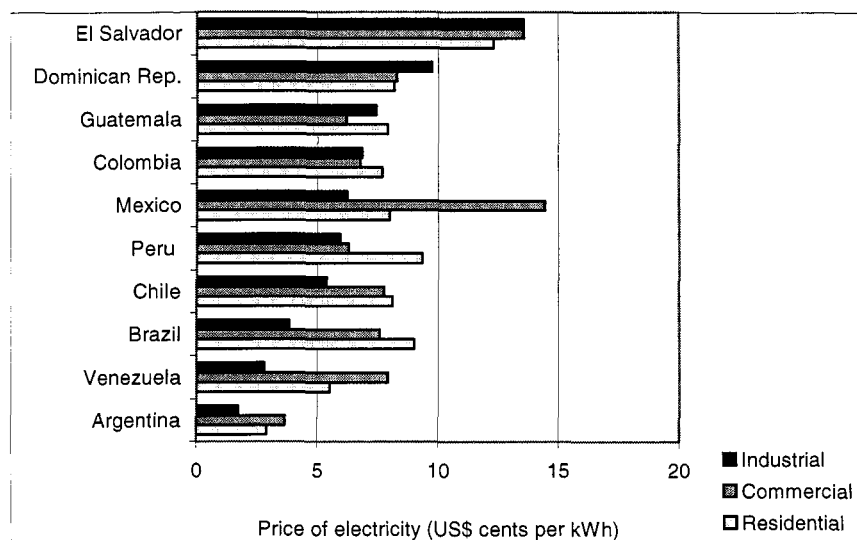
Source: Samaniego-Breach (2005) own calculations using CFE data.

2.18 The electricity tariff system remains very complex, with 112 different billing possibilities that draw from 7 basic tariffs, 2 seasons, and 8 billing options by consumption level (World Bank 2004d:139). All of the tariffs contain non-linearities and discontinuities, and arbitrary criteria for applying them, which makes it difficult to understand them and often leads to paradoxical results. Especially in the case of LFC, political involvement in the process of tariff setting by the Finance Ministry has led to rates that do not allow for cost recovery.

2.19 Residential tariffs are well below the OECD country average, while industrial tariffs are higher than the average of OECD countries and the United States. Independent sources indicate that peak industrial electricity tariffs are at times higher than the costs of producing electricity on-site with diesel-based thermal plants.⁴⁴ High industrial tariffs have led to an increasing trend toward self-supply by industries during peak hours. Compared with the electricity tariffs in other Latin American countries, commercial tariffs are among the highest tariffs in the region, while industrial and residential tariffs are close to the regional average (Figure 2.4).

⁴⁴ *Instituto Tecnológico de Estudios Superiores de Monterrey* (2004), quoted in Samaniego-Breach (2005:24). High tariffs during peak hours might be the result of underinvestment in the transmission and distribution networks as well as the lack of thermal plant availability.

Figure 2.4: Prices of Electricity in Selected Latin American Countries, 2002



Sources: Foster (2004) and CFE.

2.20 A comparison of tariffs with OECD countries and the United States shows that residential tariffs in Mexico are substantially lower than in the United States, Spain, and the OECD average (Table 2.5). Industrial tariffs in Mexico were lower than these comparators after the 1995 crisis, but are now higher due to tariff increases in Mexico and tariff decreases in comparator countries that have introduced competition (Table 2.6). Comparative data on industrial tariffs are sometimes contradictory, partly due to methodological problems.⁴⁵ For example, some sources show that industrial tariffs in Mexico were 27 percent higher than in the United States in 2003, while others say the difference is as high as 54 percent.⁴⁶ Another source calculates that in 2003 the average implicit industrial tariff of CFE was 22 percent higher than in Arizona and 25 percent higher than in New Mexico, and the average implicit industrial tariff in California was 51 percent higher than for CFE (Samaniego-Breach 2005:27).

⁴⁵ Methodological issues include the weighting among various industrial tariffs (medium and high voltage, peak and off-peak), the coverage and weighting of the sample among utilities in one country, whether taxes were included, and the choice of the appropriate exchange rate (Purchasing Power Parity or straight exchange rate).

⁴⁶ The former percentage is calculated from tariffs in Table 2.6, while the latter percentage comes from a recent study by the Industry Association of the State of Nuevo León, quoted in Samaniego-Breach (2005:24).

Table 2.5: International Electricity Prices for Households (U.S. dollars per kilowatt-hour)

	1994	1995	1996	1997	1998	1999	2000	2001
OECD	0.116	0.127	0.121	0.113	0.109	0.110	0.105	n.a.
China	n.a.	0.030	0.034	n.a.	n.a.	n.a.	n.a.	n.a.
Mexico	0.069	0.045	0.048	0.054	0.055	0.059	0.068	0.075
Spain	0.176	0.195	0.191	0.163	0.155	0.141	0.117	0.109
United States ^a	0.084	0.084	0.084	0.084	0.083	0.082	0.082	0.086

n.a. = Not available.

a. Electricity prices in the United States include income taxes, environmental charges, and other charges. However, the prices exclude the taxes collected for the convenience of the States and “passed through” to the customer.

Note: Energy end-use prices including taxes, converted using exchange rates.

Source: Samaniego-Breach (2005:27).

Table 2.6: International Electricity Prices for Industry (U.S. dollars per kilowatt-hour)

	1994	1995	1996	1997	1998	1999	2000	2001	2003
OECD	0.073	0.079	0.074	0.069	0.065	0.063	0.047	n.a.	n.a.
China	0.025	0.028	0.032	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mexico	0.042	0.027	0.033	0.041	0.038	0.042	0.051	0.053	0.065
Spain	0.078	0.076	0.074	0.061	0.057	0.049	0.043	0.041	n.a.
United States ^a	0.048	0.047	0.046	0.045	0.045	0.044	0.046	0.050	0.051

n.a. = Not available.

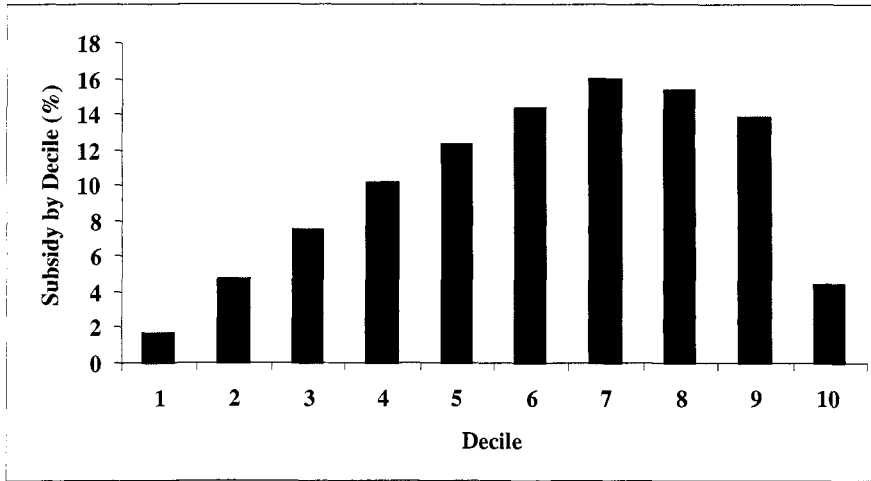
a. Electricity prices in the United States include income taxes, environmental charges, and other charges. However, the prices exclude the taxes collected for the convenience of the States and “passed through” to the customer.

Note: Energy end-use prices including taxes, converted using exchange rates.

Source: Samaniego-Breach (2005), quoting U.S. Department of Energy.

2.21 Residential electricity subsidies are highly regressive: Upper middle income households (income deciles 6, 7, and 8), receive the majority of the consumption subsidy (Figure 2.5). The electricity subsidies also go mostly to the regions that are already more economically developed. The vast majority of the subsidy—over 90 percent—is not a lifeline for the poor and encourages inefficiency, especially in the hot areas in the summer, which benefit from highly subsidized rates. Poverty criteria are absent in the determination of regional electricity tariffs, unlike in water, where some municipalities set lower tariffs in poorer neighborhoods.

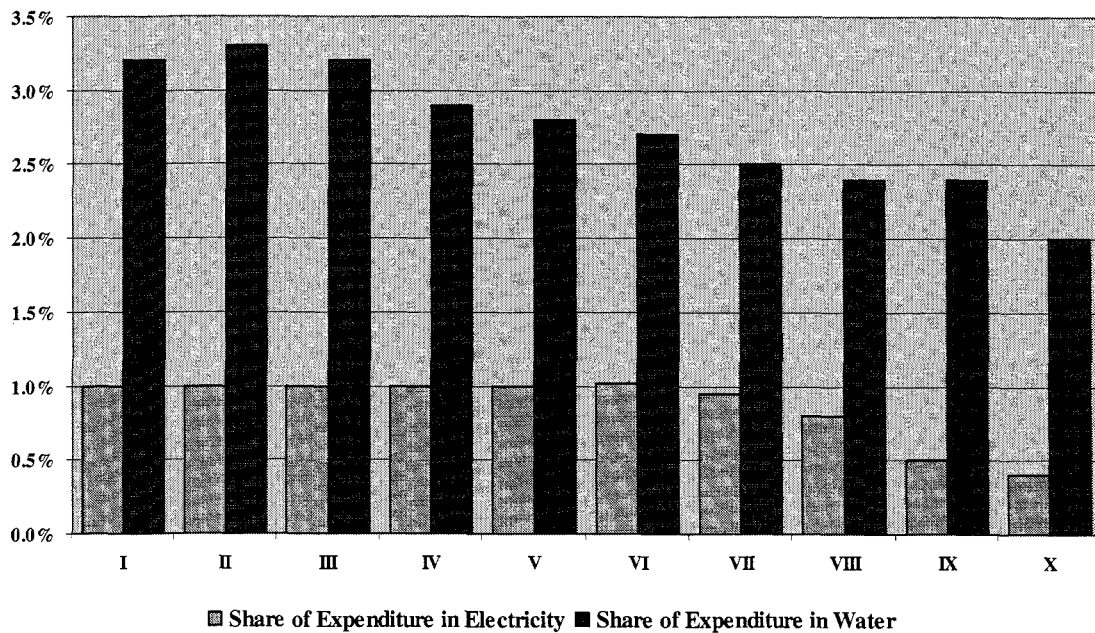
Figure 2.5: Distribution of Subsidies, by Household Decile



Source: World Bank (2004c,d).

2.22 According to the 2002 Household Survey the average share of electricity expenditures in household income was 2.65%, varying between 3.2% for the first decile and 1.9% for the tenth decile (see Figure 2.6).⁴⁷

Figure 2.6: Household Decile by Total Income, 2002



Source: World Bank calculations based on the National Survey on Household Income and Expenditure.

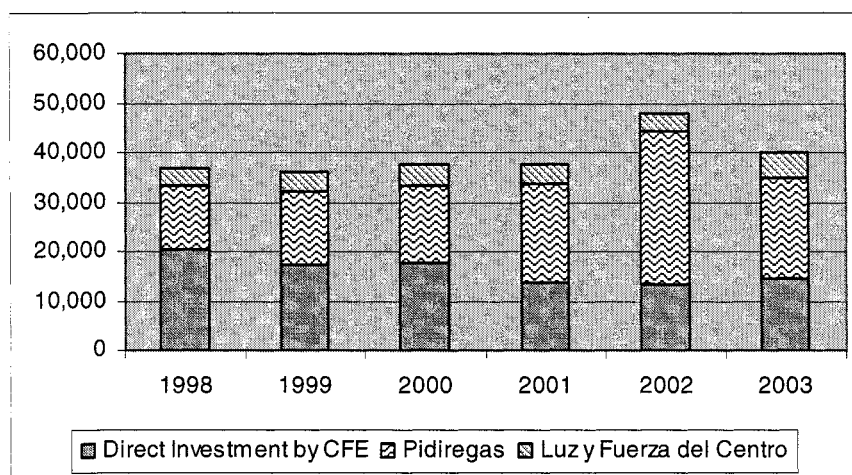
⁴⁷ World Bank calculations based on data from the 2002 National Survey on Household Income and Expenditure (ENIGH) by INEGI.

2.23 Agricultural electricity subsidies are also highly regressive, favoring the richer, Northern states that rely heavily on irrigation for climatic reasons. Poor farmers do not have access to the benefits of the subsidy, because they practice very limited irrigation, if at all, again to a large extent because there is no need for irrigation in the Southern states for climatic reasons. As a result, Chiapas received only MxP44 million of subsidy (0.8 percent of total electricity subsidy to agricultural customers), while Oaxaca received MxP18 million (0.3 percent), and Guerrero only MxP3.6 million (0.1 percent) (World Bank 2004c). Equally alarming, the subsidy and subsequently low tariffs for electricity creates a perverse incentive to over-pump aquifers, increasing already alarming water shortages.

Spending

2.24 Total investment in the electricity sector was MxP39.9 billion in 2003, a marked decline from investment levels in the previous year (Figure 2.7).⁴⁸ More than 90 percent of investments are carried out by CFE and private investors, the remainder being accounted for by LFC. CFE investments include its own budgetary investment, and “financial investments” in the form of Projects with Deferred Impact in the Budgetary Registry (*Proyectos de Impacto Diferido en el Registro de Gasto*, PIDIREGAS). PIDIREGAS investments constantly increased until 2002, but then declined abruptly in 2003. Total investment in electricity corresponded to 0.7 percent of GDP in 2003, lower than other countries in Latin America (Figure 2.8).

Figure 2.7: Investment in the Electricity Sector
(million MxP 2004)

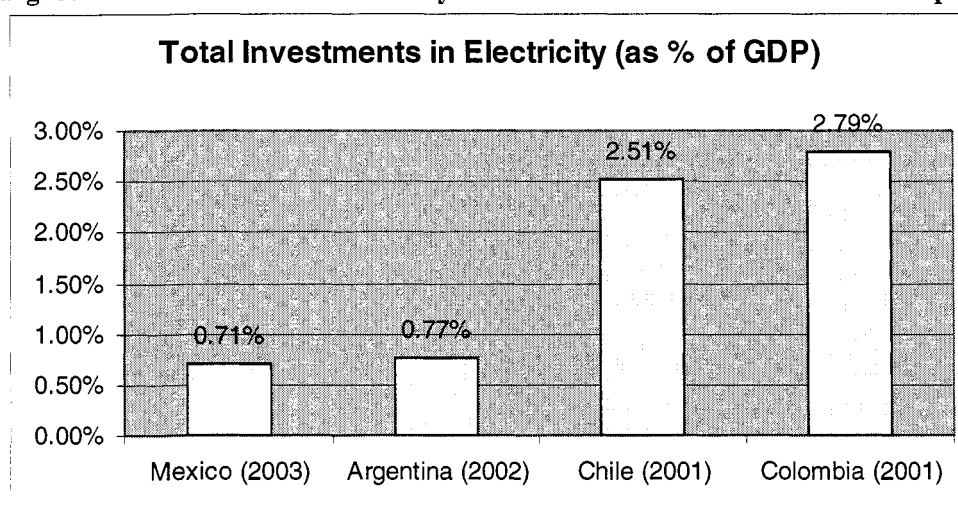


Note: Investments by municipalities, partly funded under FAIS, are not included.

Sources: *Secretaría de Energía*, quoted in Samaniego-Breach (2005); World Bank calculations.

⁴⁸ This excludes FAIS, investments made by developers and “payments for BLTs and PIDIREGAS,” which are shown by some CFE statistics as “investments.”

Figure 2.8: Investments in Electricity as a Share of GDP—International Comparison



Sources: World Bank calculation for Mexico; Calderón and Servén (2004) for other countries.

2.25 The reduction in investments is largely due to the deteriorating financial situation of CFE, which in turn is due to (a) increasing liabilities from earlier investments undertaken using the PIDIREGAS scheme, (b) increasing fuel costs, (c) and increasing pension obligations (*passivo laboral*). During 2000–02, CFE investments averaged 17 percent of total budget, or MxP17.3 billion a year. Investments were even lower as a percentage of total LFC’s budget, averaging approximately 10 percent of total expenditures for 1998–2003.

B. WATER SUPPLY AND SANITATION

Outcomes

2.26 Access to water and sanitation in Mexico has steadily increased in recent decades, reaching levels significantly beyond the average of the region and of other developing countries (Table 2.7).⁴⁹ Approximately 90 percent of the population now has a water connection either in the house or nearby.⁵⁰ Ninety percent had access to sanitation, including 63 percent that were connected to a sewer, 12 percent that had a septic tank, and another 15 percent that used sanitary latrines or evacuated their sewage through sewers discharging into the nearby environment.⁵¹ The poor and the extreme

⁴⁹ While statistics show the level of sanitation coverage the same as the average for the region, this figure is distorted by different definitions of access to sanitation, since latrines are excluded from the definition used in Mexico, while they are included in many other countries.

⁵⁰ Improved water supply includes four categories: households with piped supply in the house; households with piped supply on the plot, but outside the house; public standpipes; and households that bring water from another house with piped supply.

⁵¹ The 2000 census, as shown in spreadsheets provided by Avila (2004). CNA includes only the first two categories in its statistics on access to sanitation (*alcantarillado*), but does not publish statistics on sanitation coverage in the broader sense.

poor also benefited from the increase in coverage: 58 percent of the extreme poor had access to a safe water supply in 2002, up from 38 percent in 1992 (World Bank 2004a). However, the coverage level drops sharply from more developed urban areas through the urban periphery and smaller towns to the more remote rural areas⁵².

Table 2.7: Mexico's Water and Sanitation Coverage is Comparatively High

National Coverage (%)	Mexico	Argentina	Braz	Chile	Colombia	LAC Avg.	Philippines	Thailand	Indonesia
Water Supply	90	94	87	93	91	86	86	84	78
Sanitation	90	82	76	96	86	77	83	96	55

Sources: Data from World Bank (2003a) and CNA Water Statistics in Mexico (2004). Sanitation data for Mexico are from the 2000 census. East Asia data are from World Bank (2004b).

2.27 Service quality and operating efficiency clearly fall short of the levels achieved in other OECD countries and upper-middle-income countries. The share of municipal wastewater that receives some degree of treatment is more than twice as high as the Latin American average (30 percent compared to 14 percent),⁵³ but it remains far below levels in OECD countries, and an unknown share of treatment plants do not comply with norms for effluent discharge.

2.28 According to the 2000 census, only 45 percent of households connected to the water distribution network received a continuous supply of water; the remaining 55 percent experienced various degrees of intermittent supply.⁵⁴ The incidence of intermittent supply is higher in smaller municipalities and for the poor.⁵⁵ (Figure 2.9) This phenomenon puts Mexico clearly behind other OECD countries, where continuous water supply is the norm.

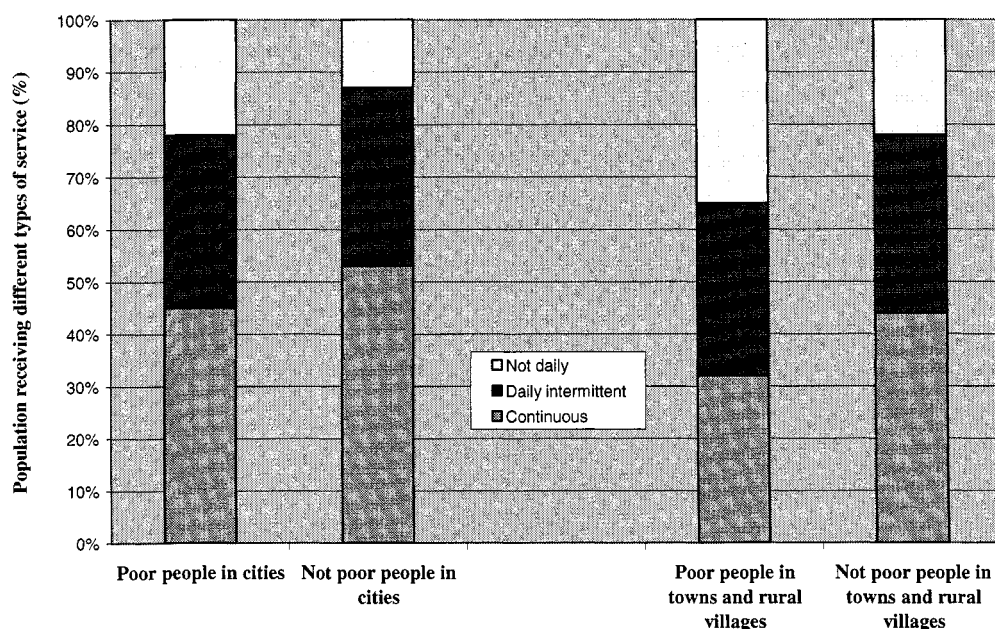
⁵² From 2000 census, as shown in spreadsheets provided by Avila (2004). According to CNA access to sewerage (*alcantarillado*) has increased to 77.5% (2004), though CNA does not publish statistics on sanitation coverage in the broader sense.

⁵³ CNA (2004a:A-76). For Latin America average, see PAHO/WHO (2001:24,81).

⁵⁴ Own calculation, based on census data quoted in Avila (2004), spreadsheet named Anexo I.CC_Agua

⁵⁵ Avila (2004) based on census data.

Figure 2.9: Quality of Water Service in Mexico



2.29 Water-related health indicators have shown a marked improvement, but still remain worse than those of a few other upper-middle-income countries in Latin America.⁵⁶ While there are very limited data on drinking water quality at the tap, the intermittency of supply is likely to have a negative impact on drinking water quality, mitigating progress made in the disinfection of water at the source, which has now reached 95 percent. A recent survey has shown that 16 percent of Mexicans with connections receive water that does not contain the required level of residual chlorine at the tap.⁵⁷

2.30 Using non-revenue water (NRW)⁵⁸ as an indicator, operating efficiency levels in Mexico are far below the average level attained in developed countries, and below the level attained in the best-performing quartile of utilities in developing countries (Table 2.8). For example, the average level of NRW in Mexico is estimated at 44 percent,⁵⁹ while the best-performing quartile of 123 utilities in 44 developing countries achieves less than 23 percent of NRW (Tynan and Kingdom 2002). The average level in developed countries is about 15 percent. The level of NRW in Mexico varies substantially, showing that low levels of NRW are achievable in Mexico.

⁵⁶ For example, the mortality rate associated with intestinal infectious diseases in Mexico is twice as high as in Argentina, four times as high as in Costa Rica, and 15 times as high as in Chile. See Background paper on water.

⁵⁷ *Comisión Federal para la Protección contra Riesgos Sanitarios (COFEPRIS)*, quoted in the Mexican press in January 2005. The study covered all Mexican states from January to December 2004.

⁵⁸ Non-revenue water is the difference between water supplied and water sold as a percentage of water supplied.

⁵⁹ CNA (2004a:42). Calculated based on a sample of 157 service providers with reliable data.

Table 2.8: Non-revenue Water in Mexico Compared to other Countries

Country (city)	Year	Non-revenue Water (%)
United Kingdom (average)	2000	14
United States	1996	16
Tunis (Tunisia)	2002	20
Mexico (Mexicali)	2000	22
Best-performing quartile of 246 developing country utilities		<23
Asian cities (average of 18)	2001	34
Brazil (Companhia de Saneamento Básico do Estado de São Paulo)	2000	38
Latin America (average)	1998	42
Mexico (average)	2002	44
Mexico (Acapulco)	2001	69
Mexico (Oaxaca)	2001	80

Sources: CNA (2004a:42) for Mexican average; data on Mexican cities are from CNA: *Ciudades Estratégicas* (2000) and Barocio (2004); for the Brazilian National Water Information System *Diagnóstico* 2000; Malaysia and Asian cities from ADB Water in Asian Cities (2004); U.K. and U.S. from IB-Net (International Benchmarking Network); Latin American average from WHO/UNICEF (2000:25). Developing country sample average is from Tynan and Kingdom (2002).

2.31 Water staffing levels vary broadly in Mexico. The average level of staff per 1,000 connections among a sample of 35 large Mexican utilities was 4.5 in 2000, ranging between 2.8 and 19.6.⁶⁰ These data suggest that there is ample scope for improving the situation of many overstaffed water utilities throughout the country.

Tariffs and Cost Recovery

2.32 Tariff levels and structures in the water and sanitation sector display a wide regional variation, including service providers that fully recover their costs and others that fail to cover even their operating costs. The sector as a whole falls far short of generating sufficient revenues to cover full costs.⁶¹ Water service providers typically charge tariffs close to full cost recovery to industrial and commercial users and cross-subsidize residential users. On average, water tariffs for industrial and commercial users are more than four times higher than for residential users.⁶² The average tariff across

⁶⁰ The average for 38 utilities in the State of Guanajuato was 4.4 in 2002. The average for a larger sample of utilities at the national level may be higher, since smaller service providers tend to have a higher staff ratio.

⁶¹ Estimates show that the sector generates a moderate “surplus” over operating costs. This does not take into account depreciation, debt service, and adequate maintenance. The accounting “surplus” thus is an illusion.

⁶² INEGI (1999), I Censo de Captación, Tratamiento y Suministro de Agua. The average tariff is MxP 1.62/m³ for residential users, Mxp 6.90/m³ for commercial users and MxP 6.76/m³ for industrial users.

users is only about half the Latin America and the Caribbean (LAC) average (US\$0.32 per square meter compared to US\$0.65 per square meter).⁶³

2.33 There are no data on average water tariff increases in Mexico, although anecdotal evidence suggests that average real tariffs remained flat or may have declined. In a few utilities, automatic tariff adjustment mechanisms are in place, linking a sector-specific price index to small tariff adjustments on a monthly basis.

2.34 Most cities do not charge for sanitation. In those cities where users pay for sanitation, it is typically as a small percentage share of the water bill. Given the substantial ongoing and planned increase of investments in wastewater treatment, which will go hand in hand with an increase in operating and maintenance costs, an effective cost-recovery mechanism for wastewater treatment is urgently needed. This could be achieved through a system of output-based transfers, similar to a Brazilian program under which the Federal Government pays utilities for the discharge of adequately treated wastewater after independent verification (Annex B).

2.35 There are no reliable figures on total water and sanitation revenues in Mexico. Water tariff collections have been estimated at MxP14.5 billion (US\$1.54 billion) in 2002. Various sources estimate billed revenues at between MxP20.2 billion (US\$2.14 billion) and MxP26.9 billion (US\$2.9 billion) in the same year.⁶⁴ On average, it seems that the sector generates only a very modest cash surplus, which is well below the financial performance achieved by the top quartile of utilities in developing countries (Tynan and Kingdom 2002:3). Moreover, this apparent modest surplus among Mexican utilities in part reflects shortfalls in essential spending on maintenance and modernization rather than financial viability. The aggregate figures also mask substantial variations in performance among service providers that depend on municipal subsidies for recurrent costs and those that self-finance substantial investments. This suggests that the some service providers in Mexico achieve or exceed international good practice.

2.36 Average collection efficiency in Mexico is far below the levels achieved in developed countries, and even in many developing countries. The level of collection efficiency in Mexico has been estimated at 72 percent (Table 2.9). The wide variations within Mexico again show that high levels of performance are achievable there. An increase in collection efficiency to 95 percent—close to the best utilities in Mexico—would mobilize more than MxP5 billion annually, without any increase in tariffs. This is more than all federal subsidies outside Ramo 33 provided to the sector in 2003.

⁶³ For Mexico: Barocio (2004:15); for Latin America: WHO/UNICEF (2000:18). The prices are not strictly comparable, because the regional figures refer to earlier years. A comparison with average 2003 tariffs in the region may show an even larger discrepancy.

⁶⁴ The lower figure is taken from CNA (2004:38) and is calculated from a sample of 437 localities in all states. The higher figure is taken from Barocio (2004), based on extrapolations made from a sample of 192 localities from states for which data was deemed reliable.

Table 2.9: Collection Efficiency

Country	Year	Collection / Billing (%)
Mexico (Monterrey)	2004	98
OECD average	1996	95
Asian cities (average of 18)	2001	88
Brazil (average)	2000	87
Mexico (Hermosillo)	1999	85
Mexico (average)	2002	72
Mexico (Matamoros)	1999	45
Mexico (sample of small cities)		20

Sources: CNA (2004); SMAPA (Tuxtla Gtz. O.O.) interviews (2004); Capitol Advisors Ltd. Hermosillo Case Study (1999); IDB, the Brazilian National Water Information System, and OECD, Ciudades Estratégicas (2000).

2.37 According to official estimates, 69 percent of Mexican water users are metered and are charged increasing-block tariffs.⁶⁵ However, from a poverty perspective increasing-block tariffs are questionable, as demonstrated by a recent international study that shows that the benefits from increasing-block tariffs accrue mainly to the better off.

2.38 Thirty-one percent of water customers are not metered and are charged a flat rate (*cuota fija*) independent of consumption. In a few instances, flat rates are differentiated by neighborhood, and sometimes sharply so. For example, in the Federal District the flat rate in the highest cadastral category is 20 times higher than in the lowest. Since the level of water consumption does not vary that much among income groups, this type of water tariff may have a progressive incidence. Geographically differentiated tariffs that are even crudely based on poverty levels may reach the poor more effectively than increasing-block tariffs.

2.39 According to the 2002 Household Survey the average share of expenditures for piped water supply in household income was 0.65%, varying between 1.0% for the first decile and 0.4% for the tenth decile (see Figure 2.6 above in the section on electricity showing the shares of expenditures for both water and electricity).⁶⁶ This share is low in international comparison.

⁶⁵ An analysis of domestic water tariffs in 23 Mexican cities with increasing-block tariffs reveals that many utilities allow a broad lifeline consumption of up to 30 cubic meters per month, or about 240 liters per capita per day. Such broad lifeline blocks defeat the purpose of cross-subsidization among domestic users, because the great majority of domestic users fall into the highly subsidized category.

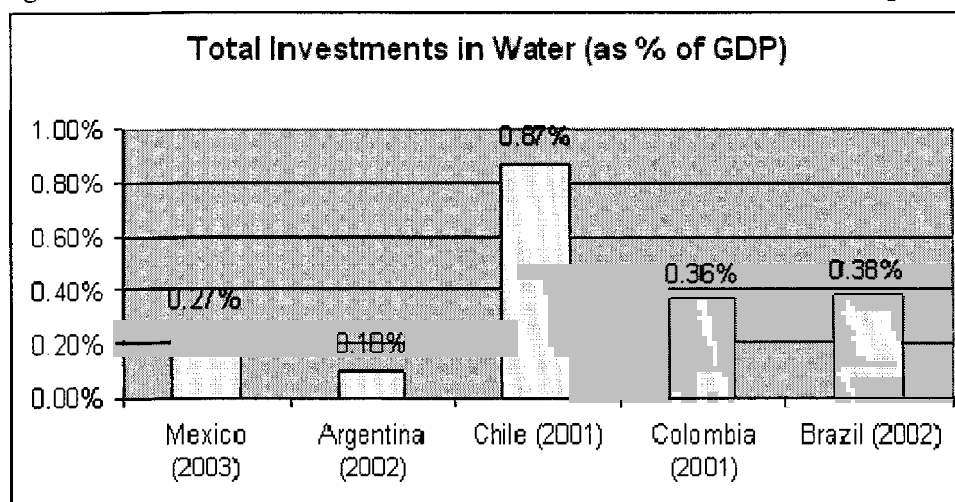
⁶⁶ World Bank calculations based on data from the 2002 National Survey on Household Income and Expenditure (ENIGH) by INEGI.

2.40 Expenditures for water from tankers and bottled water are estimated to be many times higher than expenditures for piped water supply across income groups, for both households with and without access to piped water. These expenses have not been included in the census data. Households with access to piped water frequently suffer from intermittent supply, and do not trust the quality of the water supplied. Therefore they frequently build cisterns, buy water in large bottles, boil or filter piped water, and buy water from tankers. These costs for coping with the poor quality of piped water services have not been estimated for Mexico, but are thought to be several times higher than the current costs for piped water supply.

Spending

2.41 Total investment in the sector was estimated by the World Bank to be MxP16.6 billion (US\$1.5 billion) in 2003, or 0.27 percent of GDP.⁶⁷ This is lower than investment levels in other countries of the region (Figure 2.10). Investment in water supply and sanitation declined by 45 percent in real terms from 1993 to 1996 due to the economic crisis, recovering only slowly. In 2003, it again increased significantly, finally exceeding its pre-crisis level. The impact of the low investment levels has been felt in the persistence of poor service quality, and in low levels of wastewater treatment.

Figure 2.10: Investment in Water as a Share of GDP – International Comparison



Source: Calderón and Servén (2004). The Mexico 2002 figure has been calculated by the World Bank, including investments under FAIS and by housing developers.

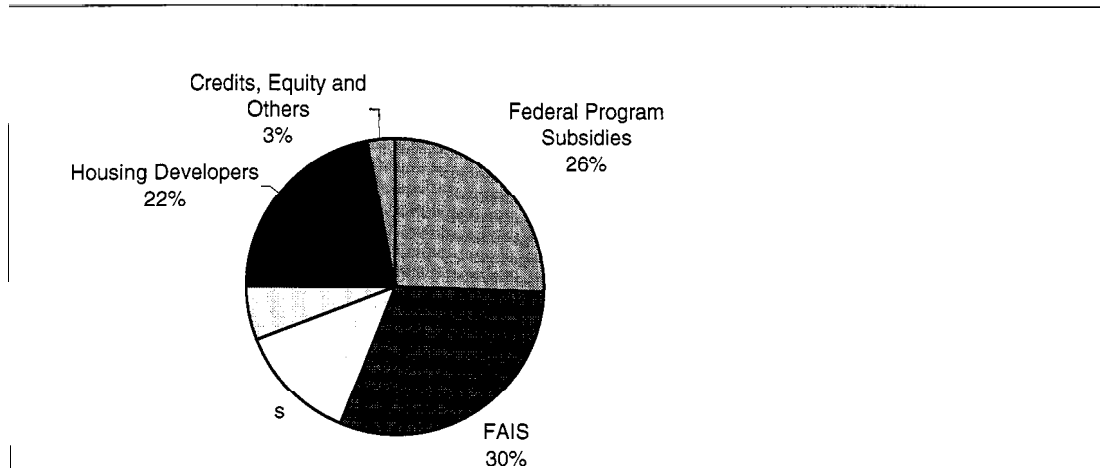
2.42 Federal subsidies (including Ramo 33) are estimated to account for 56 percent of investment financing in water supply and sanitation in 2003, complemented by state subsidies (13 percent) and a small share of municipal subsidies (Figure 2.11).⁶⁸ Internal cash generation and commercial credits account for only a small share of investment

⁶⁷ Based on a gross domestic product of MxP6,245 billion in 2003 in current prices. Source: INEGI Web site. The investment figure includes an estimated MxP5 billion of water and sanitation investments through FAIS, which are not included in CNA statistics.

⁶⁸ CNA statistics do not distinguish between municipal subsidies and internal cash generation by municipal service providers, thus making it impossible to precisely establish the total level of subsidies to the sector.

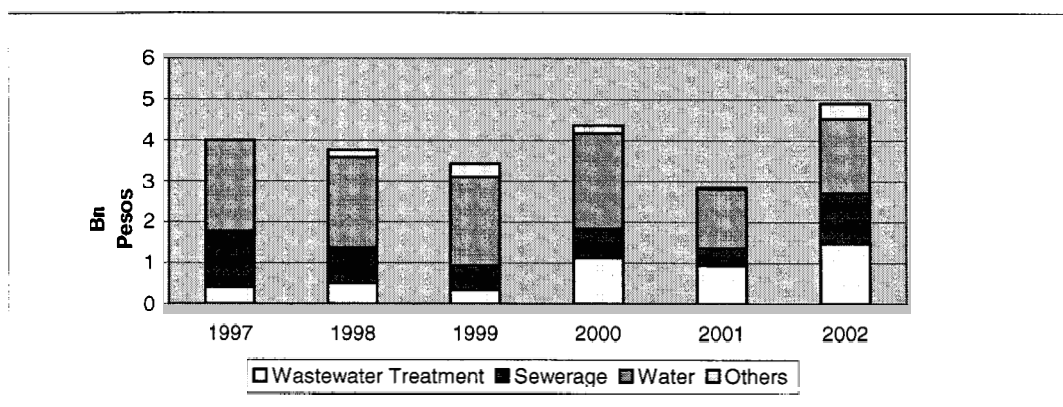
financing (possibly 5 percent), although available data do not allow making a precise estimate. By far the largest source of investment funding for the sector besides the Federal Government is housing developers (22 percent), which construct water and sewerage systems within their developments and which increased their investments substantially as part of large subsidized housing programs initiated in 2001.

Figure 2.11: Estimated Funding of Water and Sanitation Investment in 2004



2.43 Before 2000, investments in sanitation were neglected compared to investments in water supply. Since then, this distortion has been corrected, in particular through a substantial increase of investments in wastewater treatment in response to federal pressure to comply with norms for wastewater treatment. Figure 2.12 shows the breakdown of investments by subsectors.

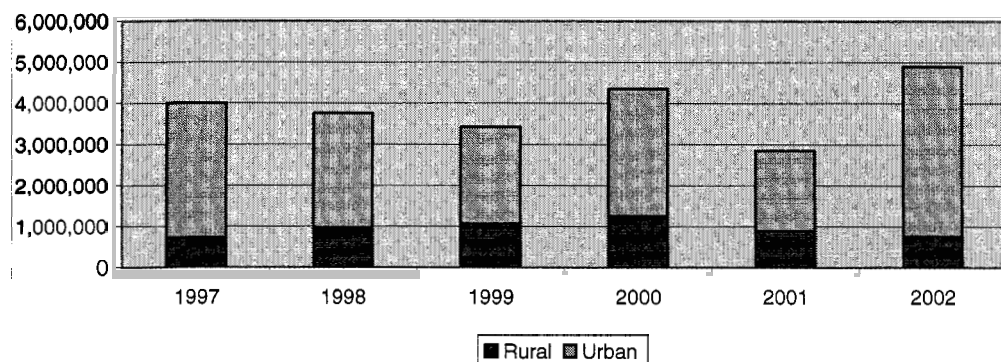
Figure 2.12: Investment in Water and Sanitation by Subsectors, 1997-2002 (in constant prices)



Source: Barocio (2004), using CNA figures. This includes only investments under CNA programs. Figures for 2003 are not included, because they do include substantial investments outside CNA, and thus are not comparable to earlier years.

2.44 As can be seen in Figure 2.13, the share of investments allocated to rural areas declined since 2000. In any case, a slight long-term decrease in the share of investments allocated to rural areas may simply reflect the lower share of the rural population in the total population.

Figure 2.13: Investment in Water and Sanitation by Urban and Rural Areas, 1997-2002 (in constant prices)⁶⁹



Source: Barocio (2004), using CNA figures. This includes only investments under CNA programs. Figures for 2003 are not included, because they do include substantial investments outside CNA, and thus are not comparable to earlier years.

2.45 The high average level of non-revenue water in Mexico (discussed in chapter 1) and feasibility studies suggest that investments in the reduction of distribution losses would be more cost-effective than investments in new bulk water supply infrastructure.⁷⁰ For example, a 1996 study estimated that the unit investment costs of leakage reduction in Mexico City would be eight times lower than the unit investment costs of additional bulk water supply (Ciudad de México 1996).⁷¹ It seems that despite a stated priority for investments destined to “increases in efficiency,” there is still a preference for investments in bulk water supply as opposed to investments in leakage reduction.

C. ROADS

Outcomes

2.46 Mexico’s road network is extensive. As shown in Table 2.10, about 16 percent of the roads are federal roads and the remaining 84 percent are state and municipal roads. About 11 percent of the federal roads are toll roads. Mexico’s road network presents congestion problems around large cities, however, and still fails to link some rural areas

⁶⁹ In 1,000 Mexican Pesos

⁷⁰ While it could be argued that the rapid increase of access (see chapter 1) at a time of declining investments during the 1990s could be interpreted as a sign of efficiency, it appears that it is more the result of prioritizing coverage expansion over rehabilitation and wastewater treatment.

⁷¹ The unit costs were US\$0.4 per cubic meter and US\$3.17, respectively.

to major state and national highways. In Oaxaca, for example, 40 percent of the state's localities representing 15 percent of the state's population are not served by a road (Fay 2004:7).

Table 2.10: Road Network, in Kilometers, 2000

Jurisdiction	Toll Roads	Free Roads	Rural Roads	Pathways	Total
Federal	5,501	41,866	4,597		51,963
State	432	64,706	108,530		173,668
Municipal			47,058	60,557	107,615
TOTAL	5,933	106,572	160,185	60,557	333,247

Source: Sector Program 2001–2006, SCT.

2.47 As a result of insufficient investment in maintenance and modernization, the condition of many assets is not satisfactory. Many federal, state, and local roads are old and require either renovation or replacement, particularly with steadily increasing traffic. Road use has risen significantly over the last decade, with road transport by bus and truck currently accounting for 98.5 percent of domestic passenger traffic and more than 85 percent of surface freight cargo. Following trucking deregulation in 1989, and the advent of the North American Free Trade Agreement (NAFTA), trucking activity has grown by 32.5 percent, and the authorized weight of vehicles was raised from 34 tons in 1960 to 66.5 tons in 1997.⁷²

2.48 Mexico's road network is in poor condition and badly needs repair. Based on an assessment of 20 indicators that include operational standards, traffic, design characteristics, security, and maintenance, only 61 percent of the highway system can be considered modern, with 39 percent requiring improvements.⁷³ Moreover, only a fourth of the roads are in good condition, well below the average of a sample consisting mainly of other OECD countries (59 percent).⁷⁴ Overall, the main federal corridors still lag in maintenance and modernization, although there is some recent improvement.

2.49 State and municipally controlled roads are in particularly bad condition, especially in rural areas.⁷⁵ For example, in Chiapas, Guerrero, and Oaxaca, rural roads account for 73 percent of the total roads, and are either (a) improved tracks (9 percent), not really suitable for vehicles, and not usually passable year round; (b) dirt or gravel roads (6 percent), which may or may not be passable year round; or (c) surface roads (58 percent). Of the paved highways, only 9 percent have more than two lanes.⁷⁶

⁷² The trucking industry has been characterized by a relatively aged fleet (17.5 years on average). In addition, the high number of owner-operators led to inefficiencies and limits economies of scale, while at the same time providing only modest service quality and efficiency.

⁷³ Communications and Transport Sector Program 2001–2006.

⁷⁴ See Guerrero (2004). The source of data is PIARC.

⁷⁵ There is very little data on the quality of roads at the subnational level. This may be symptomatic of larger issues of quality in the sector at this level.

⁷⁶ Fay (2004:9); and "Anuario Estadístico 2003," SCT.

2.50 The efficiency of road maintenance also does not meet OECD standards. The operation and maintenance costs for toll roads managed by *Caminos y Puentes Federales* (CAPUFE) average US\$80,000 per kilometer in the main highways, compared to US\$40,000 to US\$50,000 in most countries.⁷⁷ In the maintenance of free roads, suboptimal programming and the absence of contractual incentives for better performance increase costs.⁷⁸

Tariffs and Cost Recovery

2.51 Despite reductions in the late 1990s, high fares have kept the use of many toll roads below capacity. Estimates suggest that toll tariffs would have to be reduced significantly to have a real impact on traffic patterns. This is largely due to many free roads that compete with toll roads for freight and passenger traffic. After the substantial reductions of the 1990s—from MxP12 to MxP2 per truck and kilometer in constant prices in the case of roads owned by the *Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas* (FARAC)—tariffs have been stable since 1998.

2.52 The decrease in tariffs for toll roads has led to increased usage, but the tariff levels are still high by international standards. In the FARAC network, the tariff is estimated to be US\$0.20 per kilometer for five-axle trucks. In the Mexicali beltway, which is currently under negotiations for a concession, the tariff is estimated to be US\$0.35 per kilometer for five-axle trucks. For one of the most expensive roads in Brazil (São Paulo–Ribeirão Preto), the tariff is around US\$0.10 per kilometer.⁷⁹

Spending

2.53 Federal road expenditures have fluctuated substantially (Figure 2.14), although with an increasing trend since 1998. The fluctuation is most evident in the construction of new roads and in the upgrading (modernization) of roads, reflecting political influences. The share devoted to maintenance and rehabilitation is more stable, although at a low level.⁸⁰

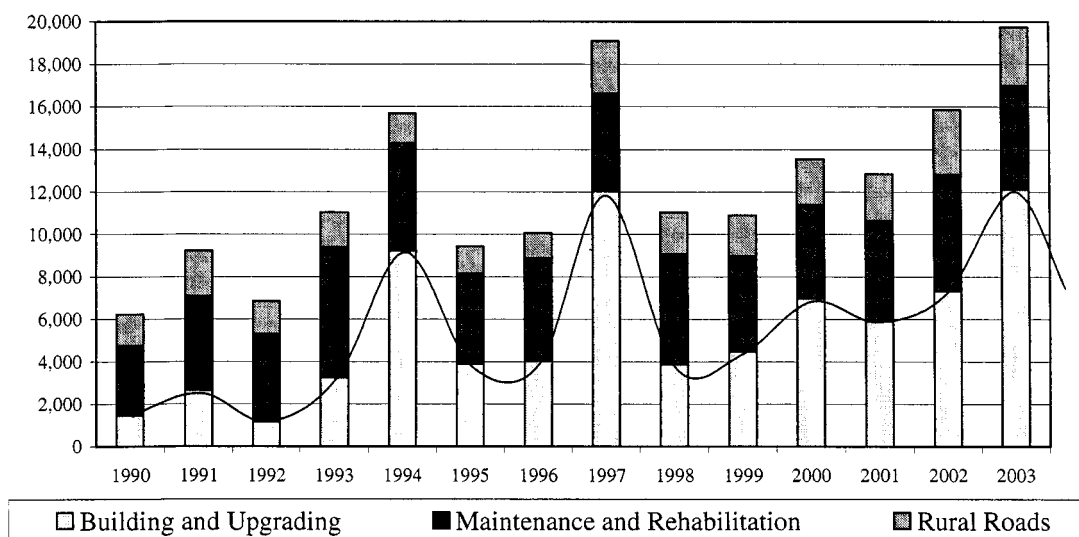
⁷⁷ Income-Expenditure Structure in 2001, CAPUFE.

⁷⁸ Regarding programming, until recently SCT was using a management program called SISTER to plan road maintenance. The program is fairly old in many respects; the need to update planning with new management tools such as the HDM-4 is essential. Regarding contractual incentives, so far fixed road segments were assigned to contractors at a flat rate, thus providing no incentives for improved performance.

⁷⁹ Sources: *Unidad de Autopistas de Cuota*, SCT, and “*Análisis de la Competitividad*,” Instituto Mexicano para la Competitividad (IMCO), septiembre de 2003.

⁸⁰ The budgetary process is discussed in Chapter 3, including an analysis of the impact of political agendas in altering overall flows of government funds to targeted investments that fall outside of sector plans issued by the SCT.

Figure 2.14: Federal Investment in Roads (million pesos, constant 2003 prices)



Note: State and municipal investments are not included in this table.

Source: "Tercer Informe de Gobierno."

2.54 Expenditures for maintenance and rehabilitation are low by international comparisons.⁸¹ They are estimated to have accounted for less than 0.15 percent of GDP in 2000, compared to 0.3 percent to 0.4 percent of GDP in other OECD countries (Guerrero, 2004).⁸²

2.55 There are no reliable figures on state and municipal expenditures for roads. They are tentatively estimated to be almost MxP7 billion per year, compared to federal road investments of about MxP20 billion in 2003. Extrapolating from a sample of 5 representative states (Oaxaca, Guerrero, Queretaro, Yucatán, and Sonora) to the 32 states, total state investment in roads is estimated to be MxP4.4 billion. Municipal investments in rural roads are estimated to be almost entirely funded through FAIS. It has been estimated, based on a survey of mayors, that in 2002, of the MxP23.5 billion in FAIS, MxP2.3 billion (or 10.5 percent) was used for rural roads.

D. RAILROADS

2.56 Structural reforms have enhanced quality and efficiency of service of Mexico's railroads, although they still fall short of international best practice. The rail industry shows a diminishing number of accidents per kilometer, better use of assets (as shown by

⁸¹ No breakdown is available between maintenance and rehabilitation, which are accounted for under the same category in the SCT budget.

⁸² Preliminary Data. This comparison should be made with caution because the inclusion of subnational expenditure in national figures is not clearly stated. There has been a recent initiative to increase the level of road maintenance at the state level, the impact of which is not reflected in Figure 2.13.

the higher number of tons per locomotive), improved service quality (as indicated by the lower number of losses and claims), and a more efficient use of fuel (see Guerrero 2004). However, as shown in Table 2.11, efficiency still falls short of levels achieved in the United States. In the World Competitiveness Survey major industrial users ranked the quality of Mexico's railways still fairly low, at position 57 out of 102 countries.

Table 2.11: Railroad Efficiency Indicators

Indicator	FNM 1995	Mexican System	USA Class One
1. Safety	168	34	4
2. Locomotives available	81	92	98
3. Operation	1.3	0.7	0.8
4. Traction efficiency	56	100	180
5. Service quality	0.0044	0.0022	0.0004
6. Fuel efficiency	108	185	255

FNM = Ferrocarriles Nacionales de Mexico.

1. Total accidents/million train kms.

2. Locomotives available/total locomotives.

3. Operation cost/operation income.

4. Million tons-km/total locomotives.

5. Losses and claims/tons-km.

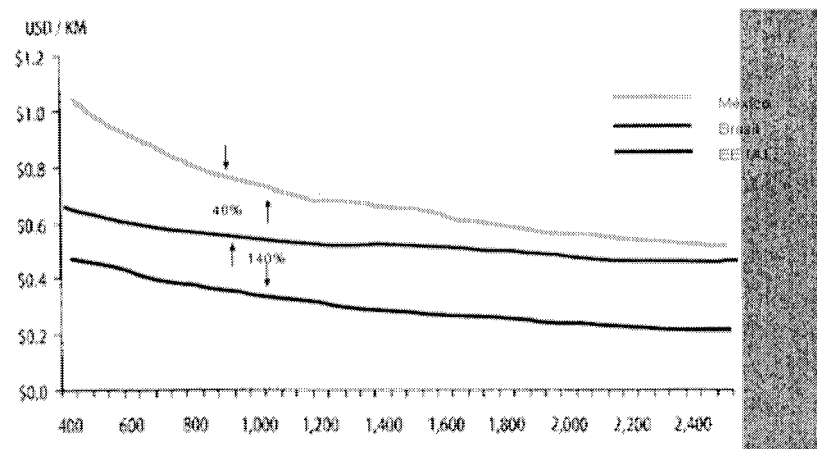
6. Tons-km gross/fuel liters.

Source: "Dirección General de Tarifas y Transporte Ferroviario y Multimodal," SCT.

2.57 The Railway Service Law establishes that tariffs are set freely by the concessionaires. This policy is based on the assumption that competition not only comes from other railways, but also from the trucking industry, and that interchange rules would be sufficient to promote competition among different concessionaires. Concessionaires are forced to register tariffs at SCT, and these tariffs then become maximum values; they may offer discounts to users in an equal and nondiscriminatory manner. SCT can establish the basis for tariffs when it concludes that there is no actual competition.

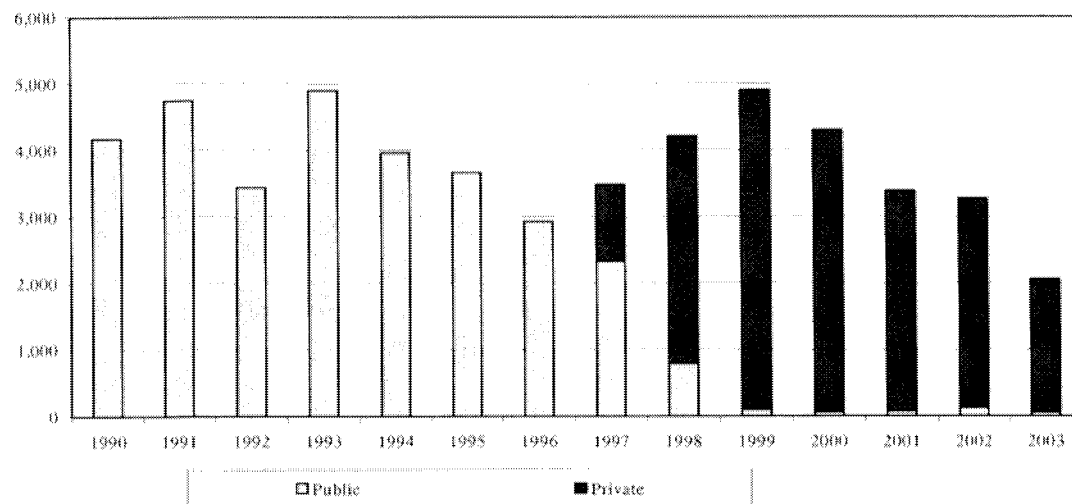
2.58 Costs for railway services are higher in Mexico than in Brazil or the United States, as shown in an analysis by the *Instituto Mexicano para la Competitividad* (Figure 2.15). This is partly explained by cargo characteristics: in the United States and Brazil, minerals account for a majority of the cargo that can be transported at a lower unit cost. In Mexico, due to the relatively low share of cheap bulk cargo and the scattered origin and destination patterns, train operation is necessarily more costly. Nevertheless, the lack of competition among concessionaires, due to the ineffectiveness of interchange rules and insufficient intermodal competition, are also contributing to high tariff levels.

Figure 2.15: Railroad Tariffs Comparison



2.59 Investments in railways display a variation trend that is characteristic for the industry. Despite a decrease in investments since 1999, investments carried out during 1997–2003 by private concessionaires have exceeded those originally agreed upon in the concession agreements. Public investments are minimal, limited to a single minor railway company in which the state maintains a majority, and some urban bypasses co-financed by states and private concessionaires (Figure 2.16).⁸³

Figure 2.16: Public and Private Investment in Railroads (million 2003 pesos)



E. PORTS

2.60 The tariff-setting policies in ports are the most liberalized of the infrastructure sectors, largely due to the Port Law reform in 1993, which created conditions for

⁸³ The Istmo de Tehuantepec line, which links the Pacific and Atlantic coasts.

competition and decentralized port management.⁸⁴ As part of the reform in 1995, port service prices were no longer set by the Government in order to encourage private investment, eliminate subsidies, and consolidate management and self-sustainable financial results. The chosen methodology in the port sector to determine infrastructure and services tariffs was total cost recovery. The system responds to an efficient cost structure in the long run, and reveals the productivity gains in the sector. Tariff updates depend on the request of concessionaires and may take place every six months. In cases where competition is not enough, a regulatory scheme based on maximum tariffs is adopted.

2.61 Increased investment and structural reforms have enhanced the quality and efficiency of service in Mexico's ports, although—just as with railways—they still fall short of international best practice. The port industry has posted significant increases in containers per ship transferred per hour, reducing the time ships need to stay in port. For example, in Veracruz—one of Mexico's busiest ports—productivity in handling containers doubled between 1995 and 2003.⁸⁵ For other ports the productivity gain increases have been in the range of 15 percent to 55 percent (see Guerrero 2004). However, in the World Competitiveness Survey, major industrial users still ranked Mexico's ports fairly low, at position 62 out of 102 countries. One problem for ports is the delays still experienced in moving cargo from terminal to rail or truck transportation. This is due to procedural and logistical factors not related to physical infrastructure. These include (a) the complex cargo review and inspection process, (b) the inability of users to properly prepare the documentation and payments, and (c) the failure to coordinate logistics with land-based transport.

2.62 Since their inception in 1994, *Administraciones Portuarias Integrales* (Integral Port Authorities, APIs)—which are allowed to freely set their tariffs—have been able to cover operational and capital costs. The three major ports of Veracruz, Manzanillo, and Lázaro Cárdenas show operational margins of around 45 percent between 1995 and 2003.⁸⁶ The success of ports in covering costs is likely attributable to an improved institutional arrangement that sets in place the correct incentives for maximizing investments and sustainability, and also an increase in demand for services.

2.63 Port tariffs are generally higher than international benchmarks when all charges are considered. Tariffs for port infrastructure use include two main categories: charges to vessels and charges to cargo. International comparisons are of limited value, since these two concepts are not homogeneous across ports. Mexico charges low tariffs per transferred ton on ports (US\$1.4 in Veracruz against US\$6.68 in Los Angeles).

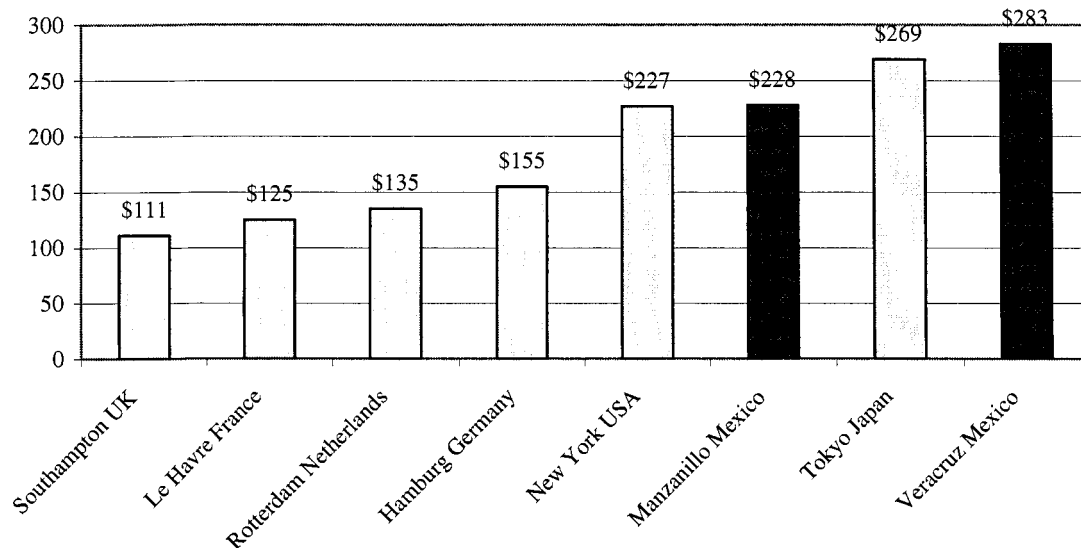
⁸⁴ Chapter VII of the Port Law established the legal framework for tariff setting. It states that SCT will set up in the concession agreement the basis for tariff setting as regards ports, terminals, and other related services when there is no effective competition. The regulation will stand as long as the conditions for its existence exist. Under the regulation, Integral Port Authorities were created as autonomous entities for the management and operation of ports.

⁸⁵ "Coordinación General de Puertos y Marina Mercante," SCT. It increased from 43 containers to 86 containers per hour.

⁸⁶ Financial Statements, 2003. Only in the case of one smaller port (Puerto Madero) does the Federal Government make limited transfers.

However, tariffs are much higher when all charges are considered (like shore-to-terminal cargo handling or custom's agent payments), as shown in Figure 2.17.

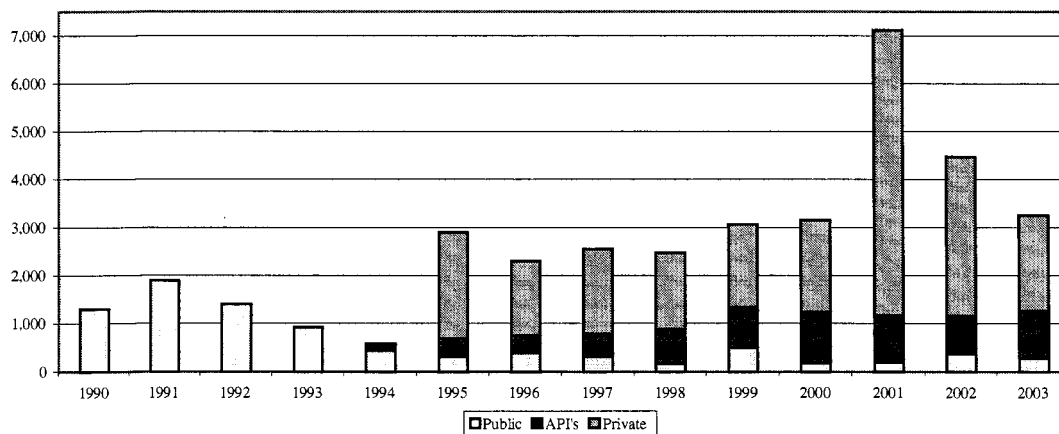
Figure 2.17: Port Tariff for a 2,800 Twenty-foot Equivalent Unit (TEU) Ship (thousand dollars)



Source: IMCO (2003).

2.64 The creation of APIs in 1993 has led to a significant increase in investment since 1996 (Figure 2.18). The total investment in ports from 1994 to 2003 was financed by the APIs (21 percent), private port operators (69 percent), and the federal and state governments (10 percent). Since 1999, federal funding has been limited to the few remaining fully government-owned ports.

Figure 2.18: Public and Private Investment in Ports (million 2003 pesos)



Source: "Tercer Informe de Gobierno" (2003).

F. CONCLUSION

2.65 This chapter has examined the quality of service, extent of coverage, and levels of spending in transportation, electricity, and water and sanitation infrastructure in Mexico. It also included a comparison of Mexico's performance characteristics with those of other middle-income and OECD countries. While Mexico has made steady progress in increasing coverage over the past decades, and has reached levels higher than the averages for Latin America, access to infrastructure services still remains below that of other OECD countries. Also, quality of service and operating efficiency lag behind other middle-income countries.

2.66 The degree of cost recovery varies substantially among sectors, but remains very low in two key segments: household and agricultural electricity users, and household users of water supply and sanitation services. Furthermore, the existing user subsidies are poorly targeted, with evidence in the electricity sector showing that most benefits accrue to the better off. Collection efficiency is very low in water supply and sanitation, exacerbating the problem of low tariffs, but also providing an opportunity to improve cost recovery without necessarily raising tariffs. The financing of subsidies occurs through direct transfers from both the federal and state governments, and through the nonpayment of *aprovechamientos* by CFE.

2.67 The main challenge is to improve the quality of services and operating efficiency, and to increase access to the remaining unserved areas, particularly in smaller cities, rural areas, and among indigenous communities. The next chapter reviews how institutions influence current spending patterns, efficiencies, and service quality, and explores options for institutional reforms that would foster achieving the goals of increased quality, efficiency, and access of infrastructure services.

3. BUDGETING, PLANNING, AND COORDINATION

3.1 An examination of the institutions in the infrastructure sectors shows a fragmented process of spending planning and allocation, and insufficient coordination within and across subsectors. In an overall context of tight constraints on central budget funding, we find two sorts of differential access to funds. First, some areas receive effective priority through their access to off-budget spending and to revenue from cost recovery, which is convenient but not necessarily in line with overall national priorities. Second, central budget funding tends to be distributed with a little for everyone, which ends up underfunding relative to needs in some areas that should be prioritized according to the government's objectives of competitiveness and poverty reduction.

3.2 Institutions are important for understanding and improving these outcomes, because they affect the structure and incentives for decisionmaking. The budget cycle of planning, annual budgeting, execution, and evaluation is at the core of the expenditure institutions within each agency. After discussing the budget cycle within each sector, this chapter considers issues of intrasectoral coordination, and the flows of money that are effectively decided outside the regular budgeting process—private financing and service charges. The lack of coordination among all agencies in each sector contributes to the ineffective prioritization in the overall allocation of resources.

A. BUDGET CYCLE—INVESTMENT PLANNING, ANNUAL BUDGET, EXECUTION, AND EVALUATION

Common Elements

3.3 The budget cycle starts ideally with a planning process, assessing the needs of the society and the funding that will be available. The plan usually focuses on investment needs, but it should also consider the associated requirements for current spending (salaries, maintenance, and so forth) and the availability of current revenue to pay for them. Next, the spending must be budgeted, annually in Mexico, to carry out a year of the plan. Then the budget must be executed, with procurement of construction, management of personnel, and adjustments to reflect deviations of revenues and costs from the budget projections. Finally, monitoring and evaluation should report on the quality and efficiency of the spending, and the evaluation should guide decisions in the next round of planning and budgeting.

3.4 In Mexico, the formal planning process by federal and state governments is done once every six years, at the start of each new presidential or gubernatorial term (which are not coterminous). These national and state development plans make statements of intent, unaccompanied by financing plans (or even cost estimates in most cases), indicative budget allocations, or effective prioritization. Hence, in the absence of

a revenue boom (oil), parts of the plans are immediately found financially unachievable, and as the *sexenio* progresses, they generally become obsolete. The annual budget formulation process, where real money is allocated, makes some reference to the development plans, but the links become more tenuous over time. Nonetheless, as shown in Box 3.1, the electricity sector and the federal roads subsector have some planning that is linked with budgeting.

Box 3.1: Planning and Budget Integration: Past and Future Options

To properly plan investment, centrally or within individual sectors, one needs to think in terms of a multiyear resource envelope within which to allocate the outlays for multiyear projects, along with the subsequent needs for debt service and operations and maintenance. Prior to the early 1990s, planning and budgeting in Mexico were done in a single secretariat—the *Secretaría de Programación y Presupuesto* (SPP)—which was separate from Finance. Even though the National Development Plan did not include an explicit financing plan, the SPP developed the plan with a good understanding of the financing requirements, and with some incentive not to produce a plan that they would not be able to carry out. Then, SPP was merged with the Secretariat of Finance to become the *Secretaría de Hacienda y Crédito Público* (Ministry of Finance and Public Credit, SHCP), so that the budgeting and spending activities would better take into account the availability of revenue.

After the SPP was converted into the Subsecretariat of Spending (*Egresos*, SSE) within SHCP, the location of the planning function was not institutionally specified. In the 1990s it was done by SSE, sometimes with good results. In the current administration, the *Plan Nacional de Desarrollo* (PND) was done within the *Presidencia*, with the objective of elevating its priority. The effect, however, was to leave the actual allocation of resources (by SHCP and the line ministries) out of touch with the plan; rather, the budget emerges from an interaction among sector ministries, each pushing its own agenda—with Congress and the SHCP—and SHCP trying to maintain fiscal discipline.

To strengthen planning and better link it with budgeting, other OECD countries have had success with a decentralized strategy, rather than a recentralization strategy, such as recreating the SPP or giving the Subsecretaría de Egresos an explicit mandate to do planning. The Cabinet or Central Executive, in coordination with the Ministry of Finance, sets the priorities for overall resource allocation and gives each sector agency its corresponding multiyear resource envelope, which is budgeted for the first year and is reflected in a rolling indicative plan for the next three to five years. Within these envelopes, the sectors develop their detailed plans, with allocations for investment and current spending categories. In Mexico, CFE already follows this rolling multiyear approach, and SCT is moving in that direction.

3.5 Box 3.2 lists the steps in formulating the federal spending budget, embodied in the annual *Ley de Ingresos*. In the budget formulation and execution, the *Secretaría de Hacienda y Crédito Público* (Ministry of Finance and Public Credit, SHCP) plays a central role, particularly in enforcing spending restraint, which became an overriding priority after the financial crises in the 1980s and mid-1990s. It does not act in isolation, however, and the parts in italics indicate where political negotiations are particularly important.

3.6 For investment budgeting, new processes are currently being introduced. The SHCP Unidad de Inversiones (Investment Unit) developed a Nuevo Sistema de Inversión Pública (NSIP) in 2003; the implementation for all public investment is just starting. The NSIP requires technical, economic, and environmental assessments as prerequisites to set a code number for each project, which is mandatory for a project to enter into the budgeting process. The NSIP is looking for a more careful assessment of projects; for large investment proposal, the NSIP requires a third-party expert opinion. The originating agency selects and pays the expert; however, if SHCP selected and paid for the expert, the opinion would tend to be more independent and neutral.

3.7 For investments executed with in the federal budget, the expenditure-control process is structured directly by SHCP through the *Cuenta de la Hacienda Pública Federal*, which registers the flows granted and executed in all government programs on a yearly basis. If irregularities arise, the *Auditoria Superior de la Federación* (a body that reports directly to Congress) is in charge of sanctions. In 2004, SHCP developed a new mechanism to make the process quicker and more transparent—the *Sistema de Información de Proyectos de Inversión* (SIPPI), housed in SHCP. SIPPI will allow for online portfolio management of all government projects, automatically linking the budget allocation of funds with their current execution. Within SIPPI, SHCP is developing a module that will allow for the consultation of the cost–benefit analysis of the projects and their ex post evaluation, which was previously unavailable.

Box 3.2: Steps in Formulating the Federal Spending Budget

1. SHCP sends main guidelines to sectoral agencies.
2. Sectoral agencies prepare first draft Annual Operative Programs (POAs), with sector priorities.
 - a. *States and municipalities (subnational governments [SNGs]) exert influence.*
3. SHCP reviews draft POAs, *negotiates* with sectors, and sets the fiscal envelope for each sector.
4. Sector agencies develop definitive POAs and deliver them to SHCP.
5. SHCP integrates sector POAs into a consolidated draft federal budget and delivers it to Congress.
6. SHCP and Presidencia *negotiate* budget with Congress.
 - a. *Sector agencies lobby Congress.*
 - b. *SNGs exert influence with their Deputies and Senators.*
7. Congress approves budget, with modifications.
8. Sector agencies revise POAs to be consistent with the approved budget.
9. Sector agencies execute the budget, subject to cuts required during the year by SHCP.
 - a. *SNGs and sector agencies exert influence.*

Note: The parts in italics indicate where political negotiations are particularly important.

3.8 Some important spending in each of the infrastructure sectors is outside of the regular federal spending budget, under the headings of *Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas* (FARAC), *Proyectos de Impacto Diferido en el Registro de Gasto* (Projects with Deferred Impact in the Budgetary Registry, PIDIREGAS), and the subnational governments, as noted in the section on agency structure and elaborated below in the sector-specific contexts. PIDIREGAS, nonetheless, are being brought into the budget process: the borrowing with PIDIREGAS does have to be approved by Congress within the revenue budget; the outlays for interest and amortization of previous years' PIDIREGAS are in the spending budget; and the list of new projects to be financed with this scheme are presented. The borrowing and spending by FARAC remains outside the budgeting process. Of course, the borrowing by *organismos operadores* (OOs) and municipalities for local water works is completely outside federal budgeting and control mechanisms, although the funding is mixed with federal transfers from *Ramo 33*, and the federal *participaciones* are sometimes the collateral for the local borrowing.

3.9 Usually, the sectoral ministries or agencies are in charge of project identification, selection, and development. The rationale is that these ministries or agencies have more experience than others in aligning their projects with the national development plan and sectoral programs, and that eventually the Ministry of Finance would refuse projects that are not consistent with macroeconomic or budgetary constraints. This approach is not always effective, however, since some agencies are motivated by private interests, and the Ministry of Finance is not always politically able to turn down bad projects. It is important to mention that, in accordance with the legal framework associated with the budget, it is the Congress who ultimately approves the issuing of new PIDIREGAS.

3.10 The implementation of projects, including procurement, is under the individual management of the relevant secretariat or agency. In procurement, Mexico has made considerable progress in standardizing the process and making it more transparent. As discussed in Box 3.3, however, it does not effectively assure that the most cost-effective bids are selected. Other aspects of implementation and subsequent evaluation are handled in a more ad hoc manner, with substantial variation across sectors.

Box 3.3: Procurement

Although Mexico has made important progress in improving procurement practices, there still remain substantial deficiencies in transparency and achievement of the objective of getting good value for public money, especially for infrastructure investment in many areas. Mexico's e-procurement system—COMPRANET—has succeeded in becoming the almost universal venue for advertising opportunities for contracting at the federal level, although not yet at state and municipal levels. For the subsequent step of bidding, however, COMPRANET is slow and cumbersome, and is therefore essentially never used for bidding civil works, even at the federal level.

Infrastructure investment contracts were bid with a two-envelope system until 2005, so that bids evaluated on non-price dimensions to get a short list, and then only they are evaluated on the basis of prices, which had been concealed in the second envelope. The time officially allowed for bid preparation is typically short—10 to 30 days—whereas 40 days or more are normally needed. Thus bids are rarely well prepared unless a bidder can access insider information. In practice, in some cases, this allows a few firms to collude and overprice their bids, because they obtain critical information through informal channels to prepare the bid, and more competitive bids are disqualified on technical grounds. Allowing more time for bid preparation (according to size of project), making projects of optimum size (usually larger), and switching to a one-envelope system would improve the procurement process. Single-envelope bids, with price and technical quality revealed from the start, would make collusion more difficult by making its cost clearer. Congress passed a new procurement law in 2005, making some important reforms, including the one-envelope system for bidding, a requirement of clearer and more objective award criteria, and an allowance for contracting beyond the fiscal year, with approval of SHCP.

Other problems with procurement are the crush of completing most contracting near the end of the fiscal year, with a rushed schedule to finish a project that only has a budget assured for a single year. This also means that what should be larger projects get fragmented into pieces that can be finished in a year or less—but at higher total cost—problems also observed in other countries in the region, where future budget commitments (*vigencias futuras*) have become sources of corruption and budget rigidity. Getting a guaranteed budget for enough years to finish a project would therefore increase efficiency in the allocation and use of public resources.

An improved procurement system will have a significant impact on both national investment rates and long-term growth rates. Regulation and implementation are the important next steps, for which good practices could be learned from Canada, the United States, and some European countries.

Transport

3.11 The analysis here of the transport expenditure process concentrates on roads, due to the sector's dominant size, and because railroads and ports have been privatized or made to operate on a commercial basis. Thus they are largely outside the federal budget allocation process. The policy guidelines and project identification for highway investment result in a top-down process with two stages: the overall sector strategy, and the identification and prioritization of specific projects.

3.12 Three considerations, in addition to technical factors, have shaped the highway strategy in Mexico: First, since around 1990 the Federal Government has largely followed the policy of not constructing new toll-free highways. Second, the toll-road system is expected to generate enough revenue to cover its current and capital-service cost. Thus new federal highway investment only goes where there is demand sufficient for a second highway to make substantial revenue with tolls, although each segment does not need to be financially self-sufficient.⁸⁷ The rest of federal highway spending (over half) goes to upgrading existing highways, often substantially, and to maintenance. Third, highway investment ranks among the most visible and politically salient federal infrastructure spending. Thus it is not surprising to see the three-year political cycles reflected in Figure 2.13, with peaks in the congressional (and presidential) election years—1991, 1994, 1997, 2000, and 2003.

Sector Strategy Formulation Recommendations

3.13 Sector planning is especially important for transport, because of the network interdependency. The public sector involvement in transport includes the provision of basic infrastructure (by itself or through agreements with private operators). The infrastructure is usually integrated in networks, therefore requiring physical coordination (planning) for its optimal development. There are also many externalities associated with infrastructure. The market has a strong role in transportation (in services and infrastructure operations), but some public planning remains essential, to assure complementarity.

3.14 Planning should consider all modes of transport and the different levels of government involved, but the tendency in Mexico is to approach transport planning mode by mode and government by government, disregarding the links. The main transport network—that is, the road network—and services are split among national, state, and municipal jurisdictions. Therefore, public planning should be undertaken at all levels, and in many cases it should coordinate vertically (primary and secondary networks) and horizontally (several municipalities within metropolitan regions). Best practices currently look for strategic planning. Although models are required to perform sound plans, a high-level strategic policy exercise should precede the technical exercise. The European Union, Canada, the U.K., and the U.S. Department of Transportation provide good examples of strategic planning.

3.15 The *Plan Nacional de Desarrollo* (PND) 2001/2006 constitutes the general framework, and is the basis for the transport Sector Program 2001/2006. These documents are produced at the beginning of the Presidential term; the Sector Program is based on the *Secretaría de Comunicaciones y Transportes* (Ministry of Communication and Transport, SCT) research, a consultation process (*Foros de Consulta Ciudadana*), and previous programs. It defines the key strategies and goals for the period, estimating

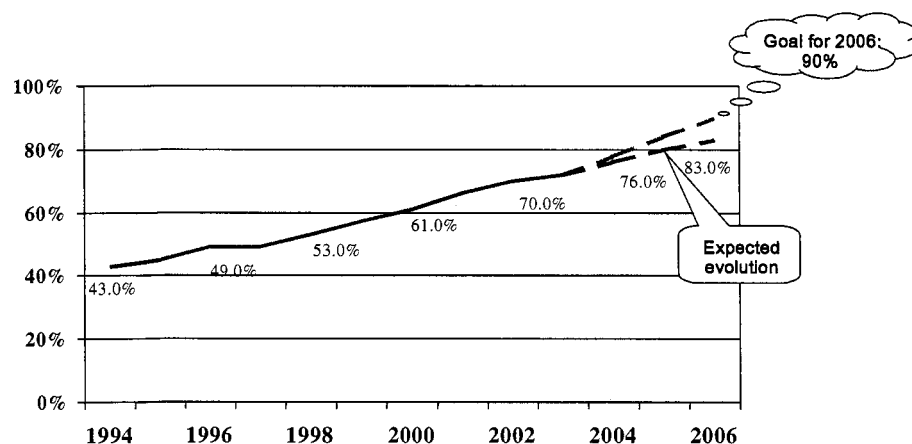
⁸⁷ The Constitutional clause mandating “free mobility” is sometimes interpreted to mean that the government may not construct a toll road on a route for which there is not also a toll-free highway. Due to the density of the existing highways, however, it is rare that the government cannot construct a toll road because a non-toll connection is lacking.

the required resources. For highways the Sector Program 2001/2006 includes two main pillars: (a) the modernization of 89 percent of the length of the established 14 key corridors of Mexico's federal roads by 2006, and (b) the achievement of a goal of 90 percent of paved roads in good or acceptable condition by the same year. Although overall resource needs are estimated at this stage, there is no financial planning or budget allocation, and therefore no guarantee that the goals established could actually be achieved.

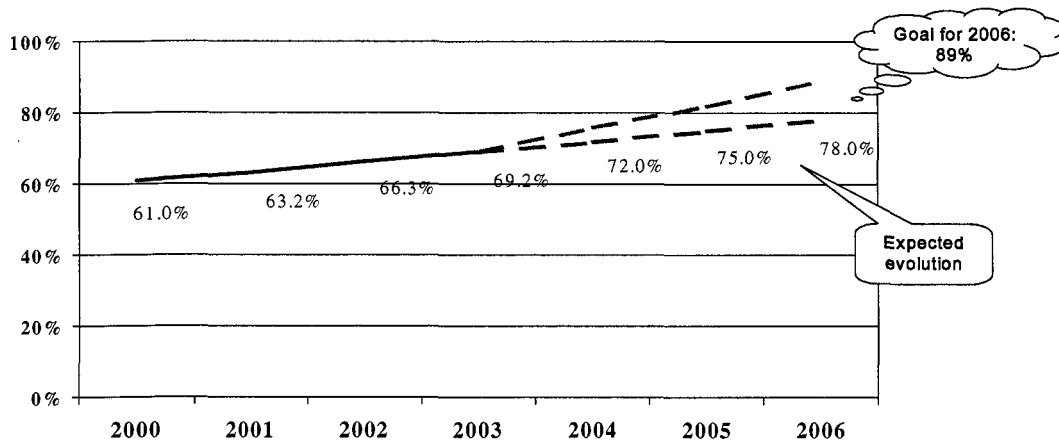
3.16 Figure 3.1 shows the original goals of the PND and the actual progress in the two key programs. Seventy-one percent of the highway corridors were modernized by 2003 (widened, straightened, and so forth), and an 83 percent goal is likely to be attained by 2006. Toward the goal of improving road conditions, 69 percent of the road surfaces were brought up to good condition by 2003; at this execution pace, approximately 78 percent is expected to be completed by 2006. Although the six-year program establishes goals and estimates resource needs, it is the yearly budgetary process that allocates funds and sets the pace for actual achievement of the goals.

Figure 3.1: 2001/2006 Program Original Goals and Expected Progress

(a) Modernization of Major Highway Corridors



(b) Road Condition Good or Acceptable



3.17 Setting goals and measuring achievements in this open manner is a step in the right direction. Figure 3.1.a measures the share of roads with designs that were upgraded, with straightening, widening, and so forth. Figure 3.1.b looks at road condition. International experience has also shown the benefits of measuring the cost per kilometer of achieving this, and of external performance audits to verify the achievements, and this would be a good next step for Mexico.

3.18 **Project Identification and Ranking.** The *Unidad de Autopistas de Cuota* takes the lead in evaluating the projects to be included in the investment program, both toll and free roads, because it has the best technical capacity. It is organized with particular emphasis on regional coordination, including the participation of states in several regional working groups and active input from the SCT regional centers. The objective of federal integration in defining investment needs is reinforced by regional agreements between several states and the Federal Government, and by bilateral agreements between it and some particular states. In these agreements, states assume some responsibilities for the projects, mainly the liberation of the right of way, and eventually co-financing works.

3.19 The working groups appointed by the *Unidad de Autopistas de Cuota* review the regional portfolios that the SCT Regional Centers develop in discussion with the states in their areas, check the progress in projects development, and finally set a list of priorities based on established criteria. These criteria—presented in Box 3.4—reflect a multi-criteria analysis aimed at balancing technical, economic, financial, and environmental aspects with political interests and agreements. The first four criteria are the most relevant: they reflect the strategic objective of concentrating efforts in the 14 key corridors, allow for the continuity of multiyear projects, avoid the budgeting of projects without adequate preparation, and reflect local authorities' preferences. When rigorously emphasized, these provide a solid technical basis for selectivity. When the main criteria are interpreted loosely and mixed with the secondary criteria, almost any ordering of projects is possible, and the actual selection may be political and with little

technical or economic justification.

Box 3.4: Criteria Followed by SCT for Setting Priorities for Road Investment

Main Criteria:

Location within the 14 major corridors.

Work in progress.

Level of project preparation.

Regional/state preferences.

Secondary Criteria:

Socioeconomic impact.

Potential for private finance.

Contribution to other projects.

Environmental impact.

Co-financing with states.

Scope of the project benefits.

Impact on poor and marginal communities, and other existing commitments within the state.

3.20 The cost–benefit analysis is barely a preliminary one. Cost estimates are based on standardized unitary costs; benefits are based on existing traffic flows when the projects are improvements of existing roads (even though the presumed result would be more traffic), and on origin–destination studies when they are new links. No network model is used as a support of project evaluation. The multi-criteria mechanism can be seen as a compromise between technical considerations and political bargaining. According to experts, project evaluations usually yield an internal rate of return (IRR) that is barely above the minimum threshold established by SHCP (12 percent), which indicates the weakness of the portfolio, since even a slight worsening of the economic context would put the IRR below the threshold for most of the projects.

3.21 The program for planning maintenance focuses on bringing the whole federal highway system up to adequate standards by 2006. After severe deterioration of the system due to lack of sufficient funds during the 1990s, the government has launched a program for highway maintenance that will total US\$309 million.⁸⁸ The program was set as a priority in the budget and the Sector Program 2001/2006 after the diagnosis of the condition of highways.

3.22 ***Budget Preparation, Negotiation, and Approval.*** The negotiation and approval of the SCT budget involves mainly SCT, SHCP, and the Congress, as described in Box 3.2. SCT also prepares an additional list of projects beyond their main submission of Annual Operative Programs (POAs), in case more resources become available. Highway resources in Mexico result from the overall budgeting process, because there is no specifically earmarked road fund. An incipient *Fondo Carretero* was recently implemented, aimed exclusively at financing the public component of the private–public agreements under the new toll-road concessions scheme. Investment in construction and

⁸⁸ The World Bank finances US\$218 million of this program.

maintenance of free roads uses exclusively budget resources.

3.23 In recent years the Congress has introduced major changes to the highway budget proposal submitted by SHCP. For example, in 2003 the Congress raised investment resources to 3.4 times the request from SHCP, and maintenance resources to double the request (Table 3.1); SCT and subnational entities lobbied the Congress to get the budget increase. In some cases, the money put back in by Congress goes to fund projects initially (reviewed and) proposed by SCT, but increasingly Congress has proposed to fund projects without any prior technical analysis.⁸⁹ Box 3.5 on pork-barrel spending discusses this. The Congress did this for the 2005 budget on an even larger scale, leading to a Presidential veto and some Constitutional uncertainty. A decision of the Supreme Court in spring 2005 seems to have resolved the issue in favor of giving the executive priority in budget details, like which project to do, and letting the Congress decide on broader issues, like spending ceiling for sectors and subsectors.

Table 3.1: Evolution of Resources for Highways in the Budget Process (Year 2003, in 1,000 millions of Mexican pesos)

Item	Originally Requested by SCT	Request by SHCP to the Congress	Amount Authorized by Congress
Construction	7	1.8	6.1
Maintenance	5	2.5	4.9
TOTAL	12	4.3	11

Source: DG de Programación, Organización y Presupuesto, SCT. Values rounded.

⁸⁹ SCT submits to SHCP an additional list of projects that would be worth doing if unforeseen funds became available through, for instance, a rise in oil prices.

Box 3.5: Pork-Barrel Spending

Although the main highways and roads funded by the national government have some nationwide benefits, most of the benefits are relatively local, as are the employment effects of building them. Consequently, as in many countries, road building is a principal ingredient of pork-barrel politics; state delegations in Congress are always inclined to push for more funding than is in the national interest, which is better represented by the Federal Executive. In Mexico, transport is the largest investment sector outside of energy, and most transport investment goes for roads. In looking at institutions for road budgeting, one must ask not only how well the budget process constrains the appetite for pork, but also how well the Executive uses the distribution of projects to achieve its other political and policy objectives.

Two or three decades ago, in the heyday of PRI hegemony, pork was an important currency for maintaining party discipline and supremacy. Since the end of a one-party majority in Congress in 1997, the politics and practice of budgeting has changed. Two of the new developments have probably made the process less efficient in terms of political bargaining to achieve national objectives. First, Congress is earmarking more of the investment budget for specific geographic destinations, which shows up particularly in transport. This makes the process more transparent but also more rigid. In the 1990s and before, the Executive often made unwritten agreements with governors and legislators, promising public investment in return for votes on one issue or another. In 2001–02 these promises were often unfulfilled, and regional interests in Congress reacted by putting them into the annual budget law. The second development is a less-united front of the Executive Branch. For, example, in 2003 the SCT requested a budget of MxP12 million for 2004, SHCP put barely a third of that in the budget request to Congress, and then SCT lobbied with state interests in Congress to get the transport budget back up to 90 percent of the original request. The same pattern was repeated in 2004 for the 2005 budget, but the 2005 Supreme Court decision may reduce the problem for the future. The government could also continue its practice of listing technically approved projects that did not fit into the proposed budget, in order for Congress to have a feasible slate to choose from.

One would expect Congress to add some politically motivated, but it would be more politically efficient if their distribution were used to achieve some other national-interest reform on the President's agenda—labor, energy, fiscal, and so forth—rather than just to advance one sectoral interest within the Cabinet.

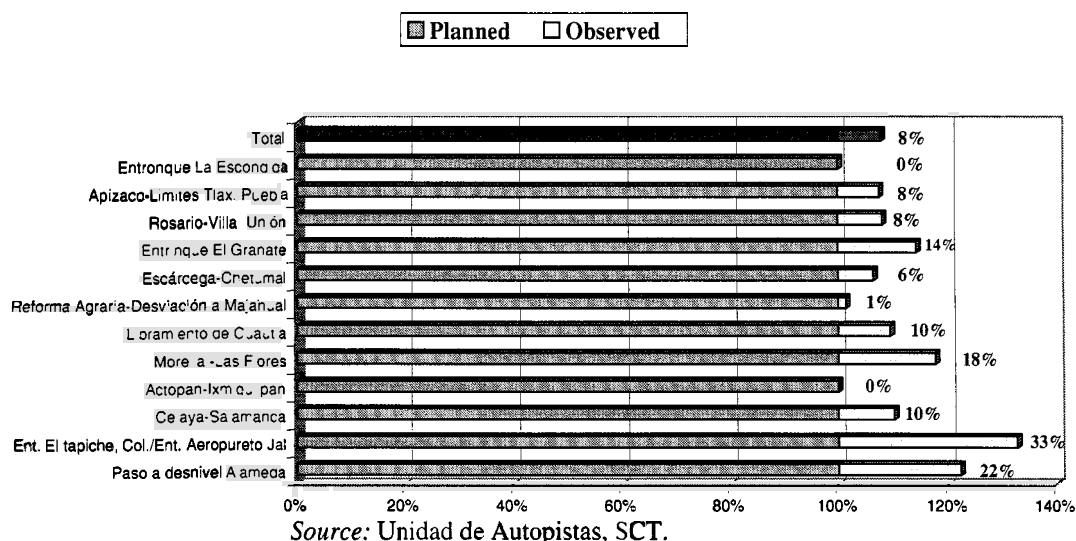
3.24 *Budget Execution and Control.* Once the SCT yearly program is defined and the budget approved, projects start (or continue) being implemented. At an aggregate level, allocated resources are almost all expended. In 2003, of the MxP24.4 billion approved for the transport sector in the federal budget, MxP24.2 was spent, accounting for 99 percent. The same can be said for the roads subsector, with MxP21.4 billion approved in the budget and MxP21.2 spent, again accounting for 99 percent of the total.

3.25 Looking at the project level, the picture is quite different. A sample illustrates significant variations, with an average 8 percent increase, with cases of up to 33 percent, and all of them showing costs higher than approved⁹⁰ (Figure 3.2). If the project evaluation with the original costs was hardly above the minimum IRR threshold, cost overruns this size may move them below the threshold; this may be exacerbated if traffic

⁹⁰ An increase in expenditures of up to 25 percent can be approved without a project review.

(and therefore benefits) is less than forecast when the project was submitted for approval. Since the whole of investment spending stays within the sector ceiling, some projects must have been dropped or substantially underexecuted (Figure 3.2). If the projects that turn out to be more problematic and less worthwhile are the ones dropped, then concentrating on the better projects is not so bad. Thus, it would be useful to review the rationale for dropping projects.

Figure 3.2: Planned Compared to Executed Highway Investments, A Sample of Projects



3.26 The fragmentation into annual pieces of what should be multiyear projects becomes even more problematic in the implementation phase, because budget uncertainties and the (re-) bidding process delay the release of funds and completion of works. To help address this problem, the New Concession Scheme (NSC) was instituted as a highway subaccount within *Fondo de Inversión en Infraestructura* (Infrastructure Investment Fund [FINFRA], a fiduciary fund for infrastructure, administered by BANOBRAS, like FARAC), which operates as a *Fondo Carretero* in the sense that funds put there can remain into the next fiscal year with earmarking for highway investment. During 2003, FINFRA received enough contributions to allow for a multiyear budget and a variety of projects because the resources available surpassed MxP\$14 billion. However, due to the lack of capacity to implement more than three or four important projects at the same time by the *Unidad de Cuota* and BANOBRAS, and the complications found by the private investors for taking part in the NCS, funds have been only partially used. Once allocated in FINFRA, resources are managed outside the budget, which has advantages for manageability (that is, carry over), but it needs to be done in a transparent manner.

3.27 Maintenance of federal roads is carried out mainly by third parties on contract. Two chief players on the government side do the contracting: CAPUFE and the SCT's General Directorate of Road Maintenance (DGCC). CAPUFE handles maintenance in the toll-roads system, the ownership of which is gradually being transferred totally to

FARAC. DGCC is in charge of maintenance for the non-toll federal highways.

3.28 For the toll roads, the rules of concessions require guarantees of adequate funding for maintenance (SCT 2003:26). Minor maintenance is done directly by CAPUFE; FARAC reimburses the funds on a weekly basis for those services for which CAPUFE can provide evidence of execution. In major maintenance, CAPUFE outsources the works to contractors through a bidding process; FARAC reimburses CAPUFE for the works proven to be done. Problems sometimes arise because CAPUFE does not provide any performance indicators, making it difficult to evaluate its efficiency. FARAC lacks the capacity to properly monitor CAPUFE, especially to avoid gold-plating behavior (that is, speculative behavior in which those activities that generate the largest profit are selected), which is tempting, given FARAC's off-budget income. Auditing and monitoring by FARAC are weak: the unit has only 20 people to supervise 23 major concessionaires.

3.29 For the federal free roads, the expenditure-control process is better structured directly from SHCP through the *Cuenta de la Hacienda Pública Federal*, which registers the flows granted and executed in all government programs on a yearly basis, as noted above. Maintenance of the free federal highways looks more efficient than for toll roads, although the funding is less generous due to budget constraints. Minor and major maintenance is entirely outsourced by DGCC following a fairly transparent bidding process—mostly through COMPRANET, the federal e-procurement program—and controlling execution. However, in this case contracts are assigned with conventional bidding for certain works (rather than longer-term contracts for maintenance up to a certain standard), which implies high administrative costs and lack of incentives for efficiency. Recently the government attempted to broaden the scope of maintenance and grant the contracts in an integral, multiyear, and output-based manner. To this end, the *Programa Piloto de Mantenimiento Integral* (PROPIMI) was conceived. PROPIMI seems to be working adequately; DGCC regional units have increased its magnitude from US\$20 million to US\$60 million for 2005. SCT, SHCP, contractors, and some states have agreed to have multiyear budgeting in a few cases. Nevertheless, it would be more effective to determine explicitly the process for multiannual budgeting, which then could be used generally, instead of having particular agreements for particular projects.

3.30 State and municipal authorities develop plans to fill gaps in connecting users with the national network and within urban areas. Quality of this planning and its coordination with SCT planning varies widely and depends heavily on the local political cycles, which are not synchronized with each other or with the national cycle. Some states and municipalities plan and execute substantial projects, but there is rarely continuity across administrations (no reelection), which is especially problematic for the municipalities, with only three years for each administration. Some states complain that their own needs and planning are not factored into the federal planning, making the allocation of federal road funds less efficient.

Electricity

3.31 CFE has the most advanced planning system of any infrastructure agency in Mexico. In the 1960s, with support from other large utilities and international associations, CFE began to develop integrated power-systems planning. Mathematical models were implemented for capacity expansion of generation and transmission, as well as for system reliability, hydroelectric operations, and maintenance scheduling. Initially, the planning framework was limited to a power systems engineering perspective. Later, between 1977 and 1988, the planning system integrated other disciplines, mostly economics, statistics, and finance, into the planning function. Demand-forecasting models were developed, along with models for productivity analysis, financial planning, marginal costs, and tariff design. Also, a methodology was put in place for the systematic formulation and evaluation of investment projects. After 1991, however, the financial portion of the planning system was reallocated to the Financial Office of CFE, losing some of the integration and coordination that had previously been achieved. Since 1994, by law, CFE updates its rolling 10-year plan for investment and maintenance every year. The CFE budget for each year follows from the updated plan. The planning of investment with budget and non-budget (PIDIREGAS) resources is fully integrated within CFE, in contrast to the other infrastructure sectors where the investment with resources from outside the federal budget is largely separate.

3.32 All CFE and LFC income and outlays are formally within the national budget, which is anomalous for electric utilities, and to some extent politicizes their finances. With its own substantial revenues, CFE depends substantively on the national budgeting process mainly for the borrowing for new investment that it does directly, with important effects discussed below. Although its current spending and investment are all in the federal budget and formally approved there, the large own revenues and payments for fuel charges to *Petróleos Mexicanos* (PEMEX) are in-and-out transactions that happen automatically without substantive consideration in the federal budgeting. Despite the implicit subsidy, the actual cash flow between CFE and the Treasury has been minimal every year since the reform of CFE in 1986.

3.33 As a public enterprise, CFE should make profits and pay taxes and dividends to the government (and distribute profit sharing to its workers), and so each year since 1986 CFE has made a corresponding bookkeeping transfer (*aprovechamiento*) to the government, equal to 8 percent of the net valuation of assets. Then the government makes a bookkeeping transaction of approximately an equal amount to cover the cost of the politically mandated price subsidies to residential and agricultural consumers. (The cost of inefficiencies at CFE also gets folded in here.) During 1997–99, payments of *aprovechamientos* to the government exceeded the level of subsidies received by CFE. The utility was thus generating a small net transfer to the Federal Government. This situation reversed in 2000, when consumer subsidies from CFE grew substantially and exceeded the *aprovechamientos*, as shown in Table 3.2. Since then, CFE has been eating into its own capital, by cutting investment and not fully replacing equipment as it depreciates. Older capital also has higher operating costs, contributing to making CFE's cost of service higher than international comparators.

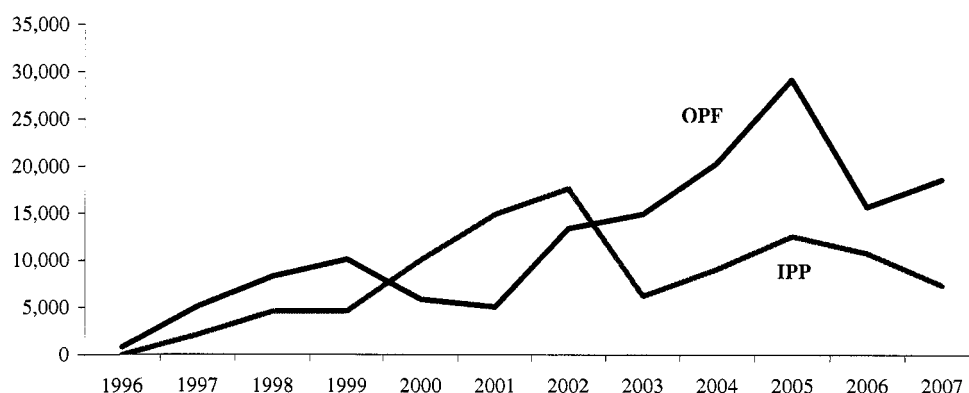
Table 3.2: Subsidies and *Aprovechamientos* 1997-2003

	1997	1998	1999	2000	2001	2002	2003
<i>Aprovechamiento</i> , MxP1,000 million	23.7	25.4	31.8	35.6	37.8	38.9	43.8
Consumer Subsidies, MxP1,000 million	20.5	21.4	29.9	40.5	43.2	41.3	56.5
Difference	3.2	4.0	1.9	-4.9	-5.4	-2.4	-12.7

3.34 Thus, in practice, CFE has to make do with the revenue it collects. It does not control its output prices and has limited control over costs; hence, the main adjusting variable is its own investment in generation, which has declined over the past decade and is now clearly less than needed to meet demand. To fill even partially the investment gap, CFE has relied increasingly on PIDIREGAS for investment in generation and transmission.

3.35 PIDIREGAS have remained and grown in amount (PEMEX has them for about four times the amount of CFE), even though the original rationale is gone; now SHCP fully discloses them and counts them as part of the overall public sector debt and borrowing. In 2003 they were 1.1 percent of GDP, almost half of the total Public Sector Borrowing Requirement, 2.5 percent of GDP. The amortization of old PIDIREGAS debt equaled over one-tenth of the new investment in the budget, and the amortization burden is projected to grow. Figure 3.3 shows the growth of direct (CFE buys the PIDIREGAS-funded plant upon completion, Optimal Power Flow) and indirect PIDIREGAS (which provide guarantees for backing power purchase agreements with independent private providers [IPPs]). IPPs in electricity generation now account for about one-fifth of installed capacity and almost all of new generation.

Figure 3.3: Electricity Sector PIDIREGAS Investment Projects (million 2004 pesos)



Source: SHCP (2004), from Aburto (2004).

3.36 One should not confuse PIDIREGAS with true private investment (still largely potential) in the electricity sector. With true private sector participation, the firms would make investment decisions and bear the full risk. Now public sector still makes most of the decisions and bears most of the risk of loss, while firms get relatively secure profits, although they do bear some risk, mostly in the construction phase. The public sector bears many risks; with build-transfer operations it ends up with an asset, in other cases, not. Now that Mexico has no external restrictions on access to the financial markets, the only potential benefit of PIDIREGAS to the public sector is that the private execution of the investment could be more efficient, although the government could always have a simple contract for construction and operation by the same firms, unlinked to financing. It seems unlikely that the firms can get lower-cost financing from the market than the government could get directly, and the government's guarantee of the PIDIREGAS debt counts against its credit rating. The main problem with current arrangements that involve the private sector is not the form of the PIDIREGAS scheme, but rather the institutional setting in which CFE is a monopsony buyer from generation facilities. As discussed further in Chapter 4, private participators would probably only need a partial guarantee against the possibility that the regulated price would not adjust to keep up with changes in fuel cost and the overall price inflation.

3.37 LFC operates in a different budget and financial regime from CFE. It is considerably less efficient than CFE, due mainly to excessive labor costs and low productivity, and it does not even have a bookkeeping obligation to pay *aprovechamientos* to the Federal Government. It has lost most of its generation capacity and mandate, and it mainly distributes power generated by CFE and its licensed private producers. To stay in operation, LFC requires about MxP17,000 million per year in outright cash subsidy from the Federal Government budget.

3.38 Rural electrification, while nominally under the purview of CFE, is actually carried out by states and municipalities, in general matching funds from the federal transfer (in Ramo 33) for the *Fondo de Infraestructura Social Municipal* (Municipal Social Infrastructure Fund, FISM) with those available from the Indigenous People Development Commission (CDI) and SEDESOL. In 2003, about 13 percent of FISM went for rural electrification projects (INEGI survey, Annex 2). Rural electrification initiatives have almost exclusively focused on grid extensions at very high costs.

Water Supply and Sanitation

3.39 Most investment for water and sanitation in Mexico is not done directly by the Federal Government, but by *organismos operadores* (OOs), municipalities, state governments, and private housing developers, although most of the money for public investment ultimately comes from the federal government. About 25 percent of water and sanitation investments are paid with federal funds channeled through the *Comisión Nacional del Agua* (National Water Commission, CNA), mostly as transfers to the local agencies plus some CNA investments in its own (non-emergency) structures for bulk water supply. Municipalities receive considerable resources (a total of 0.8 percent of GDP, which is about three times the relevant budget of CNA) through FISM in Ramo 33. Municipal contributions to investment in water supply and sanitation come from FISM and from federal tax sharing (untied funds via *participaciones*), but there are not systematically available data on the amount of funding from these sources for water and sanitation. The municipalities also have to pay for their use of water resources, as described in Box 3.6.

Box 3.6: Mexico's System of Water Abstraction Charges

In Mexico, since 1989, all users who abstract water directly from a river or the ground have to pay a water abstraction charge (called a water right, or *derecho*) to the Federal Government through the Ministry of Finance. The level of the abstraction charge is differentiated according to nine geographic zones and six user categories, resulting in about 40 different rates. Users in water-scarce areas pay substantially higher charges than users in water-abundant areas (Table 3.3). Likewise, self-supplied industries (*uso general*) pay charges that are more than 30 times higher than for utilities. The largest water user by far, irrigated agriculture, was initially exempt from the charges.* The system was thus designed with both fiscal and political motives, often conflicting, and with little consideration of environmental economics, which would have suggested the use of uniform charges for all user categories.

In 2001, total revenues from abstraction charges were MxP5 billion. Eighty-six percent of the charges were paid by industries, 7 percent by CFE for its hydropower plants, and 7 percent by utilities. Final water users supplied through the network—whether residential or industrial—ultimately are the ones that pay for charges levied on utilities, although water bills to final users do not identify abstraction charges separately.

Table 3.3: Level of Water Abstraction Charges

USO	MONTO en 2002 (Centavos/m ³)	
	ZONA 1	ZONA 9
Uso general	1,338.85	105.09
Agua potable	26.52	0.31
Balnearios	0.76	0.08
Acuacultura	0.22	0.02
Agropecuario	0.0	0.0
Hidroelectricidad	0.28	0.28

Source: Asad and Garduño (2004:7), on the basis of the Federal Rights Law.

Initially, cash-strapped utilities refused to pay the water abstraction charges. To remedy this problem the Federal Government initiated a program to return these revenues to utilities subject to certain conditions, in a program called the *Programa de Devolución de Derechos* (Water Rights Return Program, PRODDER). The conditions include that for each peso returned, the utilities have to invest that much plus another peso from other sources. The program has led to a substantial increase in investment and in the collection efficiency (*recaudación*) of abstraction charges, and PRODDER now has become the largest federal subsidy program for water supply and sanitation. The program, which is administered by CNA, caused abstraction payments by utilities to more than double, accounting for 18 percent of payments in 2002 compared to 7 percent the previous year. Abstraction charges paid directly by industries remain with the Federal Government and are not returned to users.

*Since 2003 agricultural water users that [are discovered to] exceed the abstraction amount specified in their license have to pay a nominal fee for the amount used in excess of the licensed amount. Likewise, utilities that abstract more than 300 liters per capita per day have to pay a surcharge to provide a disincentive for self-supplied industries to switch to network supply.

3.40 Most of CNA's funding to municipalities and states is provided on a matching fund basis through the *Programa de Agua Potable, Alcantarillado y Saneamiento en Zonas Urbanas* (Water Supply, Sewerage, and Sanitation in Urban Areas, APAZU), which has successfully stimulated more state and local investment in water and sanitation. The first APAZU program varied the percentage matching requirement according to the marginality index of the locality, to help the poorer areas, but APAZU II abandoned this practice. Poorer areas do get more FISM funds, in accord with the formula, and there is evidence that rural municipalities and smaller urban ones use a larger share of their FISM for water and sanitation investments. PRODDER funding follows from collections by *organismos operadores* (OOs) in the previous year, and thus favor richer municipalities, on average.

3.41 For water, planning at the central level seems less important than planning at the state and local levels. The six-year state development plans supposedly set priorities for water investments, for which states and municipalities seek federal co-funding. These plans are monitored by the *Comites de Planeación para el Desarrollo* (COPLADEs). At the federal level, the budget envelope for federal subsidies is set annually with no multiyear resources envelope (except for donor-funded programs such as *Frontera Norte* and the *Programa para la Sostenibilidad de los Servicios de Agua Potable y de Saneamiento en Comunidades Rurales* [Program for Sustainable Drinking Water and Sanitation Services in Rural Communities, PROSSAPYS]). The lack of coherence between the annual budget cycles at the state and local levels makes planning at these levels extremely difficult. The need for coordination in the water sector thus is mostly "vertical" between the federal, state, and local governments.

3.42 Local governments do most of the planning and budgeting for water and sanitation. Some of the better institutions are in the more economically advanced states, like Nuevo Leon, Baja California, and Guanajuato, but some poor states like Chiapas also have good programs in place (Box 3.7). CNA has an elaborate electronic system for cataloging, categorizing, and tracking individual projects. It was intended to reflect national programmatic priorities, but the results are usually to give a few projects to each water region. The overlapping planning and budget cycles and multitude of norms at the federal, state, and local levels make investment planning in Mexico's water sector complex and difficult. Most investments in water and sanitation are co-funded through one or more federal programs, the state government, the municipal government, and sometimes municipal service providers. Economic planning is rudimentary, in the sense that cost-benefits analyses are routinely conducted, but often without much rigor or consideration of alternatives. CNA gives some help and technical assistance for local planning, for example, as part of the *Programa para la Modernización de Organismos Operadores de Agua* (Program for the Modernization of Water Utilities, PROMAGUA), although implementation of this program has been slow.

Box 3.7: Innovative Chiapas State Government Technical Assistance to Municipalities

The State of Chiapas has some of the poorest water service quality in Mexico, with no single urban municipality receiving water on a continuous basis. Investments have been haphazard and poorly planned, creating problems in system operation. Maintenance is poor, and billing efficiency low.

To remedy this situation, the state government—through its Water Commission—in 2001 initiated a municipal water and sanitation program (*Agua Potable y Saneamiento en Cabeceras Municipales y Zonas Urbanas*) to create autonomous municipal utilities and to assist in planning investments on a long-term basis. Participating municipalities produce diagnostic studies covering technical, social, financial, and human resources aspects of system modernization. The studies are fully paid for by the municipalities, and they are carried out by consultants from within the state, selected from a list of 24 qualified consultants prepared by the Water Commission. Participating municipalities commit to create autonomous operating entities. The program also foresees the creation of citizen councils (*Consejos Consultivos Ciudadanos*) in the participating municipalities to communicate citizen concerns to municipal decisionmakers. The councils also disseminate information about water and sanitation investments and planned changes such as metering and volumetric tariffs to citizens.

So far 37 municipalities have signed a contract (*convenio de coordinación*) with the state Water Commission under this program, and 14 municipalities are in the process of conducting the diagnostic studies. Some have undertaken investments funded through the federal APAZU program and municipal resources from FAIS.

3.43 Multiyear investment plans exist at each level of government, but are often not coherent with each other. At the federal level, CNA produces a National Hydraulic Plan (PNH) that coincides with the Presidential term and feeds into the *Plan Nacional de Desarrollo* (National Development Plan, PND).⁹¹ The multisectoral Development Plans States, mentioned above, coincide with the six-year gubernatorial terms and thus not with the Presidential terms or PNHs. At the local level, there are multisector Municipal Urban Development Plans that usually cover 20 years, but these are not connected to concrete actions, and the Municipal Development Plans cover only the three-year terms of local governments. Most water utilities do not engage in formal long-term planning for their systems, which expand ad hoc, following the pattern of urbanization and in response to the fluctuating availability of funds from federal programs. Investments in wastewater treatment are mostly driven by pressure to comply with legal deadlines for environmental norms, which often ignore the financial and technical capacity of service providers to operate and maintain these assets adequately. Finally, maintenance and rehabilitation—the step-children of water investments—are usually neglected. Some of the better utilities have established Master Plans, including investment plans covering varying periods (5 to 15 years). Investment projects need to be approved by the municipal council, which usually does not have a long-term perspective and favors piecemeal system expansion over maintenance.

⁹¹ The PNH for 2001–06 includes targets for investment, but these targets are not binding.

3.44 The federal allocation for various water investment programs is determined year by year in negotiations among CNA, SHCP, and Congress. After approval of the annual budget, adjustments are frequently made throughout the year, generally within the initial envelope. CNA's budget is detailed, distinguishing among four types of expenditures and 36 budget lines in three subsectors. Each budget line usually corresponds to a national program and sometimes to a regional program.⁹² In rare cases, Congress specifically introduces individual projects as line items in CNA's budget.⁹³ Thus the agency has to go back to SHCP for every reallocation, even to achieve the initial goals with the same overall resource allocation.

3.45 In recent years, Congress has regularly increased the budget envelope proposed by SHCP for CNA by 8 to 10 percent (Barocio 2005:25). Congress has also intervened to modify the structure of expenditures, substantially increasing the envelope for water supply and sanitation, while reducing it for irrigation and water resources management. Actual expenditures implemented, however, are usually identical to or slightly lower than what Congress approved. The numerous budget modifications during the year of execution do not affect overall expenditures or allocations for major subsectors. The envelope for federal investment programs varies significantly from year to year. The overall federal contribution to investments in water supply and sanitation declined significantly during the second half of the 1990s, but has increased since 2001, as recommended by the PNH.

3.46 The availability of funds at the federal, state, and local levels not only varies considerably, but usually does not coincide with spending needs during the year. This either leads to delays or forces state and local governments to advance funds that ought to be paid by the Federal Government, to be later reimbursed when the funds become available. The delays in the availability of federal funds sometimes result from the difficulty in complying with all relevant administrative norms, and in other cases the delays come at the subnational levels.

3.47 The administrative norms for public investment projects at various levels of government are so complex that they delay investments and are often ignored, opening space for politically motivated decisions and favoritism. The complexity of the norms discriminates against funding for states and municipalities—usually poorer ones—that do not have the capacity to comply with all the norms. SHCP's administrative norms are defined in the budget law, the manual of budget norms, and its annexes, and in guidelines for operating rules for federal programs. In addition, states and municipalities have, of course, their own administrative norms. A detailed analysis of these norms is beyond the scope of this review. While some norms are needed to ensure economic efficiency,

⁹² The only regional projects in the 2003 and 2004 CNA budgets were a water project and a sanitation project for the Valle de México, a project for the Lerma-Chapala Basin to protect the environmentally sensitive Chapala Sea through measures in several states, and the water supply project for Guadalajara and León.

⁹³ This was the case of the Water Supply Project for Guadalajara and León, located in the States of Jalisco and Guanajuato, respectively. The project has a single line item.

environmental sustainability, and transparency of investments, the norms are overly complex and could be streamlined without sacrificing the original objectives.

3.48 To assess the degree of satisfaction of service providers with various federal programs, a federal water association conducted a survey in 2004, evaluating the programs using the following criteria:

- The perception of the service providers participating in the programs;
- The existence of incentives for generating co-funding;
- The existence of incentives to improve efficiency;
- The degree of flexibility in the use of funds at the local level;
- The degree of discretion in the allocation of funds to specific states and cities and the concomitant risk of pork-barrel spending and favoritism;
- The administrative burden of the programs, in particular concerning the relationship between state and federal budget cycles;
- The degree of poverty targeting; and
- Quality assurance, monitoring, and evaluation mechanisms.

The survey found that most participating service providers are satisfied with the programs, although the extent varies by program.⁹⁴

3.49 All the federal programs require some co-funding by states, municipalities, and utilities, which has effectively motivated increased investment funding from the local level, especially for those programs that are administratively relatively uncomplicated and provide a large degree of local discretion for use of the funds. For instance, in the Water Rights Return Program (PRODDER), municipalities and utilities can reclaim the amount they paid in water abstraction charges to the Federal Government, provided they fulfill certain limited conditions and invest an equal sum financed by state, municipal, or utility funds. The program contributed to increasing the municipal (and utilities) contribution to CNA programs from 10 percent (in 1998) to 22 percent (in 2003) (Barocio 2005).

3.50 On the other hand, the existing programs have not brought about improvements in operating or economic efficiency, despite the intentions of some programs to do so.

⁹⁴ The Mitofsky survey was conducted by the *Asociación Nacional de Empresas de Agua y Saneamiento* (ANEAS) among 191 respondents. Quoted in the ANEAS journal *Agua y Saneamiento*, Year 3, No. 13, 3rd quarter, 2004:54–56; and in Barocio (2005), various pages. Among respondents participating in the respective programs, the share of those declaring to be satisfied or very satisfied are as follows: PROMAGUA 67 percent, APAZU 86 percent, PROSSAPYS 88 percent, and PRODDER 98 percent. The rate of participation among those interviewed is also varied: PROSSAPYS 31 percent, PROMAGUA 53 percent, APAZU 55 percent, and PRODDER 82 percent. Many of those not participating have a negative view of the programs.

For example, PROMAGUA was specifically created to improve efficiency through the elaboration of Master Plans and the introduction of Private Sector Participation (PSP). In the five years of the program, however, it has not led to any case of introducing PSP, and disbursements have been far below expectations. Few of the existing programs tie the level of subsidies to past improvements in efficiency. Indeed, PROMAGUA even provides higher federal subsidies for service providers with lower efficiency, probably to offset their inability to raise co-funding, but this encourages inefficiency.

3.51 Flexibility in the local use of funds has made various programs more attractive to service providers. For example, PRODDER, the largest federal subsidy program in the sector, has very few strings attached. Since service providers refused to pay water abstraction charges before the introduction of the program, there seems to be an implicit acknowledgment that these funds “belong” to them and their use should thus not be much restricted. Correspondingly, service providers have expressed great satisfaction with this program. However, the program does not provide any incentives to improve efficiency. FAIS, a multisector fund under Ramo 33, also has no strings attached. The importance of FAIS for the sector is significant. While the exact amount of water and sanitation investments under FAIS are not well known, it has been estimated based on a survey of mayors that the total volume of federal subsidies channeled to the sector through FAIS is more than twice as high as all federal subsidies under CNA-administrated programs. Finally, none of the federal programs—FAIS or the CNA-administrated programs—is conditional on changes in the governance structure of utilities or on policy/regulatory changes at the state level.

3.52 The degree of discretion in the allocation of funds to states and municipalities varies substantially among programs. For example, the discretion in the case of PRODDER is practically zero, since funds are “earmarked” for service providers corresponding to the amount they have paid in water abstraction charges. On the contrary, discretion in APAZU—the second-largest program in the sector, which has recently been significantly expanded—seems to be considerable, which has led to charges of political favoritism, despite the formal existence of detailed operating rules that are apparently not always respected. Programs funded by international donors, such as the rural water supply and sanitation program PROSSAPYS, funded by the Inter-American Development Bank and the U.S.-funded *Frontera Norte* program, may entail a somewhat lower degree of discretion due to the external supervision of the programs.

3.53 The administrative burden of the programs varies considerably. For example, some states and service providers complain about the heavy administrative burden of APAZU, while there are few, if any complaints, about PRODDER or PROSSAPYS. In particular, the mismatch between the federal and state budget cycles poses a significant problem, coupled with the allocation of federal subsidies on an annual basis despite the multiyear nature of infrastructure investments. Federal budget allocations are usually determined so late that it becomes impossible for state and municipal governments to plan appropriately. The complexity of programs may make access by states and service providers with limited administrative capacity more difficult. A simplification of operating rules may reduce that bias. However, the solution to that problem ultimately

lies in the strengthening of local capacity through continuity of managerial staff and better insulation of service providers from undue political interference at the municipal level.

3.54 There is no poverty targeting in any of the federal subsidy programs for the water sector, except for the rural water and sanitation program PROSSAPYS. Actually, some of the programs favor the more affluent parts of the country. For example, the *Frontera Norte* program is only available to localities within 300 kilometers of the border with the United States, which happen to be the areas with the lowest degree of marginality in Mexico. PRODDER, the largest federal program, is heavily tilted in favor of the Northern states as a result of the technical characteristics of the program. The water abstraction charges are set at much higher levels in the arid, Northern parts of the country, so that service providers in these usually richer localities both pay more and receive more funds through this program⁹⁵. This bias in favor of richer localities is partly compensated by FAIS, a multisector fund under Ramo 33, the importance of which for the sector has been emphasized further above, which is allocated according to a formula that heavily favors poorer municipalities and states.

3.55 There are only limited effective quality assurance and monitoring mechanisms in the federal programs. The program with the largest impact on investments in the sector, FAIS, has no reporting requirements, no screening mechanism, and no evaluations. In the CNA-administrated programs cost-benefit analyses are pro forma exercises, which are of limited effectiveness as screening tools, despite quality control of CBAs exercised by SHCP. Ex post evaluations are rare and, if done, usually lack independence and critical assessment. There is no effective requirement for reporting the allocation or monitoring the effectiveness of these funds. The attempts at monitoring outcomes, both at the federal level and in some states, are hampered by the poor quality of financial and technical data collected by service providers, the lack of incentives to improve the quality of data, and the lack of links of reporting formats to specific investments or programs. Information is reported voluntarily to the national statistical agency, with a substantial lag and without a standard format. The Law of Ramo 33 requires the states to report the destination of these resources, but there are no standards for this or sanctions for not doing it at all. This hinders both accountability to the local clientele and planning at the state and national levels.

3.56 The lending by BANOBRAS for local water investment has recently increased, starting from a very low level. High overhead costs, passed on to borrowers, and cumbersome procedures make the BANOBRAS option less attractive than it should be, given its access to low-cost international funding. For large and well-managed localities, the market has filled the financing gap or could do so, especially with links between debt service and tariff collection. Small localities, on the other hand, typically lack financing, even from BANOBRAS.

⁹⁵ It must be noted however, that PRODDER has been designed to stimulate payment by all water service providers.

Lessons from Multisector Evidence

3.57 Infrastructure planning and investment require a long preparation period, and that is one of the reasons why sound policy planning and coordination is a critical factor in infrastructure development. As noted, Mexico does national-level planning episodically, but it is not linked with budget ceilings or allocations, (a problem common to all sectors in the budget and planning process), and is not linked with planning by governments and agencies at the subnational level, which handle most of the household water and sanitation infrastructure, and some important parts for transportation. There are insufficient incentives and help for good subnational planning, which are critical in transport and water and sanitation.

3.58 The CFE's 10-year rolling plans, linked integrally with the annual budget, could be a model for the other infrastructure sectors, perhaps with a shorter time horizon, say three to five years. This would be a logical next step from the current practice of having multiyear budgets only for individual projects, and toward the concept of a complete multiyear budget and fiscal projection (see World Bank 2004c, chapter 4).

3.59 The transport and water and sanitation sectors in Mexico went through significant changes during the last decade. To varying degrees, these sectors reformed their policies and institutions, particularly in regard to privatization and decentralization, but the policy and planning functions do not seem to have adapted to the new circumstances. At a macro level, government plans are inconsistent with budget allocations because the plans give a lot of emphasis to investment projects, but in practice investment funding comes as a residual after funds are allocated for salaries, debt service, transfers to local governments (formula based), and other current spending.

3.60 In order to implement the planned national strategy with policies and programs for the infrastructure sectors, the government should have strong policy planning and coordination functions at the center. SHCP takes into account the resource constraint, but usually has neither concern nor technical know-how to set the priorities among different projects coming from competing agencies. This requires technical reviews—including feasibility, economic analysis, and environmental and social impact—for which SHCP could develop some capacity, for the largest projects and when the impact is multisectoral. Most of the technical review and prioritization, however, would need to be done at the sector level, by the secretariat that has responsibility for all agencies in the sector—the *Secretaría de Comunicaciones y Transportes* (SCT), the *Secretaría de Energía* (SENER), and *Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación/Comisión Nacional del Agua* (SAGARPA/CNA) in the sectors studied here.

3.61 The strong impulse for fiscal control by SHCP within the budget context has increased the relative attractiveness of infrastructure spending that can be financed outside the regular budget ceilings, even if these investments are nominally counted in the budget. The electricity and road transport sectors each has some parts of spending that are subject to relatively rigid budget constraints, and some parts that are more or less

outside the budgeting process, and thus much less constrained, although the latter are still using public resources, including credit, guarantees, and creditworthiness. This observation does not apply so much to water. It seems that CNA has considerable clout and thus has substantial discretion in determining its budget. SHCP is relatively inactive in water and focuses basically on the fiscal ceilings, and Congress only adds a few pet projects to serve local interests. The use of guarantees in the water sector seems limited and below their potential.

3.62 The federal matching-grant investment programs in the water sector, especially APAZU, have been relatively successful in terms of securing local contributions through matching funds. Such experience might help in the roads and rural power sectors to motivate a clearer and more constructive division of labor and to further the impact of other water programs that do not currently require subnational co-funding. This is needed because the extreme dependence of Mexico's local governments on transfers from the center both reflects and reinforces the culture of lobbying for projects and funding from the federal level, rather than raising own resources with accountability to local taxpayers and clients.

B. INTRASECTORAL COORDINATION

3.63 Mexico's infrastructure sectors traditionally played a large role in distributing rents and political patronage, so the appointment of the agency heads and the development of the unions have tended to follow political considerations. Hence, the agencies tend to become bureaucratically isolated silos, (that is, they are closed, with no interaction with other agencies), without incentives for the intrasectoral coordination that is often needed to improve the quality and efficiency of service delivery. Multisector planning, linked seriously with budget allocations, does not exist, and even within the sectors the coordination across agencies is increasingly rare, because the unofficial mechanisms of coordination through a monopoly political party have become inoperative in the 21st-century context of political competition.

Transport

3.64 Most of the information and decisionmaking for transport stays within the institutional silos of free roads, toll roads, railroads, and ports. This leaves the intermodal infrastructure underdeveloped, and the modes themselves inefficiently used. Better intersectoral, that is, intermodal, coordination in transport could contribute importantly to making Mexican business more competitive.⁹⁶ Several European countries, such as Spain and France, and the U.S. Department of Transportation, provide good examples.

3.65 Transportation is partly decentralized, but there is relatively good information sharing within each subsector—toll roads, free highways, railroads, and ports. Transport has some coordination in theory, with the priority for 14 road corridors, but in practice

⁹⁶ Logistics cost about 18 percent of GDP in Mexico, which is 40 to 75 percent above most OECD countries, although still better than the other large LAC countries (World Bank 2004).

the directorates in SCT that handle highways, ports, airports, and railroads each has effective autonomy in its own area. The regional centers mainly channel requests for roads from the state and municipal governments and do not realize their potential to work with multiple local governments to develop integrated regional transport plans that would govern the investment plans of all other SCT directorates, plus FARAC and the port administrations. The lack of coordinated information and management is especially severe around the intermodal connections between the transport subsectors. Individual large corporations make their own arrangements—often with state-of-the-art efficiency and government cooperation—but small and medium enterprises have to rely on the substandard public sector connections and are left at a disadvantage.

3.66 SCT, which is the logical place for accountability, is not in fact accountable for the performance of the transport system as a whole, nor does it currently have authority to manage the whole sector. For instance, the unclear accountability and reporting relationship of FARAC and the multiple roles of BANOBRAS (especially as supervisor of FARAC as well as sectoral financier) are institutional problems that need addressing. Also, the transfer of the responsibilities for the development of local transportation infrastructure to local governments makes it more difficult to have the essential policy planning and coordination between the federal and subnational governments.

Electricity

3.67 The reforms of CFE in the late 1980s and 1990s have led to better public information and indicators of performance for that part of the sector. LFC is still more under the control of unions, and lacks accountability for service or fiscal balance. Within the narrowly defined electric power sector, CFE and LFC generally coordinate adequately, with the production and transmission of CFE linking well with LFC's distribution system, which is all that is left of the company. Aside from a pricing issue mentioned above, the inefficiency and fiscal problems of LCF are relatively independent of its relationship to CFE.

3.68 The arms-length relationship between SHCP and CFE causes several problems. Agreeing on budget allocation and annual expenditures requires a number of meetings during which CFE finds it difficult to convince SHCP on ways to prioritize expenditures to maximize the technical performance of the company. For instance, as the number of transmission and distribution lines increase, CFE needs approval to buy more equipment or additional vehicles to conduct maintenance; Hacienda often does not approve on the grounds that its economic impact is not clear. Thus, information asymmetries distort the allocation of resources, because SHCP does not or cannot trust information from CFE about the status of assets in terms of efficiency or needs for maintenance expenditure. Ideally, CFE would have autonomy to follow the most cost-effective way to meet performance standards, and SHCP and other central agencies would focus on ex post monitoring of performance. Given CFE's monopoly position and political clout, however, SHCP does not have much ability to impose ex post enforcement, so the emphasis remains on ex ante controls that leave little incentive for managerial and technical improvements. The lack of autonomy prevents the implementation of more aggressive strategies at the regional level (for example, competition with other utilities

through international interconnections and other commercial practices or strategic behavior). CFE has no incentive to improve its efficiency, and no CRE regulations can in practice be imposed on CFE.

3.69 There is poor coordination between CFE/LFC and the rest of the energy sector, especially with PEMEX on gas. Shifting technology and the financing pressures to rely on smaller plants (independent power producers, IPPs) that can be financed with PIDIREGAS is making gas ever more important for generation. This should lead to incentives for producing more gas (of which Mexico has substantial unexploited reserves), but the internal organization of PEMEX—monopoly controller of gas as well as oil—prevents an appropriate response to the demand for gas. As a result, Mexico is becoming increasingly dependent on liquefied natural gas and other high-cost sources, and is locking this in with long-term contracts. The Secretary of Energy traditionally has not been able to coordinate the activities of these two giant institutions, which carry great political weight through the political appointment of their heads and the strength of their unions. The IPPs for electricity generation often make their own contacts and deals with PEMEX–Gas. Due to political pressures and constitutional constraints, neither market incentives nor the Energy Secretariat can reallocate resources within the sector or bring in private sector investment as needed to efficiently meet the growing energy needs of the economy.

Water Supply and Sanitation

3.70 Overall policies in the Mexican water and sanitation sector seem more or less appropriate. The National Hydraulic Program and the Water Law emphasize the need for greater operational efficiency, financial autonomy of service providers, and the protection of water resources through environmental awareness (referred to as a “culture of water”; see Annex A). The challenge lies not so much with the basic principles of the policies adopted by the Federal Government, but rather in the implementation of these policies, which are hampered by weaknesses in the institutional framework (as mentioned above), overlapping planning and budget cycles at various levels of government, and complex administrative norms including the operating rules of some of the programs that have been put in place to implement these policies. As a result, most water utilities in Mexico still lag behind their peers in other Latin American countries and even the good performers in Mexico in terms of technical and commercial efficiency and capacity to recover costs.

3.71 The water sector is the most decentralized, with the great majority of spending decisions taken at the local levels, and it has recently seen a few important innovations, mostly local. Box 3.8 gives some history on decentralization of water in Mexico. Although the sector is inherently decentralized, the technically logical pattern of decentralization for water service does not usually match the pattern of political decentralization in Mexico. The new arrangements that stem from the Water Law, however, and the requirements of a reliable supply of water services by sectors of the economy (that is, the tourist industry) mandate more coordinated planning. CNA has

appropriate and necessary roles in setting national standards for water service, collecting information, and distributing financial resources derived from national taxation.

Box 3.8: Decentralization of Water and Sanitation Services in Mexico

Until the decentralization initiated by President de la Madrid in 1983, most water and sanitation services in Mexico were provided by federally owned agencies (*Juntas Federales de Agua*) under the supervision of a Federal Ministry. Planning, financing, and operation were federal responsibilities without involvement of state or municipal governments. The still common belief that water is a responsibility of and a gift from the Federal Government is rooted in the policies of that period.

In 1983, as part of a broader decentralization process, municipalities were entrusted with providing water and sanitation services, with the assistance of state governments where necessary. However, municipalities received neither the necessary financial resources nor technical assistance to fulfill their new responsibilities. As a result, the quality of services apparently deteriorated where it was entrusted to municipalities. Many state governments decided that municipalities did not have the capacity to provide services. Thus, in 1988, 21 state governments were responsible for service provision, and only 10 states had devolved responsibility to the municipalities.

In 1989, the Salinas government, recognizing the weaknesses of earlier efforts, decided to support the creation of municipal service providers with legal and financial autonomy from the municipality. The newly created service providers were supposed to be under the authority of a Board that included non-political members, and which would have the authority to approve tariff increases, instead of having tariffs approved by State Congresses or the Municipal Councils. The newly created CNA was given the task of defining federal policies to strengthen service providers, providing them with technical assistance, and administering federal programs aimed at funding them. As a result, 11 more states transferred service provision to municipal service providers, bringing the total to 21 states in 1996. In addition, many state water laws were amended. The amendments granted service providers tariff autonomy and stipulated that revenues had to be used exclusively for service provision instead of being diverted to other municipal activities. These policies were essentially continued after 2000 by the Fox administration.

Despite the appropriateness of the federal policies to strengthen service providers, the autonomy of many service providers remains limited. Moreover, the quality of services and the degree of cost recovery have not significantly improved 16 years after the policies were introduced, making the search for more effective and sustainable models of local service provision more imperative.

Source: Pineda (2002).

3.72 Traditionally, three groups of institutions in the sector have needed to coordinate activities—CNA, the *Comisión Estatal de Agua* (State Water Commissions, CEAs), and the municipalities and *organismos operadores* (OOs). Some of this happens, but coordination remains inadequate. Investment planning is carried out by the municipalities and the OOs, and sometimes by the CEAs, while CNA administers federal subsidies, including technical assistance. The functions of the CEAs differ widely among states, some being in charge of investment planning, and operation and maintenance, while others provide technical assistance, and at least one operates a benchmarking

system. Furthermore, CNA and the new basin agencies have a potentially valuable role in issuing (and controlling) permits for the development of new sources and wastewater discharge. Regulations are needed to realize this value.

Financing

3.73 SHCP also needs to improve the coordination of its own interaction with the sectoral agencies, especially if it wants to move more toward multiyear budgets. As the sector ministries develop multiyear financing plans to go with their sector investment and operations plans, these will need to be coordinated with the expected future fiscal envelopes, which are the responsibility of *Planeación Hacendaria* (fiscal planning) in the Subsecretariat of Public Credit for aggregate allocations, and the responsibility of the Subsecretariat of Expenditure for sectoral allocations. This also needs coordination with cost recovery plans (where the Subsecretariat for Revenue has the lead role in setting tariffs), with the anticipated future needs to borrow (Subsecretariat of Public Credit), and the accumulation of contingent liabilities (Subsecretariat of Public Credit). Even if SHCP does not get involved in the choice of particular projects and lines of spending within the sectors, it needs to take an active role in developing the financing plans for the sectors and setting standards for making projections of spending and contingent liabilities.

3.74 To achieve this, the various parts of SHCP—the *Unidad de Inversiones* in the *Subsecretaría de Egresos* (SSE), the DGs of *Planeación Hacendaria* and Public Credit, and the tariff-setting units in the *Subsecretaría de Ingresos* (SSI)—will need to work with each other and with their counterparts in the sectoral ministries and in the states. This will challenge the traditional tendency of each subsecretariat and even directorate to operate as a silo, with which others neither interfere nor coordinate.

C. CONCLUSIONS AND CHALLENGES

3.75 The two main institutional problems for Mexican infrastructure are: (a) inadequate transparency and accountability; and (b) insufficient coordination of investment planning, not only among agencies within each infrastructure sector, as just noted, but also at the macro policy level.

3.76 **Transparency and accountability.** Fragmented information systems and decisions about monetary allocation have led to disparate sector outcomes—some bad, some good—but not linked to the national development outcomes. The process is least fragmented in the electricity sector, which is almost all managed from the center, but there is also less experimentation. Innovations of the 1990s in CFE left a legacy of institutional strength, but as problems emerged since then it has been hard to motivate change. In the other sectors, all three levels of government are involved, especially municipalities in water and sanitation, and multiple federal agencies are involved with transport, but generally the various actors do not share information well, which is often a

tactic to avoid accountability.

3.77 The present system authorizes individual projects and budget envelopes annually, with little reference to the effectiveness and efficiency of sectoral spending, but rather on the basis of notional, largely historical unit costs and ex ante cost-benefit studies. There is little systematic information on whether results are good or bad, and such information rarely has budgetary consequences. While sectoral agencies and subnational governments are demanding greater autonomy in investment planning, execution, and financing, there is not the effective accountability that should accompany autonomy. Indeed, without reliable, verifiable information on actual performance, it is risky to respond positively to demands for more autonomy. Rather, increments to autonomy should depend on improvements in accountability.

3.78 Currently, SHCP does not receive timely, objective information on whether funds were provided to the executing unit as planned, whether they were used for the purposes intended, or whether their application translated into improved services, and at what cost. Without such information, it is difficult to determine what could have been done better. There is no regular reporting by subnational governments on the use of federal transfers, especially unconditional transfers such as Ramo 33/FAIS, which are a growing source of finance for WSS, urban and state roads, and electrification; nor is there standardized reporting on performance of WSS companies (*organismos operadores*).

3.79 ***Coordination of planning.*** Federal ministries, agencies, and local governments have been relatively isolated in the planning and implementation of infrastructure spending. Coordination has been lacking between the subsectors and modes in each sector, because the President and secretaries do not insist on it, but rather grant autonomy to powerful appointed heads of subsector agencies that operate as silos. The powerful unions reinforce the autonomy of the subsector agencies, usually at the expense of efficiency. A *Comisión Intersecretarial* and the *Comités de Evaluación de Proyectos*, established under *Unidad de Inversiones* in SSE, are theoretically in charge of intersectoral coordination, but they do not have decisionmaking powers, and sometimes these commissions are only forums for the exchange of information.

3.80 To a large extent, the requirements for infrastructure planning have changed, shifting the focus from public investment programs to strategic planning in Mexico, reorganization of the infrastructure sectors, decentralization, private sector participation, pricing and subsidies, and financial support. Clearly, some central coordination is important for setting the medium-term allocation of resources in a way consistent with the national economic and political priorities. Even with such sectoral resource envelopes, set by the President, Cabinet, and SHCP, there still needs to be some sectorwide planning that covers all agencies within each sector. While this could be accomplished with a return to the old centralized planning model that Mexico had with the SPP, the newer, more promising route in many countries is to have a lead sectoral agency, like SENER and SCT, do the planning for all federal agencies in the sector and to use performance standards and conditional transfers, especially with co-funding, to provide incentives for other levels of government to go along with the national strategy.

3.81 Achieving a reunification of planning and budgeting within each sector will require not only coordination within the sectors, but also improved coordination among the various parts of SHCP that are responsible for budgeting and financing, setting prices in the sectors, and controlling the accumulation of budget and contingent liabilities.

4. FINANCING MEXICO'S FUTURE INFRASTRUCTURE INVESTMENTS

4.1 This chapter considers three questions with regard to the financing of Mexico's infrastructure: (a) how much is needed, (b) who should finance it, and (c) how to best structure the financing. Answering the first question requires agreeing on what the goal of financing is. Is it high-income OECD-country levels of coverage? A reasonable expansion and guarantee of minimum quality of service? These questions are reviewed in Section A, which discusses infrastructure investment needs and how they vary according to objective. It reviews the estimates generated by Mexico's infrastructure agencies, and provides a sectoral analysis of the size, structure, and timing of the investment needs.⁹⁷

4.2 While infrastructure investments must eventually be paid for by either the taxpayer or the user, answering the question of who should finance investments and how to best structure investment schemes is much more complex. Section B looks at the potential role of the private sector in financing infrastructure needs, and argues that Mexico has not made a very effective use of private finance—first because of the modesty of the investment, and second because this financing has gone almost exclusively to upstream activities (generation of electricity, wastewater treatment plants) and not to the downstream ones at the retail level. Section C reviews the way in which public mechanisms have promoted private financing of roads, water, and electricity, and discusses ways to make these credit enhancement schemes more effective. Section D concludes by offering recommendations on how the Government of Mexico could better leverage existing sources of financing in the provision of infrastructure.

A. HOW MUCH? MEETING THE INFRASTRUCTURE NEEDS OF TOMORROW

4.3 There are several ways of estimating expenditure “needs” in infrastructure, each of which gives different answers, depending on the objectives (Table 4.1). The first issue is whether a benchmarking approach is adopted, or a set target defined.

⁹⁷ The IPER treats the investment trends and credit enhancements used in the electricity, water, and sanitation sectors, and the transport subsectors of roads, railroads, and ports. It does not analyze housing, urban transport, telecommunications, or airports. The model built to anticipate the future investment needs of Mexico's core infrastructure sectors includes roads (federal and state level), electricity and water supply, and sanitation. Wastewater treatment is not included in the model, nor are the other subsectors of transport, which already receive the vast majority of their financing from the private sector.

Table 4.1: Different Approaches to Estimating Expenditure Needs in Infrastructure

	“Benchmarking”	Set target
Costing Exercise	<p>Example:</p> <ul style="list-style-type: none"> - Stock target: What would it cost to get Mexico’s infrastructure (per capita, per unit of GDP, per km²) to the level of the LAC leader; or to the level of the East Asia median? - Flow target: How does Mexico’s expenditures on infrastructure compare to peers? 	<p>Example:</p> <ul style="list-style-type: none"> - MDGs: What would it cost for Mexico to achieve universal service coverage in water and sanitation, electricity, and access to all year-round roads.
Model	<p>Econometric:</p> <ul style="list-style-type: none"> - Growth: What level of infrastructure coverage is needed to achieve x percent growth and reduce inequality by z percent? Model developed by Calderón and Servén (2004) could be used for this. - Demand: What level of infrastructure coverage will be demanded by firms and consumers for given growth projections? This is the approach followed in Fay and Yepes (2003). 	<p>- Engineering–Economic Models: These are “set” targets inasmuch as the target is a particular level of coverage and quality as defined through engineering–economic models</p> <ul style="list-style-type: none"> - Power sector: Well-defined international methodology, applied by CFE in Mexico, which estimates the investment needed to maintain the integrity of the network and satisfy predicted expansion in demand. - Water/sanitation: Financial model that estimates investment needed to attain the coverage goals set in the National Hydraulic Plan. - Roads: Well-defined methodology for rehabilitation/maintenance expenditures, combined with road sector expert opinion on definition of major corridors and investment needs for their completion.

Simple Benchmarking

4.4 Benchmarking can be done through a simple costing exercise. Looking at infrastructure stocks, for example, what would it cost for Mexico to reach the infrastructure density of a country deemed an appropriate comparator or goal? (See Box 4.1 for an illustration.) An even simpler approach is to benchmark Mexico relative to its peers, in terms of how much it spends on infrastructure. This was done in chapter 2, showing that while Mexico’s investment in infrastructure is low, the levels of the past two years are comparable to that of most of its Latin American peers.

Box 4.1: The Growth Dividends of Better Infrastructure

Calderón and Servén (2004) carefully analyze the impact that infrastructure might have on growth. They find that it is significantly positive, and that improved coverage, notably of services with social impacts such as water and sanitation, also contribute to reducing inequality, making growth even more pro-poor. In the case of Mexico, their results imply that raising infrastructure coverage and quality to the level of the Republic of Korea, the East Asia median, would entail a growth payoff of an additional 3.2 percentage points per year.

How much investment would be required to achieve this growth payoff? This simple benchmarking exercise is done in Table 4.2, relying on international average costs: Mexico would have to invest 52 percent of GDP, or 2.6 percent of GDP over 20 years, to achieve the level of coverage of Korea. Some additional resources would be needed to improve quality.

Is this a pie-in-the-sky ambition? Not at all: Similar increases were in fact achieved by Korea (as well as China, Indonesia, and Malaysia) over the 20-year period from the late 1970s to the late 1990s. Indeed, Korea's infrastructure endowments 25 years ago were substantially worse than Mexico's at the time.

The implication of this exercise is not, of course, that were Mexico to double its annual expenditures on infrastructure it would become the next Korea. In fact, Korea is a much more densely populated country, so it is not even obvious that it would be desirable for Mexico to aim for a similar road density. Nevertheless, this exercise illustrates the fact that most countries that have grown fast over long periods of time have invested substantial amounts of resources in developing their infrastructure. It also highlights the fact that substantial progress in infrastructure coverage does not come cheap.

**Table 4.2: A Simple Benchmarking Exercise:
What Would it Cost for Mexico to Achieve the Infrastructure Coverage
of Korea, the East Asia Median
(% GDP)**

Electricity– Generating Capacity per Worker	Road Density Roads (km/km2)	Mainline per Worker	Total
16%	34%	2%	52%

Note: Korea is the East Asian median country in terms of infrastructure density for the three services covered in the table. Costs used are US\$1,900 per kilowatt of generating capacity, US\$400 per mainline, and US\$150,000 per kilometer of roads (paved and unpaved).

Source: Bank staff calculations based on data from Calderón and Servén (2004).

Costing Set Targets—Pricing Universal Service Access

4.5 As for targets, a possibility is to price the cost of achieving the Millennium Development Goals (MDGs) or some similar universal coverage goal. In the case of Mexico, the cost of reaching universal coverage in electricity and water and sanitation by

2015 would be a rather modest 0.17 percent of gross domestic product (GDP), of which 0.13 percent of GDP would be for water and sanitation, and 0.04 percent for electricity (0.03 percent rural and 0.01 percent urban). Unfortunately, data were not available to estimate the cost of ensuring universal access to a year-round passable road, which would be the equivalent universal service access measure for transport.

4.6 This estimate is modest partly because it relies on alternative technologies in circumstances where the price of a connection to the grid or the network would become prohibitive. For electricity, it assumes an average price of US\$1,000 per new connection, which implies that households too far from an existing network to be connected at a price inferior or equal to US\$1,000 would be served by alternative off-grid technologies.⁹⁸ In the case of water and sanitation, it also assumes that households in low-density areas would not have access to sewerage connections, but to alternative sanitation systems (such as latrines), and that a proportion of households would have access to water, but not necessarily in-house connections.

4.7 The 0.13 percent of GDP estimate for water relies on Mexican prices, but would be almost 25 percent lower (0.10 percent of GDP) assuming Latin America and the Caribbean (LAC) average costs. These numbers do not include the cost of maintaining or rehabilitating the existing system.

Sophisticated “Benchmarking”—Econometric, Macro Models

4.8 More sophisticated approaches can use either macro, econometric models, or micro, engineering-economic models. The macroeconometric models can estimate what might be needed in several ways. One looks at the infrastructure coverage needed to achieve a particular growth objective, assuming given levels of other inputs. This has not actually been done, but an approximation can be obtained using the work of Calderón and Servén (2004), as described in Box 4.1. Another sophisticated form of benchmarking, developed in Fay and Yepes (2004) assumes that as economies grow and populations get richer, both firms and individuals demand a greater level of infrastructure coverage.

4.9 The growth approach described in Box 4.1 suggests that Mexico could gain substantial growth payoffs from increasing its infrastructure coverage but this would require investing substantially more than Mexico currently invests. The approach of Fay and Yepes’s (2004), on the other hand, suggests that Mexico would need to spend about 0.5 percent of GDP more on new investments in water and sanitation, roads, and electricity to satisfy the additional demand implied by a modest growth performance of about 2.5 percent per year.⁹⁹ About the same amount would be needed for maintenance

⁹⁸ Since there are still some households to be connected that are relatively close to existing grids and could be connected at lower prices (say US\$500 or so), the price that determines a switch to alternative off-grid technologies could be somewhat above US\$1,000. However, what is certain is that an average price of US\$1,000 per connection would not allow universal connection to a grid.

⁹⁹ This is GDP, not GDP per capita, growth. The projection used for Latin America as a whole is similar, at 2.6 percent per year.

of existing assets.¹⁰⁰ The equivalent estimate for LAC is 1.58 percent of GDP (Table 4.3).

Table 4.3: Estimated Annual Investment “Needs” for Infrastructure, Based on Predicted Demand for Infrastructure Services—Fay and Yepes Approach

	Electricity	Roads	Water and Sanitation	Total
Mexico				
Investment	0.36%	0.08%	0.06%	0.49%
Maintenance	0.28%	0.14%	0.09%	0.50%
Total	0.63%	0.21%	0.15%	0.99%
Latin America				
Investment	0.64%	0.11%	0.08%	0.82%
Maintenance	0.46%	0.17%	0.13%	0.76%
Total	1.09%	0.27%	0.21%	1.58%

Source: Bank staff calculations based on Fay and Yepes (2003).

Sophisticated “Set Target”—Engineering–Economic Model Used by Mexican Agencies

4.10 Mexico’s sectoral agencies have used the engineering–economic approach, which builds on micro-level data and sector-specific engineering–economic models. In the power sector, the *Comisión Federal de Electricidad* (National Electric Company, CFE) has adopted a well-recognized methodology that estimates the investment needed to maintain the integrity of the network and satisfy predicted expansion in demand (CFE 2003). This yields an estimate of MxP\$52 billion, or 0.63 percent of GDP (Table 4.3). It does not include universal service coverage, which, considering it is mostly rural, should be funded with Ramo 33/FAIS resources. Adding the cost of universal coverage in rural areas (0.03 percent of GDP, as mentioned earlier) would raise the estimated investment need slightly to MxP\$54 billion, or 0.62 percent of GDP, shown in Table 4.4 as “augmented government projections”.

4.11 Similarly, in the roads sector, the Highway Design and Maintenance Standards Model (HDM) can help estimate maintenance and rehabilitation needs for a network, while traffic data and transport network models can identify key corridors and possible needs for expansion. With this approach, the *Secretaría de Comunicaciones y Transportes* (Ministry of Communications and Transport, SCT) estimates that MxP6.7 billion is needed for the maintenance of the federal network, and MxP12 billion for the modernization/upgrading of major corridors, for a total of about MxP18.7 billion per year during 2006–11 (Table 4.4). This represents a 31 percent increase in expenditure on the federal network relative to 2001–03. No equivalent estimation was found for state feeder roads. Adding our own estimates of maintenance and rehabilitation costs of the state

¹⁰⁰ Maintenance is estimated as 2 percent of the value of the stock per year for roads and electricity, and 3 percent for water and sanitation.

feeder network increases the total required for the road sector to MxP26 billion per year, equivalent to 0.29 percent of GDP, as shown in the “augmented Government projections.”

4.12 Calculating the investment needs and even tracing the expenditures in Mexico’s water and sanitation sector are challenging exercises, given the decentralized, multilayered, fragmented organization of the sector. Nevertheless, the CNA estimates that MxP12.3 billion a year is required to finance sector needs during 2006–29, slightly less than what is estimated to have been spent during 2001–03. It covers the cost of expanding access through major bulk water supply and wastewater treatment projects, but at a slow pace, since universal service coverage would only be reached in 2029. We estimate, instead, the cost of reaching universal service coverage by 2015 (which is not a particularly ambitious goal for a country of the income level and existing water coverage of Mexico) and add to it the estimated maintenance cost of the existing system. This yields a slightly higher estimate than CNA’s: close to MxP21 billion, or about 0.23 percent of GDP, as shown in the “augmented Government projections” for the water sector in Table 4.4. This amount does not include any of the rehabilitation that is surely needed.

Pulling it All Together

4.13 The exercise above implies that the agencies have made reasonable estimates of expenditure needs in their sectors. In fact, at about 1 percent of GDP, these estimates are probably on the low side, since they do not include socially desirable and affordable targets, such as universal service coverage in electricity and water and sanitation by 2015. They may also underestimate somewhat what is needed in terms of maintenance and rehabilitation. This may be particularly true in the water sector, which is well known to have suffered from years of poor maintenance, but for which it is impossible to estimate the exact cost of the rehabilitation and upgrades needed to ensure better quality of service. As such, even the “augmented” government projections, at 1.14 percent of GDP, are also likely to be lower-bound estimates. Note, however, that these estimates are fairly sensitive to the GDP growth projections made—slower GDP growth implies a higher burden.

4.14 These estimates also compare reasonably well with what could be derived from the various benchmarking exercises. Indeed, by spending between 1 percent and 1.25 percent of GDP, Mexico will remain around the Latin America average in terms of both infrastructure coverage and expenditures. However, such a level of spending would not allow Mexico to reach the level of infrastructure per capita of other OECD countries or faster-growing East Asian countries (such as the Republic of Korea, which just a few decades ago trailed far behind Mexico in terms of infrastructure endowments).¹⁰¹

¹⁰¹ In 1960, Korea had less than half Mexico’s paved road density; today it has 11 times more. In 1969, Korea had one-third the power infrastructure per capita of Mexico; today it has about 3 times as much.

4.15 Nevertheless, spending 1 to 1.25 percent of GDP on these infrastructure sectors would have a much greater effect if also accompanied by efficiency gains. In particular, it appears that unit costs in the water sector could be lowered quite substantially. Similarly, studies have shown that rural electrification in Mexico is often done at extremely high costs, because of an excessive reliance on grid connections. Finally, much of the need for rehabilitation in roads, water and sanitation, and electricity is due to insufficient maintenance over the last decade. And it is well known that rehabilitation is much more costly than regular maintenance.

Table 4.4: Annual Expenditures in Roads, Electricity, and Water and Sanitation Infrastructure – Past and Predicted

	Roads				W&S						
	Upgrading	Federal Network Maint./Rehab.	Total	State Feeders ¹	Total Roads ⁴	Electricit y	C.N.A.	Others ²	Total W&S	Total	
<i>Million of constant MxP of 2001</i>											
Spent 2001–03	8.266	6.001	14.267	4.113	18.380	42.442	4.597	8.836	13.434	74.256	
Projected by Government Agencies 2006–15	6.750	12.000	18.750	n.a.	18.750	51.745	n.a.	n.a.	12.331	82.827	
Augmented Government projections	6.750	12.000	18.750	7.485	26.235	55.322	Universal coverage: 11.626 Maintenance: 8.943				102.126
<i>% of GDP³</i>											
Spent 2001–03	0.12%	0.09%	0.21%	0.06%	0.28%	0.64%	0.07%	0.13%	0.20%	1.11%	
Projected by Government Agencies 2006–15	0.08%	0.13%	0.21%	na	0.21%	0.58%	n.a.	n.a.	0.14%	0.93%	
Augmented government projections	0.08%	0.13%	0.21%	0.08%	0.29%	0.62%	Universal coverage: 0.13% Maintenance: 0.10%				1.14%

n.a. = Not available.

1. Estimated base on sample of states.

2. This includes subnational expenditures funded through the *Secretaría de Desarrollo Social* (SEDESOL), Ramo33/FAIS, and other small programs or by housing developers.

3. GDP estimated at MxP6.670 billion for 2001–03, and MxP8.942 billion for 2006–15, both in constant 2003 pesos. The projections are based on an estimated 2004 GDP value of MxP7.634 billion, and an estimated 2.5 percent per year growth thereafter.

4. Does not include Federal toll roads expenditures (FARAC network) since they are not part of the budget.

Sources: For past values and government agency projections for roads, SCT; electricity, CFE; water, CNA. “Augmented government projections” are Bank staff calculations as follows: for roads, government projection augmented with estimated maintenance cost for state feeder roads; for electricity, CFE projections augmented with the estimated cost of universal service coverage in rural areas by 2015, relying on alternative technologies as discussed in the text; for water, the cost of universal service by 2015 as discussed in the text, plus the cost of maintenance of the existing system.

Implications for Financing Needs

4.16 The analysis above suggests that the primary financing challenge for the road sector will be to ensure adequate funding for rehabilitation and maintenance of the existing network. While the new concessioning and *Proyectos para la Prestación de Servicios* (Public–Private Projects, PPPs) program hold out considerable hope for the leveraging of private sector investment in the highway program, current annual levels of financing will have to increase by 30 to 40 percent in the years ahead in order to fund maintenance and rehabilitation needs and bring all roads in the primary federal and state networks into fair to good condition. Longer-term and performance-based rehabilitation and maintenance contracts might offer the most efficient procurement mechanism to help achieve this goal in a cost-effective manner.

4.17 In the electricity sector, the challenge is to find new financing instruments to mobilize large amounts of money, which will be complex, given the shortcomings of the current *Proyectos de Impacto Diferido en el Registro de Gasto* (Projects with Deferred Impact in the Budgetary Registry, PIDIREGAS) scheme and other structural constraints discussed later in this chapter.

4.18 For water and sanitation, the highest priority will be to use existing funding more efficiently to reduce per-unit costs and to focus more on rehabilitation and maintenance. Any new additional funds should be directed to increasing service coverage, especially of the poor. Given Mexico's currently high unit costs for connecting and serving households, the level of resources and timing required to meet the social goals of universal coverage are highly sensitive to the prospective improvement (or not) in the efficiency of the use of funds, and the delivery mechanism for those resources.

4.19 Responding to the need for increased resources and, most important, increased efficiency in the use of these resources, will require new and different uses of private sector participation, and refined credit enhancement schemes to attract financiers, investors, and operators to Mexico's infrastructure market in a more cost-effective manner. Using the private sector to close the gaps noted should recognize the following principles:

- Government support—direct transfer of funds or guarantees—is a subsidy to providers and users of the infrastructure service from the taxpayer. If the subsidy benefits a connected consumer (through, for example, support to the construction of a water treatment plant) or a consumer with an automobile (through the building of a non-toll road), that portion of the subsidy transfer which is greater than the value of externality produced by the investment (for example, better public health, active commerce) is highly regressive. The rich use the services more and thus benefit more.
- In addition to its impact on equity, the setting of tariffs and user fees has both direct and indirect financing implications on infrastructure. Where average tariffs fail to cover operations and maintenance—as in Mexico's water and sanitation sectors—subsidies are required just to sustain financially unviable utilities. Also, lower charges

often simulate higher demand, which entails higher investment requirements. Moreover, guarantees and off-take agreements become particularly blunt instruments for providing support in which a flat taxpayer subsidy benefits special groups of consumers.

- Efficiency gains can be realized through competitive bidding for the provision of sunk assets (such as electricity generation facilities) and for long-term arrangements for operations of commercial services. For any of these potential efficiency gains (due to lower operating costs and, possibly, capital costs), to be passed on to consumers by public or private monopolies requires proper regulation or oversight.

B. WHO FINANCES THE INFRASTRUCTURE?

4.20 Infrastructure services are always paid for by either general revenues or user fees. There are two choices when trying to finance an investment project: ask users to pay a tariff that covers operations and maintenance and debt service, and allows for a sufficient return on investment (under credible willingness and ability to pay assumptions); or commit public funds to compensate for insufficient user fees. A third choice could, of course, be to revisit the scope of the original project and reduce or eliminate the planned investments.

4.21 While the ultimate funding can come only from taxpayers or users, the financing to shift the payment to the future can come from a variety of sources—public or private—through federal or state transfers, municipal budgets, state or federal guarantees, bond issuances, special non-budgetary funds, tariffs and rate charges, private banks, or private equity investors. And, since taxpayers or users always end up paying the bill or repaying the loan, infrastructure financing decisions should fully consider the risk to them. That is not to say that those agencies, investors, and financiers involved with mobilizing finance are not assuming risk. Indeed, since tariffs in some combination with tax revenues cannot be counted on with perfect assurance to match the ongoing financing requirements of infrastructure provision, there is a risk premium on long-term capital.

4.22 Over the past decade, Mexico introduced a number of policy instruments to foster increased private sector participation in infrastructure (PPI), but the performance is disappointing when compared with the international experience with private sector provision (reviewed in Annex C). The amount of private financing mobilized has been low, especially compared to peers in Latin America. Even more important, the mechanisms through which PPI has occurred in Mexico have not made the most efficient use of the private sector's capital or operational expertise.

How to Maximize the Efficiency Impact of PPI

4.23 Mexico's ability to improve the coverage and quality of its infrastructure and to sustain those improvements without unduly taxing public resources will require better use of PPI. This will entail greater levels of competition in service provision, and better regulation, oversight, and contractual adherence. Competition can be achieved in infrastructure provision in several ways, with increasing degrees of impact on rates and quality of service:

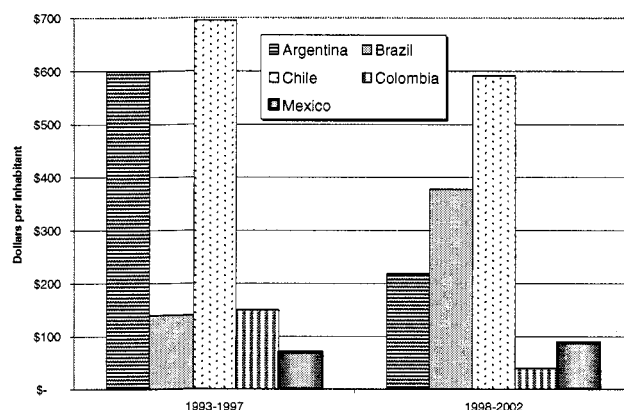
- Competition for the right to build (for example, power plants, water and wastewater treatment plants);
- Competition for the right to provide service (for example, water utility concessions);
- Competition from yardstick benchmarking derived by contrasting the performance of local monopoly service providers; and
- Competition for actual service provision in unbundled sectors (for example, merchant power plants selling into a power market; independent suppliers of electricity and gas and retail rights over existing networks).

A program's ability to achieve efficiency in service provision and capital expenditure relates to its use of all available forms of competition. In this regard, Mexico is behind its regional peers. To date, Mexico has primarily used the first form of competition—for the right to build—in the power and water sectors, with a small degree of competition for the right to serve (concessions) in water. Competition among service providers is not possible, since it relies on yardstick benchmarking—which in turns requires a plethora of independent service providers at the commercial service level, and an institution with authority for monitoring and sanctioning relative performance. Finally, competition in actual service provision (mostly in electricity) would require market restructuring and the development of independent distribution firms with the right to choose their sources of generation.

Levels of Private Participation in Mexico's Infrastructure

4.24 When viewed as a percentage of investment per capita, Mexico has made little use of the private sector in infrastructure compared to most of its Latin America competitors (Figure 4.1). In order for Mexico to attain more competitive mechanisms, greater and better use of the private sector will be required in the future.

Figure 4.1: Private Participation in Infrastructure Has Been Limited in Mexico, Relative to its Peers in Latin America, 1993-2002



Note: Includes all energy sectors (including gas), telecommunications, water and sanitation, and transport (roads, ports, railways, and airports).

Source: World Bank PPI Database.

4.25 The limited use of PPI is all the more surprising in light of Mexico's good sovereign risk and credit ratings, its macroeconomic stability and general success in attracting foreign direct investments, and the depth of local capital markets. Indeed, Mexico is probably one of the few developing economies today that could fairly easily attract substantial amounts of private capital for infrastructure.¹⁰² While PPI may indeed increase in Mexico with the new PPPs and concessioning programs, careful attention should be given to new schemes in order to increase PPI's impact on efficiency. This is described in more detail below.

Forms of Private Participation in Mexico's Infrastructure

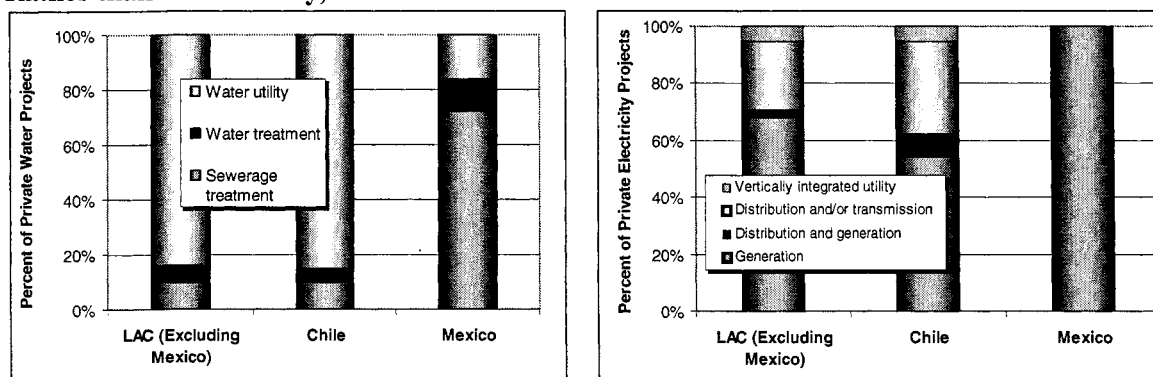
4.26 The benefit from private sector participation is generally related to the degree of interface between the private sector and domestic consumers of infrastructure services. While Mexico appears to have achieved fairly low per-unit costs at the upstream end (for generation development, for example), most utility inefficiency is found downstream, at the retail level: line losses from undermaintained assets, poor customer and consumption data, distorted tariff structures, lack of metering, and theft in tandem with lack of incentives for disconnection.

4.27 In Mexico's case, the most sensitive areas of utility-consumer interface—water supply and electricity supply—have seen very little private sector participation. Although a significant portion of CFE's financing for generation may be mobilized by private power plant developers, and several water and wastewater treatment plants around

¹⁰² Private flows to infrastructure in Latin America have collapsed since the peak year of 1997, partly because of the economic crisis in East Asia and Argentina, but also because much of the more attractive divestiture operations (mostly in telecommunications and power) have already taken place.

Mexico are built and operated by the private sector, few end consumers of those services see the private sector as their service provider and bill collector. Figure 4.2 illustrates this point.

Figure 4.2: PPI in Mexico has Disproportionately Favored Production and Generation Rather than Retail Utility, 1990-2003



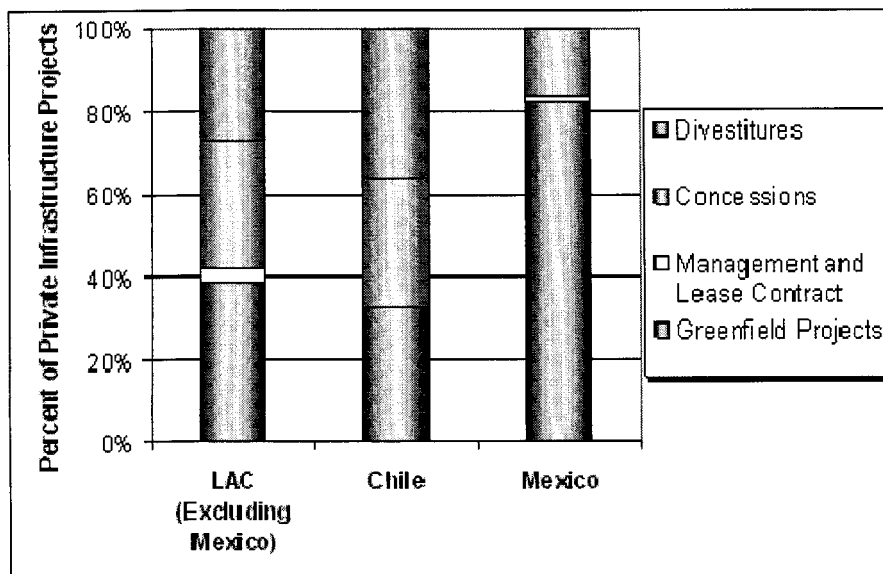
Note: Chile data extend back to 1985 to capture their early PPI initiatives. Water data extend through 2004.

Source: World Bank PPI Database; A. Karina Izaguirre, authors' calculations.

4.28 The degree to which Mexico has limited private sector involvement to production, and continued to rely on public agencies as service deliverers, has been remarkable compared to the rest of Latin America. Less than 20 percent of Mexico's water projects with private participation, and no electricity projects, have assumed some form of retail risk (Figure 4.2). By contrast, nearly half of Chile's power projects and over 80 percent of their water projects have included a "retail" element that transferred commercial risk to the private sector. Mexico's reluctance to bring the private sector to its citizens in the areas of water and electricity is a response to political constraints. But whatever the motivation, the result is lower levels of competition, fewer opportunities for efficiency gains, and a lack of incentive for the implementation of effective regulation.

4.29 A related characteristic of Mexico's private programs in water, electricity, and roads can be found in its preference for greenfield projects. While this may be changing with the new PPPs toll-road initiatives and a few water concessions, to date, the vast majority of projects have been for the construction and operation of new production facilities (Figure 4.3).

Figure 4.3: The Share of PPI Allocated to Greenfield Projects Has Been Particularly High in Mexico, 1990-2003



Notes: Chilean projects traced back to 1985; water data extend through 2004.

Source: World Bank PPI Database; Ada Karina Izaguirre, authors' calculations.

Effects of Mexico's Imbalanced Approach to the Use of the Private Sector

4.30 There are several results of the stark preference for using the private sector in greenfield and production projects. The first, as mentioned above, is the decreased opportunities for efficiency because existing service providers are not exposed to competitive pressures, new management, technology, outside sources of financing, or procurement approaches. In addition, the motivation for establishing legal and institutional arrangements that separate out political, operational, and economic decisionmaking is reduced. As a result, the degree of regulation and independent oversight in Mexico's utility and road sectors remains underdeveloped, while tariff setting remains the purview of political forces.

4.31 The dominant use of private funds in greenfield projects and the imbalance between private sector participation in production/generation versus retail operations also places a disproportionate burden on taxpayers. That is, under current arrangements municipal water utilities must offer steep take-or-pay agreements in order to secure private financing for water, and wastewater treatment plants. If the publically owned utilities themselves were financially viable purchasers, the guarantees for these agreements would be lower, cheaper, or altogether unnecessary.

4.32 In addition to shifting risk from users to taxpayers, the implied subsidy is mostly regressive, since only connected consumers benefit. The costlier the subsidy, the

higher the regressive tax against those who are either unconnected, underserved, or receiving poor-quality service.

C. HOW INFRASTRUCTURE IS FINANCED: CURRENT EXPERIENCE WITH CREDIT- ENHANCEMENT SCHEMES IN MEXICO

4.33 Even assuming political commitment at the federal, state, and municipal levels, it will take several years for Mexico to move toward the types of market structure described in Section 4.2. While those structures may reduce or eliminate the need for off-take agreements, some public credit enhancements that fall into the general category of guarantees and insurance—that is, indirect subsidies that create contingent liabilities—may continue to serve as useful elements in a strategy to leverage private sector participation in infrastructure. This section summarizes the role of the primary credit enhancement schemes currently in use in Mexico in order to help refine their role and improve the efficacy of their delivery.

4.34 Mexican experience with credit enhancement has changed over time, and the degree of success varies across sectors and programs. This section thus reviews trust funds, guarantee and transfer programs which defy a simple institutional categorization, and focuses on an overview of the primary issues related to the major credit enhancement schemes affecting those infrastructure sectors.

Analyses of Selected Existing Infrastructure Programs

Infrastructure Investment Fund (Fondo de Inversión en Infraestructura, FINFRA)

4.35 After the 1995 Mexican crisis, FINFRA was one of the first programs to promote private investment in different infrastructure sectors. Created as Trust Number 1902 in *Banco Nacional de Obras y Servicios Públicos* (BANOBRAS), it was specifically designed to finance infrastructure projects with high social return. Private participation in the provision of infrastructure is encouraged (providing public resources results in a greater national and foreign private participation in infrastructure). The program has gone through several changes over the years. Currently, the program can provide financing for building water supply, sanitation, roads, ports, airports, urban transport, and public utilities.

4.36 Projects are awarded to the contestant that requests the least government funding. For example, in the case of roads, the government sets the tariffs and the contractors bid for the project on the basis of lower subsidies (Table 4.5).

Table 4.5: Conditions for FINFRA Financing

Type of Contribution	Authorized Limit
Venture capital	Up to 35% of equity
Subordinated capital	Up to 40% of total investment
Venture and subordinated capital	Up to 49% of total investment
Aggregate public share of capital	Up to 49% of total investment
Total aggregate public share	Up to 2/3 of total investment
Commitment in one single project	Up to 20% of the Fund's equity

4.37 The following analysis of FINFRA is focused on two subsectors, toll roads and wastewater treatment plants, where FINFRA has been most active within the sectors covered by this study.

4.38 ***FINFRA's Federal Toll-roads Concessions:*** In the early 1990s, the Mexican government embarked on an ambitious toll-road concession program. While the program resulted in the construction of many new roads, a majority of the concessions failed after the macroeconomic crises of 1995, and were ultimately rescued by the government.¹⁰³ The early program was so ambitious that it not only included the few toll roads justified by the traffic volumes of that time, but also included most of the links that might be attractive for private participation according to today's traffic levels. Nonetheless, over the last two years the Government has begun to pursue the concessioning of new toll roads, two of which are under construction, seven of which are now being tendered, and another seven of which are still in the planning stages.

4.39 The new road concession program represents an effort to identify and assign risks among participants in a rational manner. It also recognizes the need for public-private partnerships. The mechanism recognizes that there are certain projects for concessioning that may not have positive revenue for the private sector, and thus require government intervention. Some key elements of the program are:

- Federal resources are channeled through FINFRA, establishing maximum limits for each project. FINFRA's funding will serve as a matching grant of the concessionaire's risk capital.
- The initial federal contribution is a nonrecoverable transfer.
- Once the concessionaire has recovered the initial investment and a certain return, it will share with FINFRA the net income from the road until the end of the concession contract.

¹⁰³ Sales, Sclar, and Videgaray (1999) offer a description and analysis of the early program and its financial failure.

4.40 The bidding is open to national and international consortiums integrated by investors and operators that must demonstrate their operating experience. With the goal of avoiding conflict of interest, given that it is both the investor and the constructor, there will be mechanisms that guarantee the risk capital:

- The concessionaire must take into consideration in its proposal the obligation to supply at least 25 percent of the total project value.
- A project bond will be established for the concessionaire to cover the risk that the project might have to be prematurely terminated, or there are out-of-budget costs for which the concessionaire is responsible.
- A similar bond will be established against authorities and called in the event they breach their part of the contract.

4.41 The new concession mechanism relies on debt financing (domestic and international). In order to mitigate risks to debt holders, FINFRA commits to providing subordinated contributions if needed to cover debt service (*compromiso de aportación subordinada*, CAS). The maximum amount of this government commitment is established in pesos in the concession documentation. If called, repayment of the CAS is subordinated to project debt, but remains senior to project equity. The concession is assigned to the bidder that requires the lowest amount of the sum of federal grants for construction and the present value of the requested CAS. The maximum time span of a concession will be 30 years.

4.42 The main objective of the new program is to increase the supply of roads through a combination of fiscal subsidies and market financing backed by tolls. In this manner, the government is leveraging the private sector to supply infrastructure services that produce positive externalities.

4.43 Although this new approach to concessioning Mexico's toll roads is a marked improvement upon the earlier approach, the market has responded with modest levels of enthusiasm. This may be a result of the lack of traffic guarantees provided in the program. While it is an improvement that those direct forms of contingent liabilities are not absorbed by the taxpayers, the Government may be able to guarantee against negative contingencies such as the construction of alternative routes. The CAS addresses these issues for debt holders, but magnifies the problem for equity holders that become subordinated to CAS recovery.

4.44 A second financing challenge is the unavailability of long-term currency swaps and *Unidad de Inversión* (Inflation-Linked Units, UDIs) (that is, inflation-adjusted, fixed-rate bonds) to floating-rate peso swaps. Given the long-term nature of the projects, the lack of long-term currency swaps is a limit on external financing options. UDI/peso swaps could be helpful in mitigating currency risks, given that the source of payment (tolls) is indexed to inflation, and therefore UDI finance is the best asset-liability match. Unfortunately, there is not yet a long-term market for such swaps, and in contrast with other sectors (that is, low-income housing), the government is not willing to provide the swaps.

4.45 On the impact on Federal Government finances, and thus on the taxpayer burden, the bid design illustrates how much more valuable a real subsidy is to a contingent payment, since bids to date have evidently preferred the up-front subsidy. In effect, the parametric formula equates the cost of the guarantee as one-to-one with the direct subsidy. In addition, the lack of currency and UDI swaps increases the vulnerability of the concessions to macroeconomic risk, which can lead to costly bailouts.

4.46 Aside from the currency mismatch concerns and the bid bond requirements, the low levels of interest to date could be the result of the wariness of private road operators to return to Mexico. However, the dominance of new road construction (including a focus on difficult-to-project ringroads and bypasses) rather than concessions over existing roads with some proven traffic makes the program that much riskier from the investors' perspective.

4.47 ***FINFRA's Wastewater Treatment Plants:*** Municipal wastewater treatment is a priority area of investment for FINFRA. In 2004 alone, nine wastewater treatment plants (WWTPs) received FINFRA support, under build-operate-transfer (BOT) mechanisms. The standard capital structure for a WWTP BOT includes a FINFRA subsidy of up to 40 percent of the investment, debt financing of about 30 percent (provided by BANOBRAS or other sources), and the remaining 30 percent in equity from the concessionaire. The public water utility (state or municipal) is the off-taker for treated wastewater. Off-take payments are monthly, comprising charges for equity return and debt service (T1), fixed expenses (T2), and variable costs (T3). T1 is a take-or-pay obligation.

4.48 To mitigate payment risk, BANOBRAS sets up a contingent credit line that covers from three to six months of payments, and the credit line is in turn backed up by federal transfers: if the utility does not pay, the concessionaire calls the credit line and gets the payment from BANOBRAS; then BANOBRAS can collect its payment from the federal transfers targeted to the local government. Although the nominal amount of the credit line is limited to three to six months, it is a *revolving* line. Given the strength of the federal transfers guarantee, the revolvency risk is minimal so, de facto, the complete stream of payments is backed by federal transfers for the life of the concession. See Box 4.2 for a comparison of Puebla case studies in the use of credit enhancement design. Annexes D (Puebla Toll Road Securitization) and E (the Puebla BOT Buyback) contain more detailed information about these individual cases.

4.49 The need for municipal wastewater treatment is evident, and FINFRA-sponsored projects have been instrumental in increasing coverage. There is no doubt that the program has been effective in addressing the negative externalities caused by residual discharges. However, the following are key weaknesses:

- Many local utilities and governments have reservations about the mechanism, and this has limited its impact. Reservations stem mainly from four factors: (a) wastewater treatment is not a political priority; (b) regulations mandating wastewater treatment before discharge into federal water bodies have no credible

enforcement; (c) the BOT increases utility expenditures; and (d) federal transfers are the main collateral available for local governments, and there may be other demands for the limited quantity. These factors decrease the effectiveness of the FINFRA matching grant incentive.

- While wastewater treatment plant BOTs have worked well in utilities that are financially healthy, in cases where the utility is in bad financial standing the BOT makes things worse by adding to expenses. Typically this increases dependence on transfers from the parent government if tariffs cannot be increased to cover the wastewater treatment plants.
- The BANOBRAS contingent credit line basically transforms off-taker risk into debt-like risk backed by federal transfers. In this context, requiring a capital structure with 30 percent equity is inefficient, and offers a risk–return arbitrage opportunity to private participants. Unfortunately for the purchasers and sponsors, this increases costs significantly. The fact that all bids for wastewater treatment plant BOTs attract strong interest from operators and banks is, therefore, no surprise.
- The accounting treatment of the contingent credit line, due to its revolving nature, does not reveal the true size of the T1 take-or-pay liability. BOTs are often marketed as schemes that do not create debt, which is true only from an accounting perspective. T1 is not a conditional obligation, and is strongly guaranteed by an intercept on federal transfers, so its present value should be acknowledged when debt is assessed.
- Bidding rules and procedures are quite intricate and prone to controversy. WWTP BOTs have become so appealing to private participants, that bidding has become contested and litigious. Some projects are delayed for months due to bid controversies, and others have been cancelled (that is, Pachuca’s project).

Box 4.2: Case Review: The Puebla BOT Buyback Compared to the Puebla Road Securitization

A comparison of the Puebla toll road securitization and the Puebla water BOT demonstrates how credit enhancement design affects risk allocation and the financial sustainability of projects. In the case of the Puebla toll road, a partial guarantee was offered, which forced the market to understand the underlying risk and absorb a meaningful part of it. Moreover, it is based on an underlying financially viable asset (the road), and a structure that achieved an A+ rating without the guarantee. In addition, the true sale structure gives control to the investors of critical variables related to payment capacity, including tariff levels. There is no backing of federal transfers, and the government has no responsibility for making any payments.

In contrast, the contingent line in the BOT was a full guarantee (disguised as partial through the revolving-line device), so the investors did not have to make any analysis or absorption of the underlying risks, such as the utility's payment capacity. It was based on federal transfers, not a financially viable asset (the utility) or credit structure. Finally, investors had absolutely no control of critical variables affecting payment capacity, such as tariffs.

Although the arrangements for moral hazard and the electoral cycles are the same in both cases, the fundamental differences in the design of the credit enhancement instrument deliver a different level of sustainability in each arrangement's financial structure. In the road's case, the risk and full control over critical variables were transferred to the investors and the guarantor. By contrast, basically all risk and control of critical variables stayed with the state government in the BOT's case. Annexes D (Puebla Toll Road Securitization) and E (the Puebla BOT Buyback) contain more detailed information about these individual cases.

D. RECOMMENDATIONS

4.50 The following recommendations to improve the design of federal infrastructure programs that increase decentralization and private participation come from a review of international experiences and the analysis of Mexico's current financing arrangements, existing credit-enhancement programs, and alternative cases. The overriding objective is to protect the government's macroeconomic stability by limiting the government's fiscal exposure to infrastructure investment wherever possible. This must be done in the context of awareness of the growing need for infrastructure investment in real terms. The recommendations have three objectives:

- Reducing risks where possible;
- Rebalancing risk allocation away from taxpayers and toward providers and users; and
- Improving the structure of credit-enhancement mechanisms and improving the efficacy of agencies involved in financing of infrastructure.

4.51 The first step toward limiting the government's fiscal exposure to infrastructure expenditures is to reduce total risk. Risk—political, economic, regulatory, or project-specific—translates into higher costs of capital in project finance and fewer bids on

competitive project transactions (reduced auction benefits). These risks may be reduced through stronger regulation, oversight, and accountability—in particular in the transfer of federal subsidies to sub-sovereign entities, municipalities, and public service providers. The greater use of local capital markets will also reduce currency risk, and may reduce project risk by fostering closer alignment between long-term investor interests and operational performance of the service provider.

4.52 To rebalance the allocation of risk away from taxpayers, guarantees should be offered only to the extent necessary to get market participation, and should allocate to the private sector or public utility its fair share of risk. This means that when guarantees are employed, the government needs to shift away from revenue, traffic, or volume guarantees, and to use guarantees against negative contingencies, such as failure of tariffs to keep pace with input prices. This will require strengthening regulation and the financial and technical performance of service providers through increased private sector participation focused on retail operations. Conversely, if a project requires a significant guarantee of cash flow in order to be bankable, the project should be reevaluated. Finally, in cases where credit-enhancement mechanisms are indispensable, given growing expenditures in infrastructure, the Government should design the enhancement to protect its own fiscal exposure and to assure that, when transfers or guarantees are made, the agencies involved are acting effectively and efficiently. The discussion here focuses on the public infrastructure bank for subnational projects (BANOBAS), the Government's largest off-balance-sheet financing scheme (PIDIREGAS), the future approach to public-private project design (PPPs), and federal-municipal matching grants.

Improving the Federal Government's Instruments to Achieve Desired Infrastructure Outcomes with Sub-sovereign Projects

4.53 To reduce political risk, it is important to understand the decentralization process and the agency problem it generates. The agency problem arises because of the different incentives of the Federal and subnational governments. The Federal Government has two main sets of instruments to achieve long-term goals in the provision of sub-sovereign infrastructure: transfers and penalties. Transfers are in the different programs to promote local government and private participation. Although penalties and fines are established in the Mexican laws (for example, in the Federal Water Fees Law), the Federal Government is only using the first set of instruments, which local governments understand, diminishing their incentives to abide by the rules.

4.54 Moreover, in a repeated interaction, municipalities and local governments perceive that they not only will avoid penalties, but will receive subsidies in the future if efficiency is not attained. This produces perverse behavior, which, in the end, is more costly to society as a whole. It is important to break this structure of perverse incentives that lead to inefficient outcomes. Box 4.3 shows some examples of how the Federal Government's failure to enforce the rule of law leads to counterproductive incentives in the infrastructure sectors.

Box 4.3: Federal Influence to Improve Municipal Water Sector Policies

Constitutional reforms starting in the 1980s established the municipalization of water in Mexico. This opened up opportunities for new partnerships in water programs. However, the decentralization of water supply and treatment to municipalities has proven problematic. Exacerbating the lack of long-term planning endemic to the three-year administration terms of local government, the water programs generally do not match the incentives of municipalities with the incentives of the Federal Government.

Some of the highest risks for the water programs come from the local government or utility freezing tariffs. Moreover, local government may decrease tariffs for political reasons, which makes current and future revenue collection difficult. This is aggravated by the short-term horizon of municipal administrations. Since the key issue of these programs is to promote efficient water charging, the whole scheme may be vulnerable if tariffs are not increased or are susceptible to government changes. Even if they are not included in the programs, some water systems have made it part of their operational rules to update tariffs to reflect changes in costs and inflation.

In general, the federal water programs need improvement. Municipal participation has been scarce, and the private sector is being attracted only through strong federal guarantees.¹ However, the Federal Government rarely penalizes municipalities for deficient provision of sewerage and treatment, or uses its fiscal powers to recover water fees from the municipalities. Most programs focus on benefits for municipalities, but little is done to enforce the law.

This type of behavior sends the wrong signal to municipalities. Municipalities do not have the incentives to correctly charge and pay for their water, because the Federal Government does not penalize them if they do not pay their fees. Moreover, there is little incentive for sewerage and sanitation because the municipalities perceive a very low probability of receiving a fine from the Federal Government for not complying with discharge standards.² Given the decentralization of the water sector, the Federal Government has two tools to promote proper water supply, sewerage, and sanitation: support through water spending programs and the enforcement of law. To date, it is using only the first.

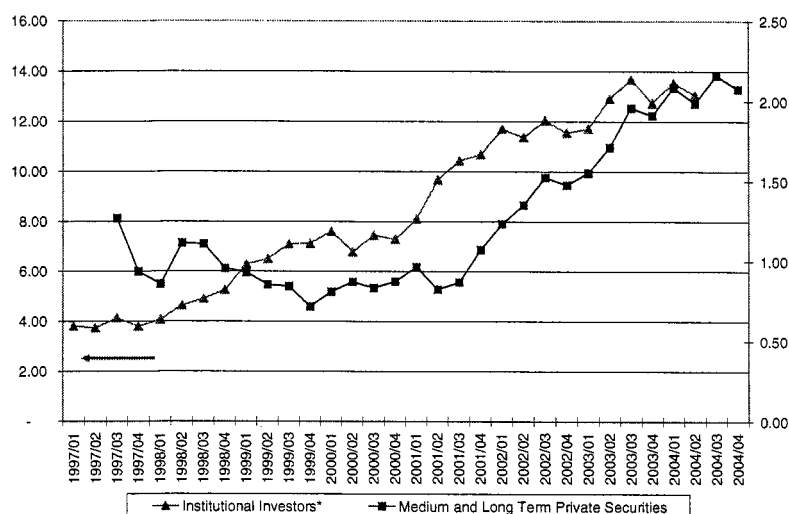
1. Mainly by the use of the contingent credit line used in the FINFRA projects.

2. CNA is the responsible fiscal authority to enforce the different regulations.

Reducing Currency Risk and Mobilizing Long-term Financing through the Greater Use of Local Financial Markets

4.55 The achievement of macroeconomic stability, along with a sustained decline in inflation and interest rates has, in recent years, led to the rapid development of Mexico's domestic financial markets. In real terms, medium- and long-term private securities more than doubled from 2000 to 2004 (Figure 4.4).

Figure 4.4: Local Market and Institutional Investors Development (% of GDP)



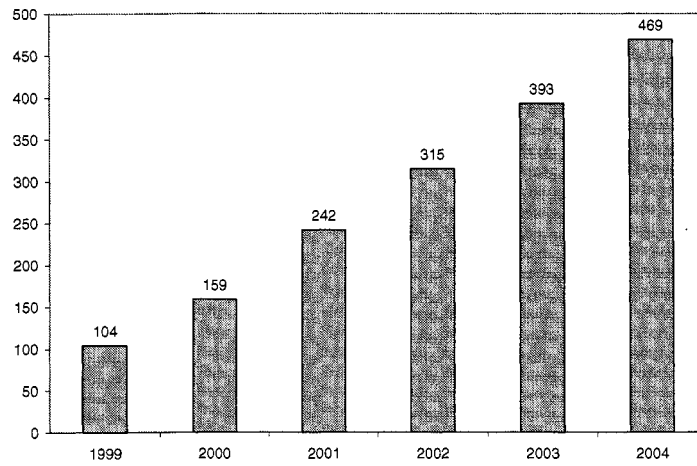
*SIEFORES, Insurance Companies (pension, health, and life), Mutual Funds (fixed-income, variable income, and capital markets), and Savings and Credits Societies.

Sources: CNBV, CONSAR, CNSF. World Bank (2003), and Banco de México (with data from Instituto para el Depósito de Valores [INDEVAL]).

4.56 At the project level, two indications of the development of local financial markets are the long-term securitization of mortgages and the financing of a toll road, at the end of 2004, with maturities of 30 years and 25 years, respectively.¹⁰⁴ Moreover, due to demography and the defined contribution reform of the Mexican pension system, there is a sustained growth in the amount of assets managed by Mexican private pension funds (AFORES). As of December 2004, AFORES managed assets in excess of MxP469 billion (US\$41.9 billion), an amount equivalent to 6.3 percent of Mexico's GDP (Figure 4.5). This figure is expected to reach 20 percent of GDP by 2015 (Sales, Solis and Villagomez 1996). These two processes have created a capital market for long-term securities, where states and municipalities are demanding long-term financing and the AFORES are willing to invest their resources in long-term projects.

¹⁰⁴ Both transactions are denominated in UDIs (Inflation-Linked Units). *GMAC-Hipotecaria Su Casita* securitized mortgages with a 30-year maturity. On the other hand, the Toll Roads Organism of Nuevo León securitized the Monterrey-Cadereyta highway to obtain 25 years' maturity.

Figure 4.5: AFORES's Assets Under Management
(as of December of each year, billions of pesos)

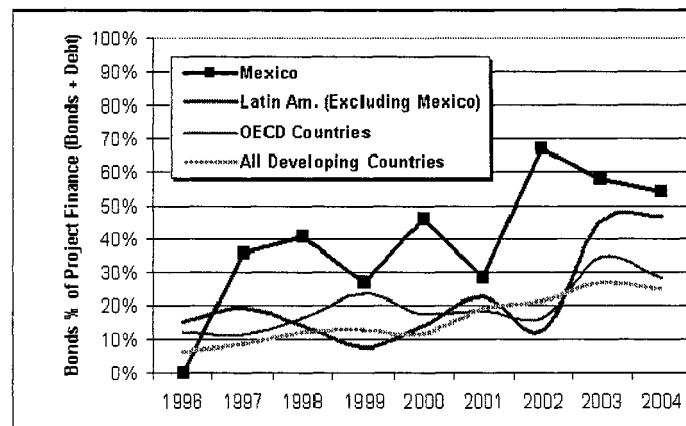


Source: CONSAR.

4.57 The market has also benefited from two wider accomplishments in the financial sector in recent years:

- Mexico has had full access to global debt markets after obtaining investment-grade ratings from Fitch, Moody's, and Standard & Poor's.
- The development of the Mexican bond market has allowed the government to access financing in the local market, converting the majority of its debt from foreign currency (mostly U.S. dollars) to peso-denominated debt, thereby reducing the existing currency mismatch. It has also led to unusually high levels of reliance on bonds for project finance, as demonstrated in Figure 4.6.

Figure 4.6: Bonds as a Percent of Total Project Finance (1996-2004)



Note: Represents voluntary reporting by financiers.

Source: Project Finance League Tables; Stephan von Klaudy, authors' calculations.

- In banking, the *Comisión Nacional Bancaria y de Valores* (CNBV) has recently enacted new rules for the creation of reserves at credit banks. The amount of these reserves depends on the bank's credit ratings, effectively forcing states and municipalities to demonstrate significant financial soundness, and to create the required financial structures in order to gain access to credit. This recent regulatory change in banking reserves represents an important step toward a more solid and certain credit market for subnational governments.

4.58 Mexico is, today, in better shape to finance long-term infrastructure projects. It can obtain financing in pesos that match the maturity term of infrastructure development. Consequently, the design of the mechanisms of intervention should encourage the use of local long-term financial markets, including banks and bonds. A long-term goal should be to use foreign funds as complements to local financing.

4.59 Domestic pension funds will grow over the next decade to be ten times the size of Mexico's yearly infrastructure investment and maintenance needs. In order to leverage these pension funds, certain measure could help to initiate them into the long-term investment opportunities:

- Preparing projects to meet their particular investment requirements by boosting credit ratings with multilateral guarantees. (See Chile Toll Road Case Study in Annex F).
- Providing set-asides for minority blocks of shares prior to final transactions for infrastructure PPPs. This would give the AFORES the chance to value each opportunity and lock in a long-term investment (if they find it feasible or attractive) without having to bid or team with strategic investors. Since they generally prefer to be passive investors, they may not care to marry with other equity investors in advance of a sale. For the competitive portion of the transaction held subsequent to the AFORES sale, having the AFORES in position could provide the market with a strong indicator of financial feasibility, and reduces the equity contribution required for a bid.

Altering the Use and Design of Guarantees

4.60 It may be difficult for projects to cover internally the cost of risks associated with proper Government behavior, given the weak institutional and regulatory frameworks in Mexico's infrastructure sectors. However, uncertainty of government behavior might be partially mitigated through negative covenants in contracts, conflict resolution mechanisms, and design of proper guarantees.

4.61 Government intervention in the provision of infrastructure creates its own problems. When the private sector has invested in a large "sunk" project, the specific asset creates asymmetrical opportunity for Government interference (for example, in tariffs), or even expropriation. Mechanisms to mitigate those risks might include:

- Establishing a Guarantee Facility with a line of credit from a multilateral organization, which focuses on Partial Risk Guarantees for infrastructure projects. Such a facility could be administered by BANOBRAS. This would allow for the facility's design and standard products to be tailored to Mexican capital markets, laws, and regulatory peculiarities. Given that guarantees are not valued fully against the borrowing capacity of the Government, this might be an effective way to bring the strength of a multilateral agency's credibility into the infrastructure sector without the full cost of sector loans.
- To improve the perceptions of the private investment environment, the Mexican Government could consider joining the Multilateral Investment Guarantee Agency (MIGA), a World Bank Group organization. MIGA was formed in 1988 to encourage foreign direct investment in developing countries by providing political risk insurance against such risks as transfer restriction, expropriation, breach of contract, and war and civil disturbance.¹⁰⁵ MIGA could help the Government avoid self-induced risks, and it does not require a sovereign guarantee.
- Guarantees for government self-induced risks, wherever they are based, should transfer the risk to the party best able to handle it. The guarantees can be in the form of contingent government debt securities, linked to negative covenants. Since the Federal Government has already reached investment grade, there is no apparent need to structure the guarantees through specific cash flows or assets.
- At the subnational level, project costs can be lowered and financing markets improved when negative covenants are backed up by specific assets or cash flows. The "Toluca-Atlacomulco" project, described in Annex G, used a contingent credit line only to back up the State's negative covenants—a relatively efficient way to address the appropriation risk at the sub-sovereign level.

Migrating Toward More Balanced Market Structures in Electricity and Water

4.62 The imbalance between private sector participation in production compared to retail operations places a disproportionate burden on Mexico's taxpayers. Under current arrangements, CFE and municipal water utilities must offer take-or-pay agreements in order to secure private financing for power generation and water and wastewater treatment plants. If the utilities themselves were financially viable purchases, the guarantees for these agreements would be lower, cheaper, or altogether unnecessary. Given the correlation between income and utility connection, these guarantees are highly regressive. The only long-term solution is to have financially viable utilities and independent entities involved in the distribution or retail activities and deciding on a competitive basis how to procure their production or generation needs. With proper

¹⁰⁵ Membership in MIGA is open to all member countries of the World Bank. A country must (a) sign the MIGA Convention; (b) deposit its instrument of ratification; and (c) subscribe to the shares of the Agency's capital stock allocated to the country, and pay in full to the Agency the subscription amounts.

regulation, public sector ownership could remain on a commercial basis, although private ownership has usually been the best solution in other OECD countries. This, in turn, requires a clear separation of roles and responsibilities among policymakers, regulators/tariff approval authorities, and operators.

4.63 If the municipal water utilities and their regulatory arrangements are not currently strong enough to attract investors willing to mobilize capital, partial-risk guarantees from multilateral agencies might serve as a mitigant for political and regulatory risk. For example, for the water utility concession of Guayaquil, MIGA offered political and contract breach insurance to protect a performance bond issued by the investor-operator. The value of the guarantee was a small portion of the investment obligations of the concessionaire, but was sufficient to bring the project to financial closure. (See Annex H for a description of the case.)

4.64 In roads, the use of the private sector in the rehabilitation and operations of existing assets will help minimize the need for revenue or traffic guarantees, given the importance of proven traffic levels to financial backers. In these cases, even partial coverage of cost with tolls helps to reduce the need for full budgetary transfers or guarantees.

Redirecting BANOBRAS Activities toward Complementing the Market

4.65 BANOBRAS is the most important government institution for promoting infrastructure in sectors such as water and roads. However, the bank's activities could be reoriented to enhance its impact:

- *Complement market functions.* BANOBRAS, as a development bank, should play a facilitator role in the market. The bank should represent a complement to the market and compete in the market only in limited cases.
- *Leverage competitive characteristics.* In spite of its structural challenges (for example, high payroll, low return on assets), BANOBRAS has valuable competitive advantages that could be used under a new business model:
 - Important brand recognition among states and municipalities;
 - The largest origination capacity in Mexico;
 - A better capacity than commercial banks to take long-term risks; and
 - Capacity to provide technical assistance.

4.66 Consequently, a business model oriented to make BANOBRAS play a catalyst role will require the bank to considerably expand its credit-enhancement activities for market transactions, as it did (in a pilot mode) in the Puebla-Atlixco toll-road securitization. Guarantee provisions can maximize the social impact of BANOBRAS's capital. Since guarantee products have a wide flexibility to support individual client requirements, BANOBRAS should use the strength of local capital markets and the bank's competitive advantages. A special guarantee line of products focused on

government negative covenants can be of great value to the market. This would build on BANOBRAS's role in securitizing projects, such as with the Puebla–Atlixco Toll Road (see Annex D), for which BANOBRAS provided a partial guarantee to bondholders.

Improving Program and Product Design

4.67 Mexico's macroeconomic stability has been recognized by the international rating agencies as a key element in the promotion of private participation in the provision of infrastructure. This stability is, without doubt, a fundamental prerequisite for financing of infrastructure with spreads that contain reasonable premiums for country, regulatory, and project risk. Consequently, program and product design must consider the impact on public finances. Widespread intervention mechanisms could result in important contingent liabilities that eventually weaken the program's and government's fiscal stance. The long-term impact of PIDIREGAS—and of the market structure of the electricity sector as a whole—shows up in this context. Likewise, PPPs could prove to be a new source of uncertain liabilities for the Government if they are not evaluated from a public expenditure perspective and commitments for transfers are not assigned rationally. Finally, federal matching grants to municipalities need to be evaluated and probably redesigned to improve the incentives of the sub-sovereign participants.

- **PIDIREGAS:** To approve a PIDIREGAS project is supposed to generate sufficient revenues to pay for itself, but this requirement is not always respected. For example, although transmission lines do not generate revenues in integrated utilities, a substantial number of PIDIREGAS are for this type of infrastructure. Furthermore, independent power providers (IPPs) have been documented selling power below production costs, creating a claim for public transfers under the power-purchase agreements. Whereas the water sector is considered a much riskier sector than power in project finance, there are cases in Mexico where even water utilities have raised bonds based on revenue streams (see Annex I). If reliance on self-generated revenues to finance production or wastewater treatment is possible for municipal or state water companies in Mexico, finding comparable arrangements in power generation should be possible for a national utility.

PPS Evaluation and Debt Management: In the case of PPPs, the future commitments of the Federal Government could be significant, making it important to assess the intertemporal effects of this intervention mechanism. To assure proper long-term management, the Ministry of Finance should carry out a global assessment. Currently, only the Undersecretariat of Expenditures of the Ministry of Finance participates in the selection process of PPPs. The Public Credit Unit (in the Public Credit Undersecretariat) should participate fully in the evaluation and assignments of PPPs, since the Unit already must comment on the long-term implications of the PPPs' program from a public-debt-management

perspective. Moreover, it should keep a register of all future contingent obligations.¹⁰⁶

- ***Matching Grant Programs:*** Program design should consider the political incentives of subnational governments. In the case of municipalities, there are some infrastructure sectors (like sewerage and wastewater treatment) that do not represent a high priority for many local governments. In this case, regular matching grant schemes do not work. One possible mechanism is to tie grants for politically attractive sectors to conditions around clear performance and financial targets in high-social-impact but low-priority infrastructure sectors.

¹⁰⁶ According to the Presidential Decree of April 9, 2004, only the Public Investment Unit and the Budget Control and Policy Unit of the Expenditure Undersecretariat participate in this process.

5. A WAY FORWARD FOR INFRASTRUCTURE FINANCE

5.1 This chapter draws out the broad lines of action flowing from the analysis of performance and financing of infrastructure of the prior chapters. It identifies common approaches and mechanisms, indicating the impact of each, and provides a time frame for their implementation. It concludes by illustrating the nature of the challenges to be addressed in operationalizing those considered of high priority. It should be reiterated that being a review principally of expenditure and finance issues, the recommendations do not address all facets of infrastructure services, nor does it provide a detailed roadmap for implementation. Rather, this review aims to stimulate dialogue and consensus building on ways to better and more fully use current and potentially available resources for basic infrastructure services.

A. SYNTHESIS OF FINDINGS

5.2 The main conclusions of the preceding chapters can be summarized as follows:

5.3 While important access gaps remain, particularly in smaller cities and rural areas, and especially among indigenous communities, Mexico's key infrastructure challenges lie in improving the quality, reliability, and efficiency of service. Chapter 2 examined the quality of service and extent of coverage, as well as levels of spending in transportation, electricity, and water and sanitation infrastructure in Mexico. It also includes a comparison of Mexico's performance characteristics with those of other middle-income and Organisation for Economic Co-operation and Development (OECD) countries. It concluded that Mexico has made steady progress in increasing coverage in recent decades—higher than the averages for Latin America, but below those of OECD countries.

5.4 The quality of infrastructure services strongly determines the extent to which enterprises can lower costs, expand market opportunities, and, with it, productivity and investment, which drive economic growth. Progress on improving service quality in Mexico has been uneven. Mexico's road network is a case in point. Though an important part of the network is in good or fair condition, still about 40 percent of roads (especially state and municipal roads) are in poor condition. Expenditures on maintenance are far lower than in other OECD countries, contributing to more rapid deterioration, which has in turn necessitated more costly road rehabilitation. In contrast, structural reforms in railways and ports have permitted increased investment, which have enhanced the quality and efficiency of service. Service quality by the main electricity provider, the *Comisión Federal de Electricidad* (National Electric Company, CFE), has improved, but still remains below international standards in terms of transmission and distribution losses and thermal plant availability, with outage rates higher than official figures would indicate. In contrast, the Mexico City electricity operator, *Luz y Fuerza del*

Centro (LFC) presents performance characteristics well below that typically found in a middle-income country, and is functionally bankrupt.

5.5 The prevailing price-setting regimes—with large subsidies for some users and tariffs covering or exceeding full costs for others—lead to distortions of usage and underinvestment. Retail tariffs for electricity, Water Supply and Sanitation (WSS), and toll roads are set by a wide array of agencies based on a mix of economic, financial, and political criteria. Most do not cover full costs, and subsidies tend to benefit better-off residential and agricultural users in the case of water supply and electricity. While industry and commerce are least subsidized, electricity tariffs for these users are higher in Mexico than international benchmarks, as are those for toll roads, despite recent reductions. This is not the case for WSS, where extensive underpricing places Mexico even below the Latin America and the Caribbean (LAC) averages in terms of average tariffs—a worrisome phenomenon given that water scarcity is most acute in Mexico. Subsidies through federal programs dedicated to WSS also disproportionately benefit richer states and municipalities, which could well finance part of their infrastructure through improved cost recovery.

5.6 Current levels of public expenditure on the infrastructure sectors considered in this study are broadly appropriate if Mexico is to remain around the Latin American average in terms of coverage and quality of infrastructure. No solid estimate of public infrastructure investment is available, but this report calculates public spending on investment and maintenance in roads, water and sanitation, and electricity to have been around MxP82 billion in 2003, amounting to about 1.2 percent of GDP (not including an additional 0.7 percent of GDP for electricity consumption subsidies). This is in line with estimates of what is needed during 2006–15 (MxP83 billion to MxP102 billion) to adequately maintain networks and achieve the completion of major policy goals (such as universal coverage in water and sanitation and electricity, and to complete major road transport corridors). This should amount to somewhere between 1 percent and 1.25 percent of gross domestic product (GDP), depending on growth performance. This does not include the cost of rehabilitation in water and sanitation infrastructure, much of which is in poor condition, but for which no estimates are available. While these estimates are probably on the low side, they could help improve both coverage and quality if well spent.

5.7 Such a level of spending would not, however, allow Mexico to reach the level of infrastructure per capita of other OECD countries or faster-growing East Asian countries. Indeed, countries like the Republic of Korea, which trailed behind Mexico in terms of infrastructure coverage in the 1960s, invested over 3 percent of GDP per year on average on infrastructure over the last decades—as have China, Indonesia, Thailand, and other competitors that are now fast catching up with Mexico in terms of infrastructure quality and coverage. This suggests the urgency of the need to reallocate untariffed subsidies—such as the 0.7 percent of GDP currently spent on electricity consumption subsidies—toward productive investment and maintenance, and the need to improve expenditure efficiency, more generally.

5.8 The current low levels of quality of service could be reverted through substantial reallocation of spending to rehabilitation and maintenance, at the same time developing better incentives and funding mechanisms to promote better upkeep of existing assets. Allocation of public funding to water supply and sanitation should focus more on rehabilitation of water distribution networks for improving continuity of service, whereas for roads, the priority is on highway maintenance and upgrading the secondary network. In electricity, as long as CFE remains a public monopoly, the priority for public funding should be upgrading transmission capabilities, and maintenance and renewal of distribution networks to reduce losses.

5.9 Improving the efficacy and efficiency of fiscal support for infrastructure requires better coordination and planning within and across sectors, and greater accountability. To a large extent, the requirements for infrastructure planning have become more complex, shifting in focus from traditional public investment programming to strategic planning, decentralization, private sector participation, and credit enhancement. Fragmented decisionmaking regarding funding allocations has contributed to disparate sector outcomes. Better coordination is essential, given the cross-cutting nature of these issues and their economic and political impacts. The process is least fragmented in the electricity sector, which is centrally managed. Central budget setting should prioritize areas that meet with the government's objectives of competitiveness and poverty reduction, while detailed planning would be done by respective sectoral agencies in consultation with subnational agencies, as appropriate.

5.10 Greater coordination between the national and subnational government planning process and the annual budget formulation process is necessary to present more realistic and achievable goals. Across all sectors, national and subnational government agency policy planning and coordination need to be linked, especially for water and sanitation, and for important parts for transportation. One area to focus on is increasing incentives and assistance for subnational planning critical to the transport and water and sanitation sectors. There should also be increased horizontal coordination between the several counties within metropolitan regions. Water attempts to do this with the Basin Councils.

5.11 Multiyear resource envelopes should be used to strengthen planning and better link it with budgeting, centrally and within sectors. This includes outlays for multiyear projects and with debt service operations and maintenance. CFE already follows this approach, and the *Secretaría de Comunicaciones y Transportes* (Ministry of Communications and Transport, SCT) is moving in that direction. The use of multiyear resource envelopes would also avoid the need to fragment larger projects into pieces that can be finished in a year or less, and the accompanying higher total costs. This would be a logical next step from the present practice of having multiyear budgets only for individual projects, toward the concept of complete multiyear budgets and fiscal projections. The government could strengthen the authority of the relevant secretariats for transport and energy to allocate multiyear budget ceilings within their sectors, and enforce compliance with performance targets for the key agencies that report to them, to achieve more coordination among national-level agencies. For the sectors that involve several levels of government, namely roads and water, experience in the United States

and other federations in the OECD shows the value of using matching grants, with multiyear projections and dependence on meeting performance standards.

5.12 Accountability and achieving performance standards require systems for evaluation. This means building into the design of federally funded programs reporting systems with respect to efficacy and efficiency of such programs in achieving measurable outcomes in terms of quality and sustainability of service. An ex post evaluation would provide valuable information on what measures work and why—and thus valuable input for the design of future programs. Such evaluations can also provide a basis for providing incentives for good performance, and would lead to greater transparency. The government should also consider strengthening enforcement measures to complement subsidy-based incentives.

5.13 In order for Mexico's service provision to become more efficient and accountable, greater and better use of the private sector will be required in the years to come. When viewed as a percentage of investment per capita, Mexico has made little use of the private sector in infrastructure compared to most of its Latin America competitors. Given Mexico's sovereign risk and credit ratings, macroeconomic stability, general success in attracting foreign direct investment, and depth of local capital markets, this is a lost opportunity. While these low levels of private participation may change with the new *Proyectos para la Prestación de Servicios* (Public–Private Projects, PPPs) and concessioning programs, the form of private involvement in infrastructure will have to be carefully monitored so that maximum benefits in efficiency are achieved through more aggressive forms of competition.

5.14 In Mexico's case, the most sensitive areas of utility–consumer interface—water supply and electricity supply—have seen very little private sector participation. Although a significant portion of CFE's financing for generation may be mobilized by private power plant developers, and several water and wastewater treatment plants around Mexico are built and operated by the private sector, few end consumers of those services see the private sector as their bill collector and service provider. The degree to which Mexico has used public agencies as service deliverers while limiting private sector involvement in water and electricity to production is extraordinary for the Latin America and Caribbean region.

5.15 Mexico's difficulties in bringing the private sector to its citizens in the areas of water and electricity may be considered a response to political constraints rather than a result of the economic arguments put forth above. Whatever the motivation, the result is lower levels of competition, fewer opportunities for efficiency gains, and lack of incentives for the implementation of effective regulation.

5.16 Mexico also uses the private sector primarily to fund the construction of greenfield projects rather than to address the inefficiencies or capital shortfalls of existing assets. While this may be changing with the new PPPs toll-road initiatives, and a few water concessions, to date, the vast majority of projects have been for the construction and operation of new production facilities. The results of this stark preference for using the private sector in greenfield and production projects include:

- Decreased opportunities for efficiency gains, because existing service providers are not exposed to competitive pressures, new management, technology, outside sources of financing, or procurement approaches.
- Reduced pressure to establish legal and institutional arrangements that separate out political, operational, and economic decisionmaking. Hence,
- Unnecessarily high cost of private participation because CFE and municipal water utilities must offer steep take-or-pay agreements in order to secure private financing for power, water, and wastewater treatment plants. If the utilities themselves were financially viable off-takers, the public guarantees for these agreements would be lower, cheaper, or altogether unnecessary, lowering the cost, in general, and the burden on taxpayers, in particular.
- Regressive transfers because connected consumers benefit most from any public support to utilities.

5.17 To the degree that guarantees will continue to be required to cover risks in infrastructure investment, their design should be oriented toward negative contingencies. Instead of using full and revenue guarantees, this study advocates for more partial risk guarantees and other measures. On one hand, this will better ensure that the private sector has an incentive to be efficient and innovative, and, on the other hand, that the Government is fulfilling its responsibilities as partner. In the same vein, *Banco Nacional de Obras y Servicios Públicos* (BANOBRAS) and other Mexican development banks should shift the focus of their guarantee coverage from broad revenue and volume or traffic bases to more breach-of-contract and expropriation coverage. It is also advisable that BANOBRAS, as the most important government institution for promoting infrastructure in sectors such as water and roads, consider separating out its roles as direct financier, originator, and guarantor.

5.18 Beyond credit enhancement, there are other fiscally positive measures which should be taken to mobilize increased private financing, such as increasing project viability, enhancing the self-financing ability of projects, strengthening the user-fee market structure, and credible regulation. Greater use could be made of Mexico's growing long-term debt markets to finance infrastructure projects, including banks and bonds. This would reduce currency or exchange rate devaluation risks. The Mexican private pension funds (AFORES) could be an important source of this local funding.

B. INTEGRATION OF RECOMMENDATIONS

5.19 In this section, the findings of the preceding chapters are translated into recommended actions, and integrated into a strategically oriented agenda for infrastructure in Mexico. It indicates how the various recommendations impact different infrastructure sectors and themes. Although many of the recommendations may appear

quite subsector specific, they interrelate with one another in a number of ways to support increased competitiveness and improved social welfare. These are presented in Table 5.1.

Table 5.1: Principal Recommendations by Sector and Theme

	Improving Service Efficiency and Quality	Public Finance: Allocation and Program Design	Private Finance and Credit Enhancement	Institutions, Information, Accountability, Coordination
Electricity	<p>Ramp up multiyear program to reduce transmission and distribution losses through modernization and maintenance of distribution networks.</p> <p>Strengthen capacity and public reporting on systems quality and technical performance (CENACE).</p>	<p>Permit electricity operators to recover efficient costs—establish benchmarking and regulatory accounting.</p> <p>Progressively restrict consumption subsidies to poor households and small agricultural users.</p> <p>Reduce size of subsidy to minimum subsistence levels.</p> <p>Options for reversing CFE's decapitalization and subsidy financing mechanism (<i>aprovechamiento</i>).</p>	<p>Reduce reliance on high-cost construction financing (OPF) in favor of long-term service contracts.</p> <p>Increase flexibility of long-term power purchase agreements to reduce risks to CFE/Federation.</p> <p>Contain scope of PIDIREGAS and review structure to reduce burden on PSBR.</p>	<p>Address LFC functional bankruptcy, to permit commercial operation.</p> <p>Empower CRE to function as regulator: oversight of tariffs, service quality, and contracts.</p> <p>Operationalize CFE Corporate Transformation program: increase management incentives/accountability.</p> <p>Pursue options to permit buyers <u>and</u> sellers choice: power markets with multiple distribution companies (public or private) and independent transmission company.</p> <p>Consider options for introduction of private management and capital in distribution companies.</p>
WSS	<p>Strengthen capacity of state water commissions in planning, performance monitoring, and tariff review.</p> <p>Institutionalize financial and operational autonomy of water operators.</p> <p>Review technical norms to promote sustainability in service provision.</p>	<p>Incorporate greater poverty targeting in existing urban programs.</p> <p>Establish program to address unique circumstances of small cities/large towns.</p> <p>Make transfers conditional to actual performance improvements.</p> <p>Performance-based transfers formalized through national <i>sistema financiero del agua</i>.</p>	<p>Shift credit support from up-front transfers to partial contingent guarantee mechanisms to improve risk allocation.</p> <p>Focus guarantee schemes on financially solid utilities, secured by tariff revenues, not unconditional federal transfers.</p>	<p>Strengthen intergovernmental coordination in policy, planning, financial participation, and service standards.</p> <p>Increase coverage, depth, and relevance of the <i>sistema de información nacional</i>.</p> <p>Strengthen municipal accountabilities for use of unconditional transfers (PRODDER, FAIS).</p> <p>Review options to improve efficacy of discharge permits and levies.</p>

	Improving Service Efficiency and Quality	Public Finance: Allocation and Program Design	Private Finance and Credit Enhancement	Institutions, Information, Accountability, Coordination
Transport				Strengthen coordination among model agencies to facilitate efficiency gains from multimodal competition.
Railways	Clarify rules for service access to facilitate exchange traffic.	Continue tripartite co-financing of urban bypasses.		
Ports	Strengthen oversight of API's planning to ensure port facilities and operations best meet future demand.			
Highways	Use multiyear, standard-based contracts to increase maintenance efficiency. Reinforce asset management capacities of states and municipalities.	Continue to strengthen planning processes; demand and cost estimates; allocate resources on technical criteria.		Establish systematic ex post evaluation at project and program levels. Strengthen tripartite coordination at regional level through regional road councils.
Toll Roads	Permit FARAC to outsource O&M to private firms. Restructure CAPUFE (regionalization and outsourcing).	Devise multiyear STC-SHCP agreement on allocation of efficiency gains from FARAC network.	Promote state PPPs (New Concession Scheme).	Establish systematic ex post evaluation at project and program levels. Strengthen tripartite coordination at regional level through regional road councils.
Multiple Sectors		Institutionalize multiyear budgeting based on approved financing plans and future budget ceilings. Streamline budgetary release procedures and synchronize with local government budget cycles. Continue to modernize public procurement rules (more specificity-team discussion). Increase reliance on user fees and/or	Incentivize private pension fund participation in long-term finance, making use of multilateral guarantees and permitting AFORES a stake before competitive bidding. Rebalance PPP and credit guarantees toward underserved subsectors (e.g., distribution). Reduce reliance on full federal guarantees, shift to partial off-take and risk guarantees.	Strengthen oversight capacity of subnational government, and accountability for use of unconditional transfers. Establish systematic ex post impact evaluation as a basis for future funding and program revision. Strengthen vertical coordination in planning, financing, and regulation. Improve coordination among sector agencies and SHCP on financing policies, investment priorities, and budget negotiations with

	Improving Service Efficiency and Quality	Public Finance: Allocation and Program Design	Private Finance and Credit Enhancement	Institutions, Information, Accountability, Coordination
		state/local own revenues.		Congress. For local infrastructure, establish state revolving funds for PPPs, disbursed on performance criteria. Revisit BANOBRAS business model: separate retail financing role from origination and guarantees.

5.20 There is an urgent need to refocus public investment on areas that the private sector cannot finance, and to make more effective use of taxpayer resources. This means reducing the role of the government in financing the electricity sector and toll roads, which have made substantial fiscal demand (many of them off-budget or contingent) and for which there is significant scope for increased private participation. By the same token, it implies improving the efficacy of spending in traditional areas of public finance such as water supply, sanitation, and (non-toll) roads.

5.21 Three broad sets of policy instruments can be brought to bear to impose discipline or incentives on service providers to improve efficiency: competition, regulation, and financial markets. Competition is notably absent from the electricity sector due to the statutory monopolies granted to CFE and LFC. It is precluded from the water and sanitation sector, due to the natural monopoly characteristics of localized services. In transport, there are substantive competitive forces through intermodal choice, directly competing ports, and the presence of “free” roads in toll corridors. As to regulation, arms-length regulation of tariffs and service quality is the exception rather than the rule, largely absent in WSS and electricity, at present. Finally, financial markets are indeed a source of funding in those segments of infrastructure where private finance has been permitted, though the structure and coverage of federal financial guarantees have muted the incentive impact on operators’ performance. This is discussed below.

5.22 Short of changes in industry organization, there are several interim measures that could be taken to improve efficiency and strengthen accountability for performance. These include programs to enhance the autonomy and service orientation of state operators. One example is CFE’s Corporate Transformation program, which should operationalize the prior pilot exercise of constituting business units and transparent transfer-pricing mechanisms. Municipal and state water companies in many localities should be more fully constituted as autonomous, commercial enterprises. In transport, efficiency gains could be obtained through better contractual vehicles for highway maintenance, outsourcing *Fideicomiso de Apoyo al Rescate de Autopistas Concesionadas* (FARAC) toll road maintenance, and restructuring *Caminos y Puentes Federales* (CAPUFE).

5.23 The incremental public funding released through greater resource efficiency should focus on three areas: maintenance and rehabilitation, strategic bottleneck infrastructure segments, and extension of basic services to the poor. Additional resources need to be allocated on an ongoing basis to preventive maintenance and renovation, particularly for highways and electricity distribution, where the rate of return to such spending is much higher than to new investments. Examples of strategic segments of networks include electricity transmission, bulk-water conveyance facilities, road links in the strategic corridors, and rail/highway urban bypasses. Such investments need not be large, but have important strategic value, and in some cases could be co-financed with the private sector.

5.24 Devoting a greater share of federal resources to infrastructure for poor households does not imply an absolute increase in spending. On the contrary, targeting retail subsidies in electricity and water to poor communities and poorer households in better-off urban areas would release substantial resources for other uses. Subsidies should focus in the first instance on facilitating access of the poor to the service and extending coverage in small localities. To the extent that consumption of these groups merits subsidization, it should be limited to satisfying minimum basic needs. Moreover, delivering service to the poor need not be costly, and relaxing technical norms governing choice of technology and billing methods have proven their worth in other countries. Examples include condominial systems for water and sanitation, and off-grid energy solutions for electricity. Finally, relaxing statutory monopoly rights of the large public sector operators to permit small-scale providers to serve isolated communities in partnership with the network utility (or the municipality), offers substantial benefits to both the utility and to households with little or no service at present.

5.25 Better outcomes can be obtained by introducing changes in the manner in which investment programs are designed and projects selected and funded. Coordination across agencies, resource allocation criteria, and budgetary procedures interact and impact the cost-effectiveness of federally funded programs, and by extension the magnitude of subsidies and demands on Mexican taxpayers necessary to sustain services. Infrastructure, by nature, has important spillover effects, involves multiple stakeholders, influences economic outcomes in varied ways, and therefore requires a good deal of coordination. In Mexico, closer coordination is required along several dimensions: among sectoral agencies and the *Secretaría de Hacienda y Crédito Público* (Ministry of Finance and Public Credit, SHCP) to keep long-term sector development “plans” in line with budgetary and broader fiscal realities, and in dealing with a newly empowered Congress to weed out projects of questionable viability; among sectoral agencies to ensure balanced sector development (for example, gas–electricity in energy, and multimodal planning in transport); and across tiers of government (for example, regional transport planning and coordinating planning, service standards, and oversight in WSS). Policy coordination is crucial in WSS—it is largely local governments that set tariffs and governance conditions under which water companies operate, while the Federation continues to provide the largest share of concessional resources for investment. Hence,

Mexican taxpayers, largely outside the local jurisdictions, bear the impact of local pricing and investment decisions.

5.26 Across sectors, federal budgetary resources tend to be allocated annually by formulas, and for large projects based on ex ante cost-benefit calculations undertaken by the project proponents. Given the limited reliance on competition, regulation, and financial markets to discipline operator performance, one of the few levers available to government is conditioning provision of resources to achievement of efficiency and/or service delivery targets. This means dimensioning the magnitude and type of transfer to the pace of progress in realizing genuine service improvements. Such performance-based allocation mechanisms could be applied, for example, in the yet to be established *sistema financiero del agua*, as stipulated in the recent modifications to the national water law, and in the sharing of efficiency gains between SCT and SHCP, in the FARAC highway network.

5.27 For performance criteria to genuinely affect resource allocation decisions, future resource availability needs to be predictable, such as through multiyear resource envelopes and budget ceilings. This is already done to some degree for large individual projects for electricity, and to a lesser degree for transport, but should be applied to entire programs. And, even in the interim, as procedures and systems are established to support more performance-based budgetary allocation processes, multiyear budgeting should be applied across infrastructure to permit more effective planning and efficient program execution.

5.28 **Mobilizing private finance for infrastructure will be essential given the likely restricted fiscal envelope available.** While the outlook for rails, ports and, to some degree, toll roads, appears promising, this is not so for electricity and water supply and sanitation, even in segments that have historically attracted significant private finance, such as thermal power plants and wastewater treatment facilities. Concerns about operators' present and future creditworthiness, the Federation's future willingness to step in to cover subnational or state-owned enterprises' obligations, and the lack of arms-length regulation strongly limit investor interest. Rather than having taxpayers assume still greater risks to attract private finance, (as has been the case in power generation with the substitution of *Obra Publica Financiada* [OPF] for independent power provider [IPP] contracts), efforts should be directed at the source of the uncertainty: the capacity of the off-taker to pay for the service without political interference. The new concession framework for state highways goes some way in this direction. Similar innovation is called for in the electricity and WSS sectors.

5.29 Federal credit enhancement will be required to attract sizable sums of private funding from domestic and international sources, but their design and functioning are due for revision. To date, projects under federal jurisdiction have generally been backed by full guarantees of cash flow (for example, electricity-PIDEREGAS, transport-New Concession Scheme) assets (for example, PPS), or even equity returns (FINFRA). This places the government in a position of assuming a wider spectrum of risks than may be called for, and hence carries commensurately larger contingent liabilities. Having

obtained an investment-grade rating on sovereign debt, the risk coverages the Federation offers could be narrowed and recast in the form of negative covenants, that is, political (and regulatory) risk insurance and other forms of contingent risk coverage. In the case of subnational projects, reliance on negative covenants may also reduce financing costs, but will require some kind of asset or cash-flow-based security, which could take the form of state-level infrastructure revolving funds for WSS, transport, and other local services. Such risk insurance and backstopping facilities should also be geared in part to rebalancing the allocation of investment finance from greenfield/off-take facilities to distribution networks.

5.30 Arms-length regulation of tariffs and service quality is largely absent at present, and especially in electricity and water and sanitation it could improve the incentives for public sector providers and start creating the environment that would make good use of private investment as legal opportunities for that are opened. Improving sector performance will require greater clarity and coherency on policy goals and instruments, institutional responsibilities for establishing and regulating service providers, and pricing policies commensurate with those goals. The goals should make explicit the major policy decision, such as the desired levels of access and service quality, the required levels of investments and potential sources of financing, and how noncompliance with regulations would be sanctioned. Although municipalities have primary jurisdiction for Water Supply and Sanitation (WSS) services, they have little technical capacity for policymaking and regulation, so state agencies might need to take this role. This would offer the advantages of consistency in policy and investment planning across hydrologically and politically interdependent geographic areas, and administrative and financial capacity and the ability to coordinate federal (and state) assistance. The *Comisiones Estatales de Agua* are well placed to carry out planning and policymaking functions, and key regulatory, monitoring, and oversight functions.

5.31 Other modifications of institutional arrangements should be considered. For investors and operators to take on some risks now borne by the government and Mexican taxpayers, they require greater predictability about future cash flows, which depend on how tariff and service standards are set and adjusted. For electricity, this implies empowering the Energy Regulatory Commission to function as a sector regulator, with oversight of retail tariffs, service quality, and contracts between CFE and service providers, including private generators and gas suppliers. For water and sanitation, this implies building the capacity of state water commissions and municipal agencies in performance monitoring, planning, and the revision of retail tariffs. For railways, the SCT should clarify the rules for service access among carriers. For highways, the SCT should expand the current pilot program for multiyear, standards-based contracts for maintenance.

5.32 Moving forward on the above recommendations will require greater accountability and better information on performance outcomes. At present, the federal authorities, particularly SHCP, face a conundrum. The present system of authorizing individual projects and budget envelopes annually, on the basis of notional, largely historical unit costs, and conjectural, ex ante cost-benefit studies says little about

how effective and efficient sectoral spending is. At the same time, sectoral agencies and subnational governments are demanding greater autonomy in investment planning, execution, and financing. The flip side of autonomy is accountability. In the absence of reliable, verifiable information on actual performance, it is risky to respond positively to such demands. At present, SHCP does not have at its disposal timely, objective information on whether the application of the funds provided to the executing units translated into improved services, or at what cost. And, without such information, it is difficult to determine what could have been done better. In order to reduce the information gap, the Investments Unit of SHCP is currently developing a methodology for program impact evaluation.

5.33 Other elements of performance tracking and information disclosure that would enhance accountability and decisionmaking for federal resource allocation include: regular reporting by subnational governments on the use of federal transfers, especially unconditional transfers such as Ramo 33/FAIS, which are a growing source of finance for WSS, urban and state roads, and electrification; and standardized reporting on performance of WSS companies (*organismos operadores*) through an expansion of CNA's *sistema de información nacional*. In the electricity sector, efforts have begun to establish an objective basis for measuring and reporting on service quality, and this should be followed through by strengthening CENACE's capabilities in this area, as well as CRE's. Progress in these areas would help form the basis for performance-tracking systems, which would facilitate several of the major recommendations discussed above. These include introducing multiyear performance-based allocation mechanisms for federal funds, and credit-enhancement instruments, better-informed economic regulation and oversight, and, more generally, greater coherency in policy formulation, planning, and execution of sectorwide investment programs. These measures do not require large sums of money, but they do require building institutional capacities among the concerned sectoral agencies and subnational governments, and sustained political commitment to transparency.

C. PRIORITIZATION OF RECOMMENDATIONS

5.34 To provide some prioritization among the recommended actions, a difficulty versus impact analysis was undertaken. The recommendations are mapped into a two-dimensional space according to whether they are likely to have high or low impact, and whether they entail high or low levels of difficulty in their implementation. Recommendations are considered to be of higher impact if they are likely to produce substantial results either in terms of saving taxpayer resources, leveraging private finance, or addressing a critical infrastructure bottleneck or social priority. Recommendations are considered to be more difficult to implement to the extent that they present either challenges that are conceptual (in their design/instrumentation), financial (in terms of necessitating large increases in public spending), legal (where new legislation may be required), or political (strong vested interests).

5.35 The recommendations discussed above are assigned to four situations. Group I corresponds to high-impact/low-difficulty measures that appear in the top-right quadrant of Figure 5.1; these are high-priority measures in the short-run. Group II corresponds to the high-impact/high-difficulty measures that appear in the top-left quadrant of the two-dimensional mapping: these are high-priority measures, and hence should be acted on in the short term. However, given their difficulty, it is not realistic to expect results until the longer term. Group III corresponds to low-impact/low-difficulty measures that appear in the lower-right quadrant of the figure. Although low priority, they could be undertaken rapidly if so desired. Last, group IV corresponds to the low-impact/high-difficulty measures, which are (or should be) of limited interest as a practical matter.

5.36 The results of mapping recommendations by impact and difficulty are presented in Table 5.2. The bulk of the recommendations fall into the high-priority upper-right and upper-left quadrants of Figure 5.1, with very few in the low-impact/long-term lower-left quadrant. Those in the right quadrants represent some of the “quick wins” either because the necessary course of action is already well defined, because they can be implemented on the basis of existing legal or administrative instruments, or because the associated financial costs are modest. Most of these actions could be addressed forthwith, with efforts focusing on those in the upper-right quadrant.

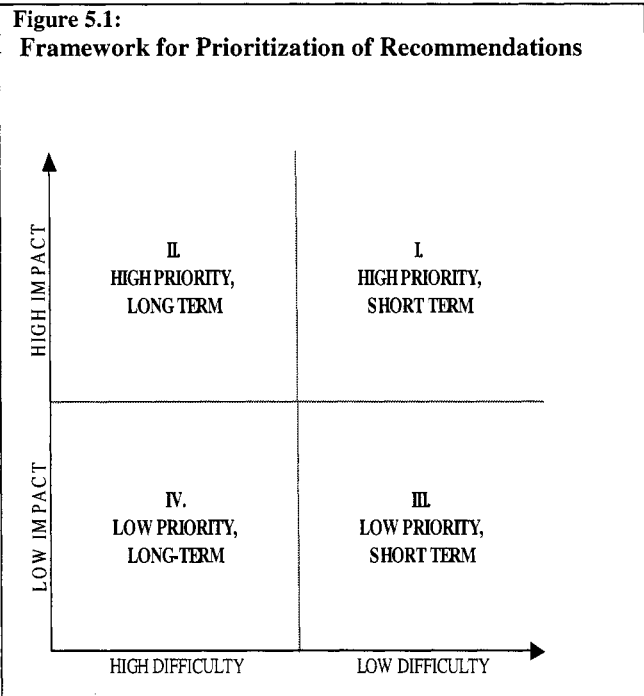


Table 5.2: Mexico: IPER—Prioritization of Recommendations

	More Difficult	Less Difficult
High Priority	<p>MULTIPLE SECTORS: Institutionalize multiyear budgeting. Establish systematic ex post impact evaluation. Strengthen vertical coordination in planning, financing, and regulation. Shift BANOBRAS's guarantee coverage to breach of contract. Shift from full debt service guarantees to partial off-take and risk guarantees. Rebalance PPP and credit guarantees to underserved subsectors. Options to access private pension funds for long-term finance.</p> <p>ELECTRICITY: Address LFC functional bankruptcy. Develop power markets options with multiple distribution companies (public or private) and independent transmission company. Introduce private finance in distribution.</p> <p>WSS: Institutionalize financial and operational autonomy of water operators. Incorporate greater poverty targeting in existing urban programs. Establish programs for small cities/large towns. Make sector transfers conditional to actual performance improvements and formalize in <i>sistema financiero del agua</i>. Shift credit support from up-front transfers to partial contingent guarantee mechanisms to improve risk allocation.</p> <p>TRANSPORT: Implement institutional reform of toll road management. Complete modernization of key highway corridors.</p>	<p>MULTIPLE SECTORS: Streamline budgetary release procedures. Strengthen subnational government accountability for use of federal transfers. Improve horizontal coordination among sector agencies and SHCP. Establish state revolving funds for PPPs, disbursed on performance criteria. Encourage private pension fund participation in long-term finance. Separate BANOBRAS retail financing role from origination and guarantees.</p> <p>ELECTRICITY: Reduce transmission and distribution losses through modernization and maintenance. Empower CRE to function as sector regulator: oversight of tariffs, service quality, and contracts. Target consumption subsidies to poor households. Reduce reliance on OPF in favor of long-term service contracts.</p> <p>TRANSPORT: Permit FARAC to outsource O&M to private firms. Use multiyear, standard-based contracts to increase maintenance efficiency. Promote federal and state PPPs (New Concession Scheme).</p> <p>WSS: Build capacity in state water commissions. Expand <i>sistema de información nacional</i>. Focus guarantee schemes on financially solid utilities, secured by tariff revenues.</p>

Lesser Priority		<p>Continue modernizing public procurement rules. Increase reliance on user fees and/or state/local own revenues.</p> <p>Increase flexibility of long-term PPAs to reduce risks to CFE/Federation. Contain scope of PIDEREGAS and review structure to reduce burden on PSBR. Operationalize CFE Corporate Transformation Program.</p> <p>Review technical norms to promote sustainability in service provision. Strengthen intergovernmental coordination in policy, planning, financial participation, and service standards.</p> <p>Restructure CAPUFE. Clarify rules of service exchange in railways.</p>
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5.37 Regarding electricity, while sector “reform” is commonly characterized as a “Constitutional” issue and therefore politically complex, there are several types of actions that can be taken in the short and medium term to improve performance without legislative action. For WSS and transport, there do not appear to be overriding legal or political obstacles. Rather, they require changes in the way institutions interact with each other and with private sector contractors and financiers. Examples include sorting out FARAC/CAPUFE responsibilities and financing terms for highway maintenance; oversight of tariffs and service quality among CFE, SHCP, and CRE; and service oversight, investment planning, and financing among CNA and subnational governments. Others present financial hurdles, including rebalancing toll-road tariffs, increased funding of maintenance and renewal of electricity distribution networks, and highway maintenance.

5.38 Nonetheless, to obtain broad, sustained gains in overall sector performance, a significant proportion of the recommendations in the upper-left quadrant (Group II) should be addressed. These are characterized as longer-term, high-impact measures. Implementation of these recommendations requires first addressing certain challenges. Table 5.3 identifies the nature of the challenges to be addressed for each. Given their complexity, preparatory work for many of these actions should be initiated in the near term. For those actions identified as conceptually complex (for example, refocusing federal guarantees, poverty targeting, program impact evaluation), work should be initiated to explore specific options in depth, and to develop more detailed recommendations. Relatively few of the actions in this group appear to require legal changes, and those that do are concentrated in the electricity sector. The current administration has prepared draft legislation and enabling regulations (*reglamentos*) for this purpose, and they should be reviewed to ascertain the scope for further improvement. Similarly, relatively few face significant financial hurdles. Those that do, require further refinement to devise practical solutions (for example, BANOBRAS-guaranteed coverages and modification of PIDEREGAS and FINFRA risk-coverage mechanisms). Finally, where the challenges involved are largely political, it will be necessary to

continue to consult with stakeholders and build consensus around the need for and direction of change.

Table 5.3: MX: IPER—Challenges in Implementing Longer-Term Recommendations

	Legal Change	Financial Hurdle	Political Opposition	Conceptual Challenges
MULTIPLE SECTORS				
Institutionalize multiyear budgeting.		?		
Establish systematic ex post impact evaluation.				X
Strengthen vertical coordination in planning, financing, and regulation.				
Shift BANOBRAS's guarantee coverage from broad revenue/volume basis to breach of contract.		X		X
Shift from full debt service guarantees to partial off-take and risk guarantees.		X		
Rebalance PPP and credit guarantees toward underserved subsectors (distribution).				?
Options to access private pension funds for long-term finance.		X		
ELECTRICITY				
Address LFC functional bankruptcy.	X	X	X	
Introduce private management and capital in distribution.	X		X	
Develop power markets options with multiple distribution companies (public or private) and independent transmission company.	X		X	
WSS				
Institutionalize financial and operational autonomy of water operators.		X		
Incorporate greater poverty targeting in urban programs.				X
Strengthen municipal accountabilities for use of unconditional transfers.	?		?	
Establish programs to address unique circumstances of small cities/large towns.				
Make transfers conditional to actual performance improvements.			?	X
Performance-based transfers formalized through national <i>sistema financiero de agua</i> .			?	
Shift credit support from up-front transfers to partial contingent guarantee mechanisms to improve risk allocation.		X		
TRANSPORT				
Implement institutional reform of toll road management.				
Complete modernization of strategic highway corridors.		X		

ANNEXES

6. ANNEX A. NATIONAL FEDERAL ORGANIZATIONS AND PROGRAMS IN WATER SUPPLY AND SANITATION

6.1 The *Consejo Consultivo de Agua* (CCA) is a high-level advisory body to the *Comisión Nacional del Agua* (National Water Commission, CNA) created in 2000 to promote a *cultura del agua*—"a culture of water"—in Mexican society. It has formed five committees covering the following strategic issues: economy and finance, education and communication, legal framework, technologies, and environmental management. It recently initiated a comparative analysis of water-related policies and their impact on water productivity and on sectors and socioeconomic groups in the society as part of World Bank studies on the economic assessment of policy instruments in the water sector. This analysis focuses on water resources management and irrigation. In addition, in 2002 the CCA initiated a 10-year media campaign on the culture of water. These are everyday water conservation ideas for the layperson to minimize water use, such as using one glass of water to brush one's teeth.

6.2 Created in 1986, the Mexican Water Technology Institute (*Instituto Mexicano de Tecnología del Agua*, IMTA), under the authority of the Ministry of Environment (SEMARNAT), is in charge of research, development, and transfer of water technologies.

6.3 The Mexican Center for Water and Sanitation Training (*Centro Mexicano de Capacitación en Agua y Saneamiento*, CEMCAS), established in 2000 with French assistance, is a national training center for the staff of water and sanitation service providers. The Center is governed by a board presided over by CNA.

6.4 Most larger service providers are members of the *Asociación Nacional de Empresas de Agua y Saneamiento de México* (ANEAS). Founded in 1992, ANEAS represents the interests of service providers in the national political arena, promotes the exchange of experiences among service providers, strives to strengthen the autonomy of service providers, and promotes the culture of water.

6.5 Water resources management and land-use planning, which are closely linked to investment planning, should ideally be undertaken at the level of the hydrographic region (basin), because of the numerous environmental externalities within a basin. In Mexico, this has been recognized in principle through the establishment of 25 Basin Councils (*Consejos de Cuenca*), since 1993, each covering one or several basins. In practice, however, the Basin Councils have had little influence on investment planning and relevant policies. Therefore, the 2004 amendment of the National Water Law mandated the creation of Basin Agencies that would strengthen the planning function at the basin level. The implementing decrees for the amended law remain to be implemented and enacted, however, and only three basin agencies have been created so far. The Basin Agencies and Councils are supposed to play a key role in the administration of the Water

Financial System (*Sistema Financiero del Agua*, SFA), introduced through a recent amendment to the Water Law.¹⁰⁷

6.6 There are 25 Basin Councils covering almost the entire national territory. The Basin Councils' functions are, in principle, to formulate and execute activities to improve water resources management, and to develop water infrastructure in their respective basins.¹⁰⁸ Most Basin Councils were recently created, the first one having been created in 1993 in the Lerma Basin, and most others after 1999. More than half the members of the Basin Councils represent various levels of government, while up to half represent users and "society." The Basin Councils (*Organismos de Cuenca*) are expected to guide, together with CNA, the work of the basin agencies.

6.7 The directors of the Basin Agencies are supposedly autonomous, but will be appointed by CNA. It is not clear if or to what extent the Basin Agencies will integrate the functions and the personnel of CAN's regional and state offices. The number of Basin Agencies is also not clear. Thus there is considerable uncertainty about the scope, form, and timing of the restructuring process and decentralization of CNA.

6.8 Drinking Water for Urban Areas (*Agua Potable en Zonas Urbanas*, APAZU) is directed at urban areas, and used to be CNA's largest program. Created in 1990, it is the oldest of the current CNA programs and was initiated by the World Bank. It has continued to be funded by the Federal Government after the closure of the last corresponding World Bank loan.

6.9 The Water Rights Return Program (*Programa de Devolución de Derechos*, PRODDER) was created in January 2002. It is funded by water rights payments by municipalities on the basis of the *Ley Federal de Derechos*.

6.10 The Program for the Northern Border (*Programa de Atención a la Frontera Norte*) is targeted at the six Mexican states bordering the United States. The U.S. government makes grants to this program through its Environmental Protection Agency (EPA).

6.11 The smallest CNA program, Clean Water (*Agua Limpia*), is directed at increasing the level of chlorination of drinking water.

6.12 The Program for Sustainable Drinking Water and Sanitation Services in Rural Communities (*Programa para la Sostenibilidad de los Servicios de Agua Potable y de Saneamiento en Comunidades Rurales*, PROSSAPYS) is exclusively devoted to rural areas and is partially financed by the Inter-American Development Bank.

¹⁰⁷ The exact role of the basin-level institutions in the SFA remains to be defined through the operating rules of the new system.

¹⁰⁸ The territory, covered by several Basin Agencies (such as the Lerma Basin), covers up to five states, while on the other hand, some states (such as Sonora) include territory covered by up to five Basin Agencies.

6.13 BANOBRAS (*Banco Nacional de Obras y Servicios Públicos*) lends to municipalities and utilities and administers the federal grant program, Program for the Modernization of Water Utilities (*Programa para la Modernización de Organismos Operadores de Agua*, PROMAGUA), jointly with CNA. BANOBRAS credits to service providers and municipalities are channeled through three multisectoral credit lines with different objectives and conditions. The BANOBRAS contribution to PROMAGUA comes from the *Fondo de Inversión en Infraestructura* (Infrastructure Investment Fund, FINFRA), which is described further above.

6.14 The *Secretaría de Desarrollo Social* (SEDESOL) administers 11 different programs that are focused on the poor, and include some investments in water supply and sanitation.¹⁰⁹ The best-known of these programs are Opportunities (*Oportunidades*, formerly PROGRESA) and HABITAT (the United Nations' program), large programs that have small activities in water supply and sanitation. Each of the 11 programs has its own criteria and conditions. Most of these programs focus on poor households in marginal urban and rural areas.

¹⁰⁹ Avila (2004:34-70). The programs are *Oportunidades*, *Microregiones*, *HABITAT*, *Oportunidades Productivas*, *Coinversión Social*, *Atención a Jornaleros Agrícolas*, *Programa de Capacitación y de Fortalecimiento Institucional*, *Iniciativa Ciudadana 3X1*, *Programa para el desarrollo de los Pueblos Indígenas*, *Programa Estatales por Demanda*, and the *Programas Regionales para Zonas de Alta Marginación*. No breakdown of the water and sanitation investments among these programs is available.

7. ANNEX B. PAYMENT FOR ENVIRONMENTAL SERVICES IN WASTEWATER TREATMENT—AN EXAMPLE OF PERFORMANCE-BASED TRANSFERS¹¹⁰

7.1 Financing and cost recovery for urban sanitation, consisting of sewerage and wastewater treatment, is a challenge throughout the world. Many utilities do not levy separate tariffs for sanitation, and where such charges exist they are usually insufficient to finance operation and maintenance costs, not to mention capital costs. This problem is particularly acute in countries that embark on ambitious investment programs to increase the coverage of wastewater treatment. There is thus considerable agreement that subsidies are needed for sanitation, at least during a transition period. The challenge is to devise programs to channel these subsidies, while promoting efficiency and operational and environmental sustainability.

7.2 In 2001 Brazil introduced a program that meets these criteria. Under the basin restoration program (PRODES), the Federal Government essentially pays service providers for treating wastewater based on certified outputs, instead of financing inputs such as civil works. Up to half the investment costs for wastewater treatment plants are eligible to be reimbursed over three to seven years, provided that the quality of the wastewater discharged meets the norms. If the norms are not met in one trimester, a warning is issued. If they are not met in the following trimester, the payment is suspended. If the norms are still not met in the next trimester, the service provider is excluded from the program. This provides strong incentives to properly operate and maintain plants. In short, the program does not fund promises, but results.

7.3 The program enhances the financial viability of utilities, and thus increases their ability to access commercial credit, through development banks (such as the *Caixa Economica Federal*) and commercial banks. The operational risk is clearly assigned to the service provider, which is best able to manage that risk. To prevent overinvestment, the treatment plants have to be included in basin plans adopted by water basin agencies as a necessary condition to be eligible for financing under the program.

¹¹⁰ Sources: Agência Nacional de Águas, www.ana.gov.br, and World Bank.

8. ANNEX C. INTERNATIONAL EXPERIENCE IN THE USE OF THE PRIVATE SECTOR

8.1 This annex summarizes some elements in the design of private participation in the financing and building of infrastructure in developing countries—particularly middle-income countries. The objective is to highlight some lessons that may be useful in evaluating and improving programs in Mexico. The common theme among the three sectoral analyses is the relationship between success and the introduction of the private sector in existing assets and retail operations.

Toll Roads

8.2 Although the public protests in Cochabamba and the struggling water concession of Buenos Aires might capture the headlines, toll roads represent a particular challenge in the areas of project finance and public–private partnerships. In many cases, private finance is sought for greenfield roads, which means that there is no proven traffic demand to back project finance. Motorists are notoriously fickle about valuing their time and paying fees even for existing non-toll roads, so willingness and ability to pay for studies of this area of infrastructure have often proven unreliable. To exacerbate the problem of demand uncertainty and price inelasticity, the public good nature of road networks has resulted in widespread laws that prohibit private toll roads from operating where alternative roads are not available.

8.3 As a result, toll roads stand out from the World Bank’s database of Private Participation in Infrastructure (PPI) as the subsector with the highest percentage of canceled projects. The PPI database counts 2,716 private infrastructure projects that came to financial closure between 1990 and 2003 in the developing world. Of those projects, only 91—about 3 percent—were canceled outright due to project failure or political disillusionment. In contrast, of the 359 toll roads that were signed into agreement during that same period, 31 have been canceled, representing nearly 9 percent of all projects. If any country knows the difficulties of managing a successful toll road program, it is Mexico. Over half of the world’s individually canceled toll roads were in Mexico, and the recent initiatives to introduce a more nuanced risk-sharing mechanism into the bidding system for the second round of toll roads reflects that learning curve.

8.4 Despite the challenges, there have been hundreds of successful toll roads in the developing world, particularly in Latin America (155 out of 359 toll roads) and East Asia (157 out of 359). **What distinguishes successful toll-road projects from Mexico’s early experience is the dominance of the use of existing roads and the blending of public and private funds right from the outset of the projects.** In Asia, only 28 percent of toll roads have been greenfield construction. The rest have been concessions or outright divestitures.

8.5 Table 8.1 shows how different countries in East Asia have leveraged private risk capital with public contributions. This does not include minimum traffic or revenue guarantees, which were used to further limit private risk.

Table 8.1: A Sample of Public and Private Contributions to Toll Roads in East Asia

	Malaysia	Thailand	Hong Kong	TOTAL
Operational Projects	9	5	4	18
Cost	4.4	2.6	2.5	9.5
Private Finance	3.3	1.9	2.1	7.3
Private Finance at Risk*	0.8	1.9	1.9	4.6
Public Funds or Contributions in Kind	1.1	0.7	0.4	2.2
Private Finance	75%	73%	84%	77%
Private Finance at Risk*	18%	73%	76%	48%
Public Funds or Contributions in Kind	25%	27%	16%	23%

*All figures in US\$ Billions

Note: Does not include contingent liabilities from minimum traffic or revenue guarantees.

Source: Adapted from ADB (2000).

8.6 As with East Asia, in Chile—where US\$6 billion was generated for 22 private toll-road projects between 1994 and 2003—16 of the projects (nearly three-fourths of all toll roads) were concessions of existing roads. Chile has further used a bidding method—least Net Present Value (NPV)—that fixes all politically sensitive variables and allows for the concessionaire to “hold onto” the rights to collect tolls for as long as it takes to achieve the winning NPV.

Electricity

8.7 Many developing countries have attempted to liberalize their energy markets and to replace rigid state controls with private initiative and ownership. As mentioned, this has often involved the use of the private sector for the assumption of commercial and retail risk (investment in distribution) and construction risk in generation. Of the 340 electricity projects undertaken in upper-middle-income countries between 1990 and 2003, 115 involved distribution and/or transmission. These projects with retail or commercial risk were valued at slightly over half of the US\$103 billion mobilized for the sector’s private projects. Aside from the financing that was brought in, the literature indicates that the greatest benefits have accrued from increased coverage levels, lower costs, and higher quality driven by competition and more independent regulation. Despite the recent shock and tension between the Argentine Government and the country’s 62 federal concessionaires, the formation of Argentina’s power market represents a successful attempt to introduce market forces into a lethargic and underfunded power sector.

8.8 To underpin the energy reform program, Argentina's government made a concerted effort to attract foreign private investment to the sector, emphasizing competition among providers. In 1992 the Argentina Bilateral Investment Treaty was signed with the United States, granting U.S. companies the privilege to invest in Argentine enterprises under terms no less favorable than those applied to domestic companies. By 1993, new regulations had removed all remaining restrictions on foreign investment, allowing investors to own as much as 100 percent of privatized entities. In addition, full repatriation of profits was allowed.

8.9 During the reform period of the mid-1990s, roughly 10,000 megawatts (MW) of Argentina's total installed capacity of 18,300 MW was sold, and Argentina's four large federal electricity companies were unbundled and a 51-percent share of each of the three resulting federal distribution companies was sold to private investors.¹¹¹ Now, over 90 percent of Argentina's transmitted power is carried by private entities.

8.10 Argentina conducted the restructuring process in a way that would facilitate competition in the electricity sector. Assets were unbundled through a process that separated the functions of vertically integrated federal electricity utilities prior to their sale. Transmission was separated from distribution, and the wires were separated from the retail function. In addition, cross-ownership restrictions were implemented. Generators were legally restricted to a market share of 10 percent or less of the national electricity sales volume. Generating companies were not allowed to own a majority share in any transmission facility.

8.11 The wholesale market was created to establish a competitive market for generation, with merit order dispatch, such that the lowest-cost generator is dispatched first. One entity, *Compañía Administradora del Mercado Mayorista Eléctrico*, S.A. (CAMMESA), is responsible for dispatch and for settlements. CAMMESA is a nonprofit, independent organization. Though it is owned by the government and the power generation companies, it is governed by a board composed of two representatives each from the generating companies, the national government/Secretariat of Energy, the distribution companies, the transmission companies, and large users. Competition is encouraged by open access to the wholesale market that is guaranteed by law.

8.12 Argentina's federalist form of government, in which much autonomy is granted to the provinces, has provided a complicated context for restructuring and privatization. While the privatization of federal electric utilities has been largely successful, privatization at the provincial level has not always proceeded as well. Delays in provincial sales have been due to concerns over unemployment and conflicts at the provincial level. In addition, there have been conflicts between the agendas of the national and state governments that have delayed transactions in several cases (ADB 2000).

¹¹¹ According to the *Secretaría de Energía*, Mexico's effective electricity capacity for 2003 was 49,672 MW. Of this total, 23.9 percent (11,872 MW) was from independent producers.

8.13 Despite the federalist challenges, the estimated average price of electricity of EDENOR, EDELAP, and EDESUR, (private distribution concessionaires for the Buenos Aires metropolitan area), fell 10.8 percent during the period under analysis, with average household rates dropping about 8, percent, and high-consumption consumer rates 70 percent.

8.14 The lessons from Argentina's experience are clear: Competition is a powerful tool for achieving market rates and better performance of service providers. The Argentine experience also shows that privatization at the subnational level might be more challenging than previously thought.

Water Supply, Sewerage, and Sanitation

8.15 The private sector plays an important role in the water sector of many developed economies, as shown in Table 8.2. In developing economies, however, the levels of private investment participation in water supply, sewerage, and sanitation are far below those observed in other infrastructure sectors. Water supply, sewerage, and sanitation accounted for just 5 percent of global private investment in infrastructure in developing economies between 1990 and 2001. Moreover, it has been declining: private flows for water supply and sanitation did not reach US\$1 billion in 2003, down from US\$8.4 billion in 1997. Build-operate-transfer (BOT) water and wastewater projects represent less than one-third of all water projects by value and by number. Again, in most countries, the private sector has been invited to take on commercial risk and to interface with consumers as the service provider.

Table 8.2: Private Participation in Water Services in 2002

Country	Water Supply (%)	Wastewater Disposal and Sanitation (%)
Spain	46%	48%
France	79%	56%
United Kingdom	87%	92%
United States	15%	8%
Chile	65%	63%
Mexico	16%	5%
<i>Source: CNA "Masons Water Yearbook 2002–2003."</i>		

8.16 The state of the water sector in the developing world remains challenging for investors. For example, in many countries there is a lack of knowledge about the location and condition of the underground networks, which represent on average 70 percent of the value of the utilities' assets. Moreover, water is often considered a free or deeply discounted public good, despite the costs of treatment and retail supply. Thus, there is often an ill-informed community constraint against private sector involvement in water supply. While this has led to several high-profile concession renegotiations and even cancellations, the evidence suggests that municipalities in the region have generally benefited from the role of the private sector in retail water systems.

8.17 Ménard and Shirley (2002) compare the content and outcomes of six water system reforms initiated during 1988–93: the concession system in Buenos Aires, Argentina; service contracts in Mexico City; state ownership and operation in Lima, Peru (where a concession was planned but not implemented); and Santiago, Chile; and leases in Abidjan and Conakry, Africa. Initial conditions in the six cities are summarized in Table 8.3. Connection rates were lowest for the two African cities, which were also the poorest and fastest growing. Water stress (unsustainable resources) was most severe in Lima and Mexico City.

Table 8.3: Different Indicators of Water Reforms

Indicator	Buenos Aires	Mexico City	Lima	Santiago	Abidjan	Conakry
Year reform started	1993	1993	1992	1989	1988	1989
<i>Type of Reform</i>						
Planned	Concession	Management Contract	Concession	Sale	Lease ^a	Lease
Implemented	Concession	Service Contract	State Owned	State Owned	Lease	Lease
Population in service area at start of reform (millions)	8.7	8.4	6.4	4.6	2.0	1.0
National GDP per capita at start of the reform (U.S. Dollars)	8,861	7,647	3,462	7,101	1,582	1,398
Population connected at start of the reform (percent)						
Water ^b	70	97 ^c	75	99	60	38 ^d
Sewerage	58	86 ^c	70	88	35	10
Annual population growth, 1980–95 (percent)	1.5	3.1	2.4	1.8	5.1	5.6
Annual Water production at start of reform (million cubic meters)	1402	1113	527	478	67	163

a. Before reform, the lease in Abidjan had characteristics similar to a management contract.

b. Includes private taps in yards of dwellings. These were predominant in Abidjan and Conakry, important in Mexico (20 percent of connections) and probably Lima, and minimal in Santiago and Buenos Aires.

c. 1990.

d. Includes people with access to standpipes or neighbors' taps.

e. 1980–91.

Source: Ménard and Shirley (2002).

8.18 Competition emerged only through competitive bidding in Buenos Aires, Abidjan, and Conakry. With a concession contract, regulation in Buenos Aires attempted to impose a fuller range of financial risks on the operator (investor) than did the other systems. Every city, excluding Santiago, provided cross-subsidies from high-volume to

low-volume customers. In the analyzed cases, none of the regulatory regimes had a very strong or formal institutional structure (commitment devices, regulatory neutrality, enforcement mechanisms, consumer representation). Nevertheless, Santiago had the best system, which, perhaps ironically, was state-owned and operated.

8.19 Changes in economic welfare after the reforms—combining the effects to government, consumers, workers, and domestic investors—were estimated and compared to a counterfactual (no reform) scenario. For the cases with available data, Ménard and Shirley (2002) found that per capita welfare gains are estimated to be largest in Buenos Aires (US\$150 in 1996 prices), followed by Santiago (US\$64) and Conakry (US\$12).

8.20 The short-term results of reforms were estimated comparing before and after indicators of efficiency and other performance measures. After reforms, labor productivity (measured in employees per connection) increased and operating costs dropped in every city (with operating costs falling below revenues everywhere except Mexico City). In addition, water and sewerage coverage expanded everywhere except Lima. New connections grew at a faster pace in every city except Lima, where the growth rate remained the same. The unaccounted-for water—a measure combining physical losses (due to poor maintenance) and commercial losses (due to poor financial management or illegal use)—fell significantly in Buenos Aires, Lima, and Santiago, but the improvement was less evident in the other three cities (Kessides 2004).

8.21 The experiences in Chile and Argentina are particularly interesting for the rest of Latin America, and particularly for Mexico. In 1988, Chile put in place a new regulatory regime for water and sanitation, allowing rates to reflect the actual cost of providing services. The Chilean Government then reorganized the sector under 13 state-owned regional water companies and started to partially privatize some of them. Privatization was followed by renewed investment by the privatized companies, but also by more apparent limitations of their public counterparts. While private companies invested 70 percent more in 2001 than in 1998, public companies invested almost 70 percent less. The decline for public companies reflected the growing difficulties the public sector had in financing their operation.

8.22 Sharp differences between the two groups of companies also emerged in price behavior. During 1998–2001, private companies' rates rose 20 percent more on average than did public companies' rates. Most of the difference in price behavior stems from the fact that privatized companies invested more, in part to add new services (mostly in sewerage and sanitation). Nevertheless, fees charged by private companies are still 40 percent lower on average than those charged by their public counterparts. The explanation for this difference might lie in the fact that the public sector kept the highest-cost companies, especially those in northern Chile, which has one of the world's driest climates (Bitran and Valenzuela 2003).

8.23 In Argentina in the early 1990s, a series of important provincial water utilities were privatized. As protection against devaluation risk, most contracts included clauses adjusting tariffs automatically to the U.S. dollar. This type of clause combined with

international arbitration clauses and the active role of the World Bank, the Inter-American Development Bank, and the European Investment Bank in syndicating these loans (mostly under A/B loan structures), made the financing of these concessions possible despite the fragile macroeconomic situation of the country, and an unstable legal and fragile regulatory framework. The shortcomings of these structures, and the little protection that the contractual clauses afforded to the lenders, became apparent with the economic collapse of the country, which led to the failure of the majority of the concessions.

8.24 Some conclusions can be drawn from this brief review. First, private participation in the water sectors of developing countries is a reality, although it has been declining as large international operators continue to retrench. Second, privatization often improves performance, although it is not the only way to foster efficiency, as the case of Santiago (which remained in public ownership during the period studied by Ménard and Shirley [2002]) demonstrates. Third, macroeconomic risks are extremely important and should be mitigated (the failure of a considerable percentage of Argentina's concessions illustrates the point). Fourth, the financial and governance credibility of municipal governments is central to the success of most water public-private partnerships, given the decentralized nature of the service.

9. ANNEX D. PUEBLA TOLL ROAD SECURITIZATION—THE USE OF SPECIAL-PURPOSE VEHICLES TO MOBILIZE SUB- SOVEREIGN FUNDS

9.1 On 27 August 2004, the State of Puebla toll-road company, *Carreteras de Cuotas Puebla* (CCP), issued a municipal bond backed by the future flows coming from the collection of tolls of the *Vía Atlixcáyotl*, a state-owned toll road connecting the cities of Puebla and Atlixco. Proceeds were used to finance the construction of a new toll road in the same state. Table 9.1 summarizes the key elements of the transaction.

Table 9.1: Transaction for the Securitization of the Via Atlixcayotl

Bond Type:	Trust-preferred, inflation-protected, interest-bearing, municipal bond (<i>Certificados Bursátiles</i>)
Amount Issued:	151,680,000 UDIS (Mexican Inflation-linked Units), equivalent to MXN519,989,073 at the issue date (27 August 2004)
Maturity:	5,460 days (approximately 15 years)
Credit Ratings:	AAA(mex) FitchRatings; mxAAA Standard & Poor's
Interest Rate:	Fixed at 6.40%
Payments:	Semiannual
Debtor:	<i>Caminos de Cuota de Puebla</i> (CCP)
Trustee (bond issuer):	<i>Nacional Financiera</i> (NAFIN)
Credit Enhancement:	<i>Banco Nacional de Obras y Servicios Públicos</i> (BANOBRAS)

9.2 The deal was structured by creating a special-purpose vehicle (SPV) to issue the municipal bonds and manage the structure's cash flows. Under the legal agreement endorsed by CCP, the SPV not only possesses the right to receive all income collected from the tolls, but also the right to collect the tolls itself. The transaction was in fact structured as a true sale of the assets to the Trust.

Transaction Background

9.3 The *Vía Atlixcáyotl* is a regional 18-kilometer toll road that connects the capital city of Puebla and the city of Atlixco. This road was constructed in the late 1980s and has been operational since 1989. Since then, the *Vía Atlixcáyotl* has enjoyed solid and growing revenue, thanks to the continuous growth of the region, which has resulted in additional traffic (mainly cars).

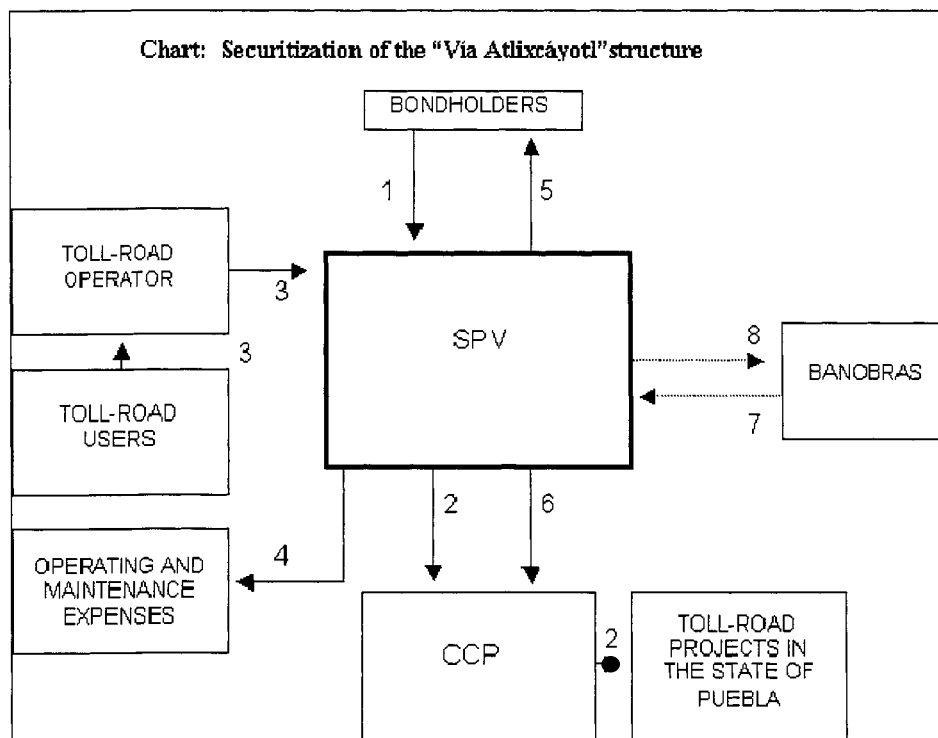
9.4 During the past few years, the government of the State of Puebla has continued to build much-needed road infrastructure. While some of these projects have benefited from federal grants, most of them have been financed by the state.

9.5 The Governor of the State of Puebla, together with the Board of Directors of CCP, decided to monetize the *Vía Atlixcáyotl* in order to release resources to finance additional toll-road infrastructure.

9.6 CCP set up an SPV at NAFIN which, acting as the trustee of this private trust, issued the MxP520-million inflation-linked municipal bond. The bond is backed by the future cash flows from the collection of tolls on the *Vía Atlixcáyotl*. The transaction is also backed by a line of credit (irrevocable, contingent, and unconditional) provided by BANOBRAS, which would cover any shortfall in the debt service (principal and interest payments) of up to the peso equivalent of 53 percent of the transaction's original principal amount of 151.7 million *Unidad de Inversión* (Inflation-Linked Units, UDIs), or approximately 80.4 million UDIs.

9.7 Figure 9.1 shows the structure of the security reform.

Figure 9.1: Securitization of the Via Atlixcayotl Structure



Transaction Innovations and other Highlights

9.8 The *Vía Atlixcáyotl* bond deal is an innovative transaction in the Mexican market due to the following reasons:

- It is the first toll-road securitization in Mexico with both partial credit enhancement and credit enhancement from a local provider.

BANOBRAS provided a credit line (53 percent of the original principal amount) to the trustee to back principal and interest payments in the event that the operating cash flows from the toll road are insufficient to service the bonds. In this sense, while the credit enhancement provides additional security to the bondholders, it calls for reliance on the creditworthiness of the toll road itself. This allows for a more efficient use of capital than under a full-wrap from an international AAA provider, because the Mexican local currency market benchmarks the spreads against the sovereign (mxAAA) rather than against a global AAA. From the issuer perspective, a local partial enhancement lowers the cost of the transaction compared to a global full-wrap.

- It is the first bond enhancement by BANOBRAS.

The transaction marks BANOBRAS's entry into the bond enhancement market. As a lender, BANOBRAS has financed a sizeable part of Mexico's infrastructure. This transaction signals an encouraging shift in BANOBRAS's approach to market development, supporting issuers and investors, rather than competing against them. This is a very positive development for infrastructure financing in Mexico.

- This is the first Mexican toll-road securitization (excluding fully-wrapped) to receive local "AAA" ratings from FitchRatings and Standard & Poor's.

Previous toll-road securitizations had received ratings of AA to AA+ (local scale) thanks to their structures, which included sunk-fund provisions and other reserve accounts, among other particularities. This transaction was the first one to receive a AAA rating (local scale), which allowed Puebla's government to increase the maturity of the bond to 15 years, and upsize the deal to MxP520 million. Other issuers might benefit in the future from stronger structures, similar to the one used in this deal.

10. ANNEX E. THE PUEBLA BOT BUYBACK

10.1 In January 1999, the water utility company of the State of Puebla (SOAPAP) and the private company *Tratamiento de Agua de Puebla*, S.A. de C.V. (TAPSA), currently an affiliate of *Ondeo Degremont* (Suez), signed a 20-year agreement to build, operate and maintain four water-treatment plants. The structure was a standard build–operate–transfer (BOT), with *Fondo de Inversión en Infraestructura* (Infrastructure Investment Fund, FINFRA) support, including the contingent credit line backed by an intercept on federal transfers to guarantee timely payments from the off-taker, SOAPAP.

10.2 In the original plan, SOAPAP was supposed to increase user tariffs to fund the payments to the concessionaire. However, after a change of State of Puebla administration, SOAPAP no longer considered the tariff increase a viable option. As a result, the monthly payments for the BOT severely affected SOAPAP's financial standing—so much so that it eventually stopped making payments. Once that happened, TAPSA called the contingent credit line, and BANOBRAS collected payment from the state government. Because SOAPAP continued to argue that it did not have the means to absorb the BOT tariffs, the State Government continued to make the monthly payments through the contingent credit line (the state was not in a position to stop payments, given the pledge on its federal transfers).

10.3 Finally, in 2004, after more than two years of paying for the BOT, the state government realized it could significantly lower its monthly payments by substituting the T1 (off-balance) liability with straight (on-balance) debt. Therefore, in January 2005, SOAPAP refinanced the T1 with an anticipated buyback of the plants, for an amount equal to MxP665 million, part of which was used to prepay the *Banco Nacional de Obras y Servicios Públicos* (BANOBRAS) long-term loan. SOAPAP financed the acquisition through a long-term loan in pesos from a commercial bank, with monthly payments significantly lower than the former T1 payments. The Net Present Value of the savings is approximately MxP400 million. These savings were possible largely because T1 included an equity component which was completely substituted for debt. Along with the buyback, SOAPAP contracted the operation and maintenance of the plant with the former concessionaire, *Ondeo Degremont*.

10.4 The Puebla buyback illustrates the following:

- A BOT structure can aggravate the fragile financial standing of a local water utility if the source of funds to make the monthly payments was not properly secured. In this structure, there was no binding obligation to increase tariffs. When this happens, the financial burden is likely passed on to the state.
- The contingent credit line implemented by BANOBRAS effectively prevented what could have been a case of outright quasi-rent appropriation. The credit line

forced the State government to step in, and the concessionaire did not miss a single payment.

- On the other hand, the fact that the credit line was a three-month revolving loan implied the State and SOAPAP registered a debt amounting to only three months of payments. However, as the state learned after more than two years of consecutive draws on the credit line, the true liability was much higher than the three months of payments that appeared on its books (since the buyback was financed with debt, now the full liability—which is lower than the original—is disclosed).
- The strong guarantee of the state's pledge of its federal transfers under the original BOT structure made it possible to lower the capital cost to the off-taker by increasing leverage (in fact, paying out equity). It made little sense to continue paying equity returns when the risk to the concessionaire was debt-like, and when 100 percent debt refinancing was possible.

11. ANNEX F. CHILE TOLL ROAD CASE: USE OF MULTILATERAL GUARANTEES TO EXTEND TERMS AND ENTICE DOMESTIC PENSION FUNDS

Transaction Background

11.1 In order to secure domestic long-term financing¹¹² for the Santiago–Valparaíso–Vina (SVV) toll road concession, a co-guarantee of the multilateral Inter-American Development Bank (IDB) and Financial Security Assurance (FSA), a private sector monoline financial guarantor with local capital market financing rated, was used. The financing was structured for placement among local pension funds and insurance companies restricted to high-investment grade, primarily national-scale, AAA-rated issues. Without such credit enhancement, capital-intensive infrastructure projects such as SVV would not be able to secure debt financing from the large pool of local capital controlled by the pension funds and insurance companies.

11.2 The use of the co-guarantee structure enabled IDB to overcome underwriting limits of the private sector window of the institution of the lesser of US\$75 million, or 25 percent of project costs. Because the SVV concession does not have a fixed term, the financing incorporates a mandatory prepayment provision, should the term of the concession be shorter than the stated tenor of the bond issue. This transaction, the largest guaranteed local currency issue to date in Chile, represents the first example of cooperation between a multilateral institution and a private sector monoline financial guarantor. It is also noteworthy because the financing attained the lowest fixed-coupon rate and longest maturity to date for a local currency infrastructure financing.

11.3 If a long-dated transaction is not rated high investment grade, primarily AAA on the local scale, it probably will not be salable among the pension funds and insurance companies that comprise the term local capital markets in Chile. International capital market financing, especially for long-dated issues typical in infrastructure financing with local currency revenue, exposes both investors and the issuer to foreign exchange risks. While the Government of Chile has attempted to solve this issue through use of a foreign exchange collar, the perception of risk among investors would most likely preclude a successful launch.

11.4 Innovation of Project: Foreign exchange risk is mitigated through financing in the local capital markets. The risk that the rating of the transaction would not be sufficient for term capital market investors in Chile is mitigated through use of the IDB financial guarantee product, where the IDB guarantee up to its underwriting limits enabled the financing to attain investment-grade ratings. This was then wrapped by the

¹¹² The project is financed through the issuance of a local currency bond for approximately the equivalent of US\$306 million, with 5.8 percent interest and 23-year maturity.

co-guarantor FSA (private mono-line guarantor) into AAA-rated financing that was well received by local capital market investors.¹¹³

¹¹³ Source: Structured Credit International Inc.

12. ANNEX G. TOLL ROAD TOLUCA-ATLACOMULCO—THE USE OF LIMITED CONTINGENT CREDIT LINES

Transaction Background

12.1 In March 1993, the Ministry of Communications of the State of Mexico and the private company *Operadora de Carreteras Alfa, S.A. de C.V* (OCALFA) signed a five-year concession to operate, administer, and maintain a 55-kilometer highway connecting the cities of Toluca and Atlacomulco, in exchange for financial compensation to the State of Mexico. Two years later, in September 1995, the agreement was extended for 12 more years.

12.2 Six years after the initial agreement, in March 1999, the State of Mexico negotiated a substitution of the dealer and some modifications of the terms and conditions of the concession, in the following manner:

- OCALFA, in exchange for an indemnity paid by the State of Mexico, transferred the rights of the concession to a Trust established in the *Banco Nacional de Obras y Servicios Públicos* (BANOBRAS). The term of the concession was extended for 20 years.
- The Trust obtained debt collateralized with the future revenues of the toll road from BANOBRAS. Proceeds were used to pay the indemnity to OCALFA, and the remaining funds were paid to the State of Mexico in compensation for the extension of the concession.
- Also in 1999, a revolving, irrevocable, contingent credit line was signed by the State of Mexico, which is secured with a pledge on federal transfers. The credit line is triggered only if: (a) the State of Mexico does not update toll-road fees in accordance with the terms and conditions of the concession; (b) if income decreases due to the crossing of users free of charge (with passes granted by the State of Mexico) in numbers that exceed the levels agreed; and (c) the collection of the tolls is suspended for more than 24 hours due to social or political circumstance or any other circumstance attributable to the local government.

Transaction Innovations

12.3 The main strength of the transaction was that the contingent credit line was not provided to secure the debt service, but rather to guarantee that the State of Mexico would not take actions that could adversely affect the collateral of the debt obtained by the trust. This guarantee has the following characteristics:

- It is partial, forcing the market to understand the underlying risk and absorb a meaningful part of it.

- It is based on an underlying financially viable asset (the road) and structure, which achieved an underlying A+ rating without the guarantee (and it has no backing of federal transfers).
- The true sale structure gives control to the investors of critical variables related to payment capacity, including tariff levels.

12.4 Moreover, by focusing only on negative covenants, it is an efficient tool to address the issue of quasi-rent expropriation. The contingent credit line has never been triggered and, in December 2004, the structure was extended for 25 years.

13. ANNEX H. GUAYAQUIL WATER AND SANITATION: USE OF A MULTILATERAL GUARANTEE TO COVER NEGATIVE CONTINGENCIES IN A MUNICIPAL WATER PROJECT

Transaction Background

13.1 The Interagua–Guayaquil Water and Sanitation Project remains one of the more innovative water transactions to come to closure in Latin America.¹¹⁴ In October 2000, the Government of Ecuador publicly tendered the administration, operation, rehabilitation, and expansion of the potable water, sewerage, and drainage system for the Canton of Guayaquil (the Concession Area), with approximately 2 million inhabitants. In December 2000, the government awarded the 30-year concession to International Water Services (INTERAGUA). A performance bond backed by US\$18 million of political risk insurance helped close the deal.

13.2 INTERAGUA is a subsidiary of the International Water Group of the Netherlands. It operates the potable water, sewerage, and drainage system in accordance with the Concession Contract, and has started necessary rehabilitation and expansion projects. The company is working to upgrade services and operating performance by reducing unaccounted-for water and increasing cash collection. The concession agreement calls for tariff increases to be linked to predetermined improvements in the quality of water and service, and to increases in the number of potable water and sewage connections (by about 30 percent and 40 percent, respectively).

13.3 The capital expenditure program contemplates investments of about US\$500 million over the 30 years of the concession. The concession term is divided into six five-year periods. Based on the information gathered during the first year of operation, INTERAGUA has been able to assess the capital expenditure program needed to improve quality of services and to achieve the requirement of 55,238 new water and wastewater connections by 2006. As a result, the capital expenditure program currently contemplated is estimated to reach approximately US\$146 million for 2002–06.

The Project's Innovation

13.4 In the absence of a strong regulatory framework, such as in Guayaquil, offsetting performance requirements were built into the contract between the concessionaire and the government. The concessionaire assured its commitment to service expansion and improvement through a performance bond. To mitigate the risk of the government calling the bond unduly—and to insure against expropriation, civil disturbance, and war, the Multi-lateral Insurance Guarantee Agency (MIGA) provided a guarantee. The presence of MIGA provided sufficient assurance for the deal to reach financial closure.

¹¹⁴ This information is extracted from an Inter-American Development Bank project report, a Multilateral Insurance Guarantee Agency report, and press reports.

14. ANNEX I. TLALNEPANTLA MUNICIPAL WATER COMPANY: A STRUCTURE FOR SUSTAINABLE FINANCING AT THE LOCAL LEVEL IN MEXICO

Background

14.1 The year 2001 witnessed the rebirth of the Mexican municipal bond market after more than 90 years of inactivity. Mexico, although a federal country, was politically and economically centralized for most of its modern history. A cornerstone in the decentralization process was the US\$600 million World Bank structural adjustment loan of 1998. The loan set up a series of criteria for disbursement that were designed to foster fiscal decentralization and to spark the sub-sovereign credit market. Today, all 32 states and over 70 municipalities and decentralized entities are rated, making Mexico, in a six-year period, the second-largest country in terms of municipal ratings (after the United States and before Canada).

14.2 These reforms have led to the increasing participation of states and municipalities in meeting the large demand for infrastructure. The growth of assets under pension fund management has further accelerated this development. Assets under management grew from MxP40 billion in July 1998 to more than MxP414 billion in April 2004. Pension funds are under growing pressure to diversify their assets in high-quality papers.

14.3 Tlalnepantla is a municipality of approximately 800,000 habitants. It is strategically located in the metropolitan area of Mexico City, which makes it a major commercial and industrial hub of a region of more than 24 million people. One of Tlalnepantla's top investment priorities was the construction of a MxP95 million wastewater treatment plant to treat domestic sewage for industrial reuse.

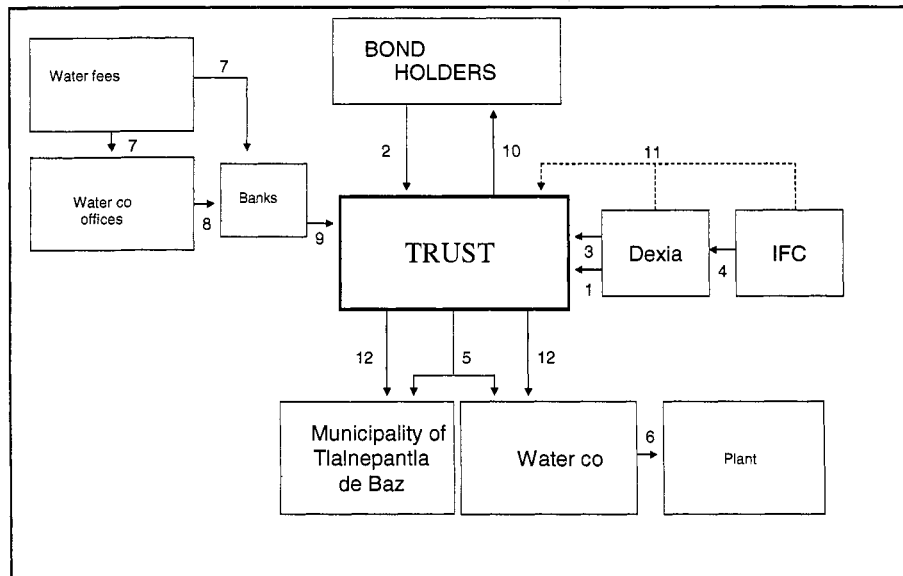
14.4 The challenge of securing water supply to populations and businesses is particularly acute in the metropolitan area of Mexico City due to its topography (high altitude, low precipitation) and high population density. The scarcity of water is further aggravated by a long history of inappropriate incentives, such as allowing the use of potable water for industrial processes. Under the leadership of the municipal government, Tlalnepantla decided to remedy this situation.

14.5 The operation closed on June 30, 2003. *Banco Santander Mexicano* acted as a trustee of a private trust and issued a bond for MxP95 million. The bond is backed by the payment obligations under a loan agreement between the trust and the municipality of Tlalnepantla and its municipal water company, acting as joint obligers.

14.6 Dexia provided a letter of credit to cover any shortfall in the debt service, up to the pesos equivalent of approximately US\$8 million. The International Finance

Corporation, in turn, covers 36.56 percent of Dexia's payment obligation. Figure 14.1 describes the structure of this arrangement.

Figure 14.1: Tlalnepantla Municipal Water Structure



Transaction Innovations

14.7 The Tlalnepantla bond issue was a landmark transaction for the Mexican market for the following reasons:

- It was the first time that a municipality did not use federal transfers as collateral for the financing. This represents an important departure from the traditional scheme for financing states and municipalities in Mexico, because it places additional reliance on the creditworthiness of the local government.
- It was the first financing using the water fees as the primary repayment source, and thereby created an important precedent for investment in the water sector in Mexico.
- It was the first credit enhancement for a bond issued by a state or municipality. The enhancement is partial, so that the enhancers will be sharing the risk with the investors. The presence of Dexia and the IFC was crucial in convincing the investors that the risk was acceptable.

14.8 In addition, the structure of the transaction addresses some of the challenges for the intervention of international financial institutions in the financing of local infrastructure. The financing is in local currency, thereby avoiding that a public utility (and its users) take the currency risk. It also constitutes an efficient use of capital by

leveraging the difference between Dexia's international rating and Mexico's local currency scale. Finally, the structure sustains the development of the local capital market with the creation of a new high-quality asset class.

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