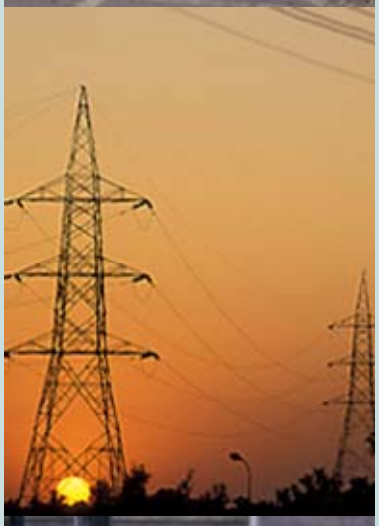

INFRASTRUCTURE IN LATIN AMERICA & THE CARIBBEAN:

Recent Developments and Key Challenges

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and Mary Morrison

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ANNEX I: COVERAGE AND QUALITY OF INFRASTRUCTURE IN LAC

A1.1 **Infrastructure in LAC is considered by sectors below.** Comparisons are usually drawn with the entire universe of 93 middle-income countries, including LAC, and two Asian nations: (i) the Republic of Korea, the per capita income of which was very close to the LAC average in 1985, but which has subsequently grown much faster; and (ii) China, the rapid recent growth of which arguably represents the greatest competitive challenge for LAC. For quality and efficiency indicators, an OECD average is also included where possible, as an indicator of best practice. Data on comparators' GDP is included at the end of the section, along with a list of the countries in the regional aggregates.

A. Transport

A1.2 **LAC had more roads than East Asia and the middle income average in 1985, but has fallen behind since.** By 2001, road density, normalized to adjust for country size, had barely grown, while those of both Korea and middle-income countries had.[1] The road network is particularly extensive in a few smaller countries, led by Jamaica and Costa Rica. These are also the two countries with the greatest expansion in their road networks over the period of analysis. In contrast, El Salvador and Guatemala show slight declines, possibly related to the civil conflicts they suffered during this period. If the road network were measured instead relative to the labor force, the regional leaders would be Costa Rica and Brazil. On that alternative basis, all countries in the region would have seen a decline in the extent of their network over 1980-2001, while East Asia would still have experienced an expansion. Today, road density by any measure is much lower in LAC than in middle income countries or China (Annex table 1).

Annex table 1. Road density is much lower in LAC than in Middle Income Coutries or China

	per 1000 person	km/1000 km2	per US $Million of GDP
Total roads			
Latin America & Caribbean	0.31	8.20	0.10
China	1.38	189.25	1.39
Middle income	1.39	59.90	0.77
Paved roads			
Latin America & Caribbean	0.08	2.21	0.03
China	1.25	172.22	1.26
Middle income	0.73	31.33	0.40

Source: World Development Indicators, 2002 except for paved roads data which is latest available year between 1995 and 2002. GDP per capita in PPP international dollars is 4379 for China, 5069 for middle income countries and 6381 for LAC. In 2000 US$, the difference is much starker: $983 for China, $1876 for middle income countries and $3759 for LAC

[1] If roads are normalized instead according to the labor force, the relative trends across regions are the same as those shown in the graph, although in terms of levels they rank differently, with Latin America ahead of East Asia, although by a margin that declines over time.

A1.3 **The quality of Latin America's roads is generally poor.** Less than a third of the national road network is in good condition in most countries for which data is available (Annex Table 1.) In fact, only two countries come above this threshold: Argentina, at 80%, and Guatemala at 75% (a figure that appears optimistic, although the .establishment of a roads fund has had a positive impact on road condition). Even fewer regional roads are in good condition, in all countries other than Nicaragua. And while little data is available for the rural and local roads that make up the remainder of the network, condition seems to be even worse, with only 8% in good condition in Peru and Ecuador, for example. Pavement rates are also low: in 1999, 27% of the roads in LAC were paved, against 54% in middle-income countries, and 75% in Korea. This proportion had risen faster in LAC since 1990, when the rate was 22%, compared with 51% for middle-income countries and 72% for Korea.[2]

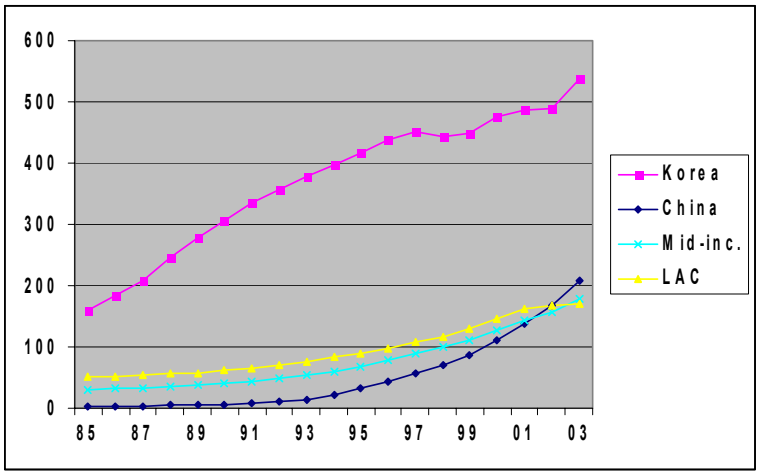
Annex table 2: Quality of national roads in selected LAC countries, on governments' assessments

	Length of total road network (km)	*National roads as% of total*	*National roads in good condition (%)*	*Regional roads as% of total*	*Regional roads in good condition (%)*
Peru	78,200	22	**23**	18	**15**
Colombia	166,233	10	**29**	40	**n.a.**
Ecuador	43,200	20	**26**	26	**10**
Nicaragua	18,950	9.2	**24**	3.4	**26**
Guatemala	26,000	15	**75**	12	**45**
Brazil	1,611,000	4.5	**24**	14	**n.a.**
Argentina	630,000	6.0	**80**	30	**78**
Mexico	302,000	16	**23**	27	**n.a.**
Haiti	3,400	20	**16**	44	**4.0**

Source: World Bank reports

B. Telecommunications

Annex Figure 1: Telephone mainlines (per 1,000 people)

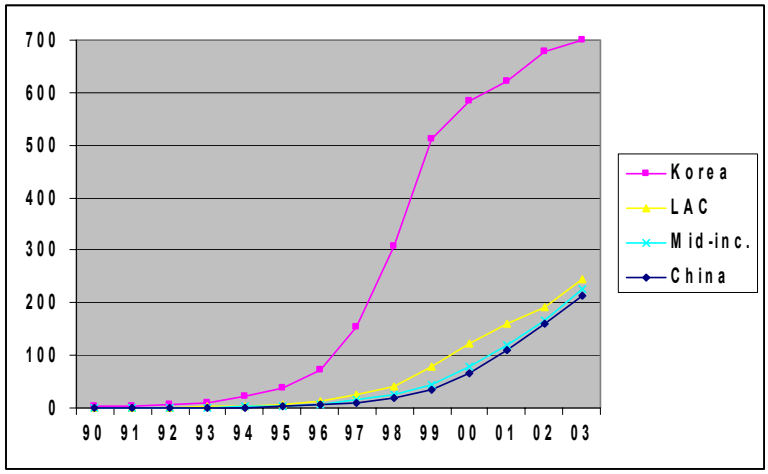


Source: International Telecommunication Union

[2] International Road Federation, from World Development Indicators Database, World Bank

A1.4 **Despite a strong performance by some countries, Latin America has fallen behind all comparators for telephone mainline coverage since 2002.** In 1985, the region was well ahead of both China and middle-income countries in general, but already far behind Korea (see Annex Figure 1). But in 2003, LAC's 170 lines per 1,000 people was behind 209 in China and 178 for middle-income countries. For Korea, the total was 538. The 2003 range within LAC spanned from 17 in Haiti and 37 in Nicaragua to 251 in Costa Rica and 280 in Uruguay. (See Annex Table 2 for fixed and cellular subscription numbers by country.

Annex Figure 2: Mobile phones (per 1,000 people)

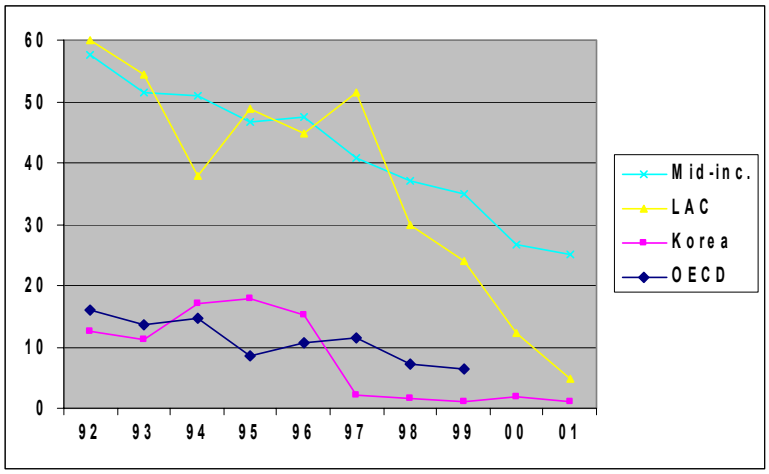


Source: International Telecommunication Union

A1.5 Mobile phone expansion has made up for slow fixed line growth, although China is still ahead for total telephone subscriptions. Cellular penetration was higher in 2003 in LAC, at 246 per 1,000 people, than middle-income countries (225) and China (215). Korea was even further ahead than for fixed lines than, at 701 (Annex Figure 2). Within LAC, the lowest levels were 2 (2002) in Cuba, 38 in Haiti and 49 in Honduras. However, countries at the top end: Chile (511) and Jamaica (535 in 2002) compare for cellular density with some much wealthier countries, including the U.S. (488 in 2002 and 543 in 2003. If mobile and fixed lines are added together, which is appropriate as the two are partly substitutes and recent cellular growth has apparently come at the expense of fixed line expansion, the LAC figure of 416 puts it above middle-income countries (403), but just below China (424). LAC now has 45% more cellular subscriptions than fixed lines, a margin that is greater than in China (2.7%), Korea (30%) and middle-income countries (27%).

A1.6 **The quality of fixed telephone service has improved even more dramatically in LAC than comparators.** Between 1992 and 2001, the number of faults reported per 100 lines fell from 60 to 4.7 in LAC, against 58 to 25 in middle-income countries and 12.5 to 1.2 in Korea (Annex Figure 3). In high-income OECD countries, the decline was from 18 in 1992 to 6.3 in 1999, the last year for which an aggregate figure is available. And while LAC was still behind Korea in 2001, fewer faults were reported in the region that year than for some OECD members, including the U.S. (12 per 100 lines) and Australia (8.3). Waiting times for the installation of new lines, which stretched to several months in LAC in 1985, had also fallen to a few days. Technological progress is behind much of this improvement.

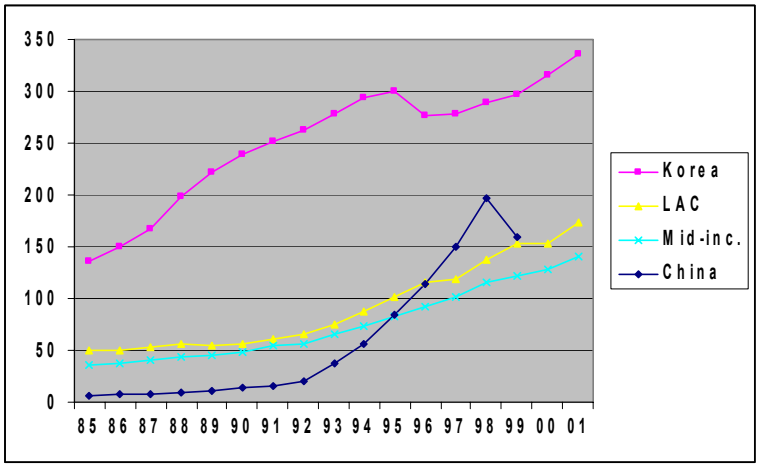
Annex Figure 3: Telephone faults reported (per 100 lines)



Source: International Telecommunication Union

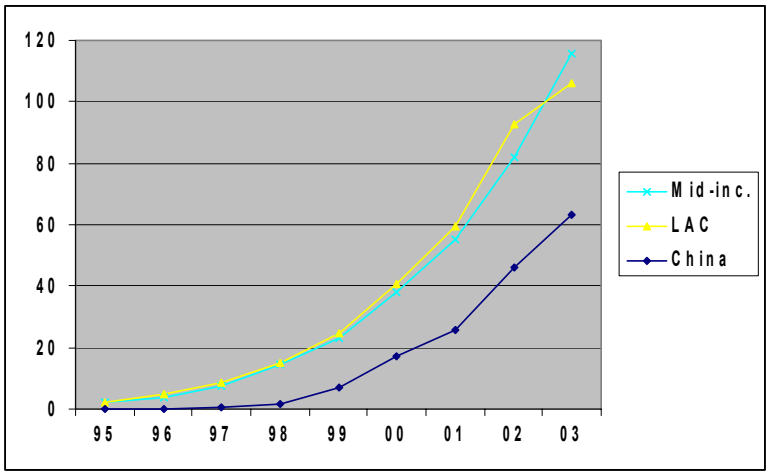
A1.7 **In fixed telecommunications, labor productivity has risen fast**. Due largely to technological improvements in the telecommunications sector, the number of fixed lines per telecom employee has risen sharply in LAC and worldwide in recent years, and now stands at above the middle-income average but well below Korea and the OECD average.

Annex Figure 4: Mainlines per telecom employee



A1.8 **Internet use has spread fast in LAC, but growth has slowed relative to middle income countries since 2002.** In LAC in 2003, there were 106 users per 1,000 people, compared to 116 in middle-income countries, 63 in China (Annex Figure 5) and 610 in Korea, which is not included in the graph due to data incompleteness. But LAC's growth of internet use between 2002 and 2003 was much slower, at 15%, than China (37%) and middle-income countries overall (41%). Within the region, the range stretched from 81 in Haiti and 21 in Paraguay to 272 in Chile.

Annex Figure 5: Internet users (per 1,000 people)



Source: International Telecommunication Union

Annex Table 2: Telephone subscriptions in LAC (per 1,000 people)

	1985			2003		
	Mainlines	Mobile	**Total**	Mainlines	Mobile	**Total**
Argentina	90	0	**90**	219*	178*	**396**
Bolivia	27	0	**27**	72	152	**224**
Brazil	53	0	**53**	223	264	**486**
Chile	44	0	**44**	221	511	**732**
Colombia	57	0	**57**	179	141	**321**
Costa Rica	79	0	**79**	251*	111*	**362**
Cuba	27	0	**27**	..	2*	..
Dominican Republic	23	0	**23**	115	271	**387**
Ecuador	30	0	**30**	122	189	**312**
El Salvador	19	0	**19**	116	176	**292**
Guatemala	16	0	**16**	71*	131*	**202**
Guyana	23	0	**23**	92*	99*	**191**
Haiti	5	0	**5**	17	38	**55**
Honduras	11	0	**11**	48*	49*	**97**
Jamaica	33	0	**33**	170*	535*	**704**
Mexico	50	0	**50**	158	291	**449**
Nicaragua	13	0	**13**	37	85	**123**
Panama	78	0	**78**	122	268	**390**
Paraguay	21	0	**21**	46	299	**345**
Peru	21	0	**21**	67	106	**173**
Trinidad and Tobago	102	0	**102**	250*	278*	**528**
Uruguay	96	0	**96**	280*	193*	**472**
Venezuela, RB	71	0	**71**	111	273	**384**

* 2002 data

Source: International Telecommunication Union (from World Development Indicators Database, World Bank)

C. Energy

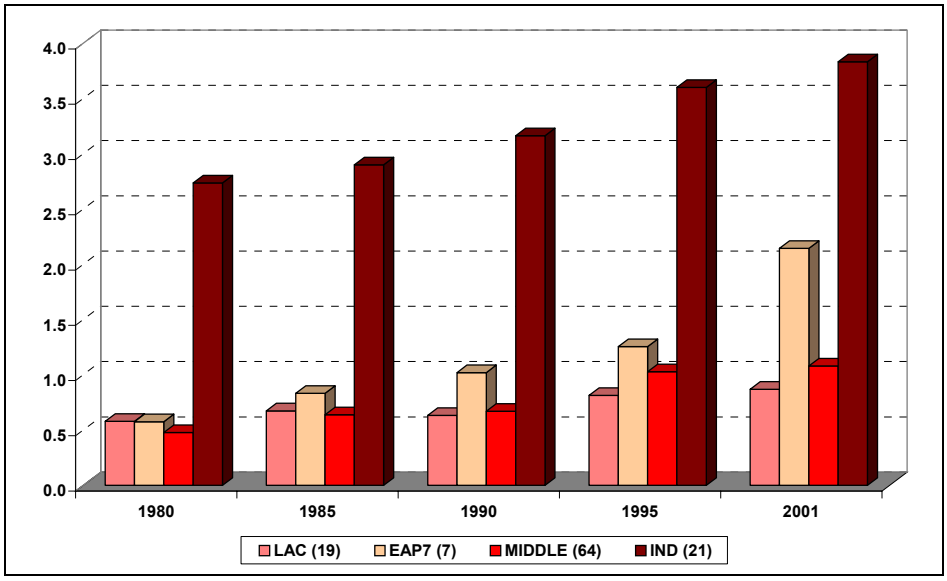
Annex Table 3: Households reporting access to electricity

	Total	Urban	Rural
Argentina (2002)	n.a.	100%	n.a.
Brazil (2002)	96%	99%	79%
Costa Rica (2002)	98%	100%	96%
Guatemala (2000)	73%	95%	56%
Jamaica (2000)	87%	92%	79%
Mexico (2000)	97%	n.a.	n.a.
Peru (2000)	69%	92%	28%

Source: adapted from Ernst & Young country briefs

A1.9 Electricity coverage is close to comprehensive in many urban areas, but remains thin in some rural areas. Annex Table 3 above shows that while more than 90% of urban dwellers have access to electricity in most of the region, there are major gaps in rural areas. Of the countries for which data is available, the urban-rural disparity is most extreme in Peru.

Annex Figure 6: Electricity generating capacity, medians by region (megawatts per 1,000 workers)



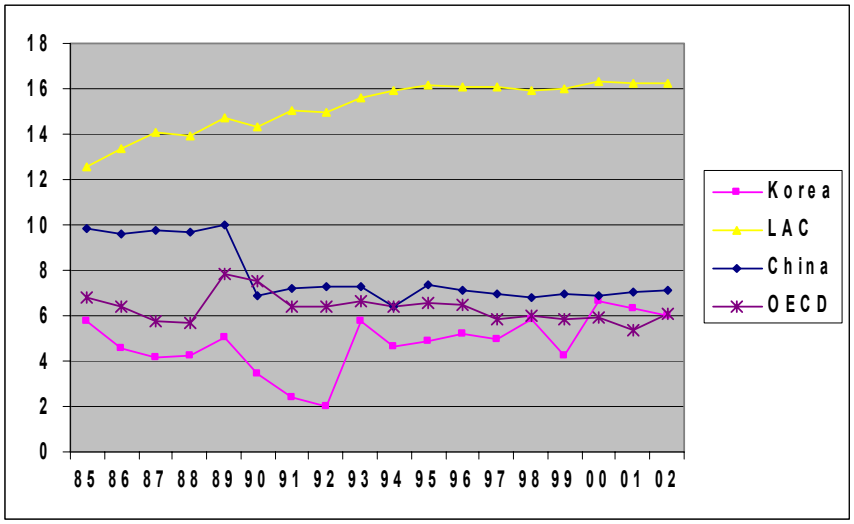
Source: Calderón and Servén (2004a)

A1.10 **Slower growth in generation capacity has left LAC behind middle-income countries in terms of generation capacity.** Overall, the region has slipped behind middle-income countries since the 1990s, while the gap with East Asia has widened considerably. There is great variation across Latin America in power generation capacity

per worker, which partly reflects geographical characteristics. In 2001 Paraguay ranked far ahead, due to the huge Itaipú hydroelectric project. It was followed by Venezuela and Argentina, with Bolivia at the bottom. Over the period, Nicaragua and Peru showed virtually no change in power generation capacity per worker, while Paraguay had the fastest growth, followed by Chile.

A1.11 **In the energy sector, transmission and distribution losses have risen in LAC and are much higher than elsewhere**. At 16% in 2002, the level in Latin America is nearly three times that of OECD countries (6.1%) and Korea (6.0%). LAC's losses are also well above the middle-income average of 12%. Within the region, a few countries show extremely high losses, which signify serious inefficiency: Haiti (51%), Dominican Republic (33%), Nicaragua (29%) and Venezuela (25%). The best performers were Paraguay (3.2%) and Trinidad and Tobago (4.7%.) Besides these two, only three other countries improved losses over the period over the period: Chile, El Salvador, and Jamaica.

Annex Figure 7: Electric power transmission and distribution losses (percentage of output)



Source: World Development Indicators Database

D. Water and sanitation

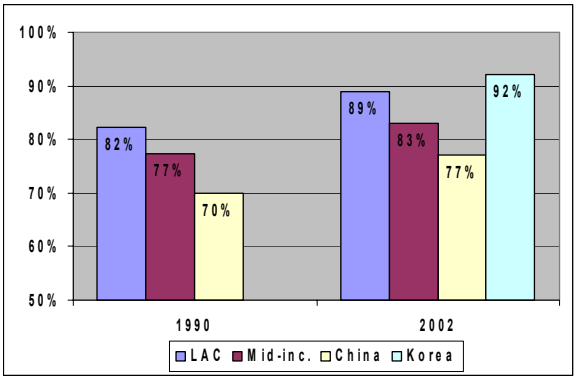
A1.12 **In access to safe water, LAC surpasses the mid-income average (as well as China), with poorer nations making the greatest gains in the 1990s.** The region increased coverage of safe water, which has both a quality and coverage aspect, from 82% of the population in 1990 to 89% in 2002 (Annex Figure 8a). Expansion during the period was in line, in percentage point terms, to that in China and middle income countries in general, but still left the region with lower coverage than Korea[3]. Across Latin America and the Caribbean, the degree of disparity apparently declined over the 1990s, as countries with lower access caught up. But the range is still wide, extending from 71% in Haiti to 98% in Uruguay (2002.) In Paraguay, access jumped from 62% to 83% from 1990 to 2002. Ecuador, El Salvador, Guatemala and Haiti also increased levels by 15 or more percentage points. The only country where coverage shrank over

[3] Data for 1990 was not available for Korea, and neither was information on sanitation access.

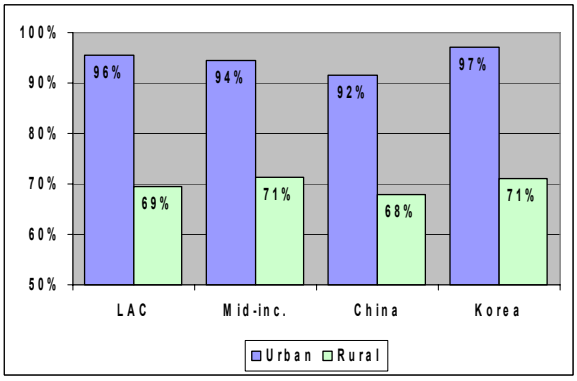
the period was Trinidad and Tobago, where the level declined from 92% to 91%. (See below for further data on countries' coverage levels.)

Annex Figure 8: Population with access to improved water sources[4]

a) by region



b) urban/rural (2002)

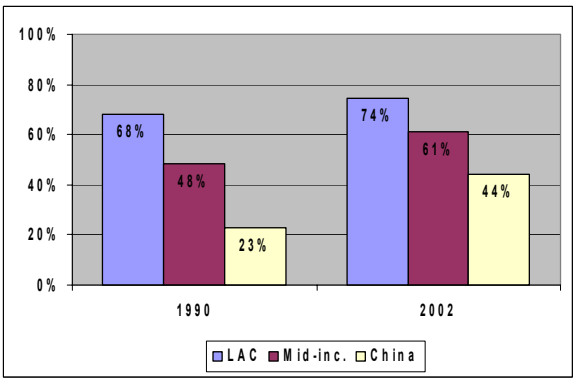


Source: WHO and UNICEF

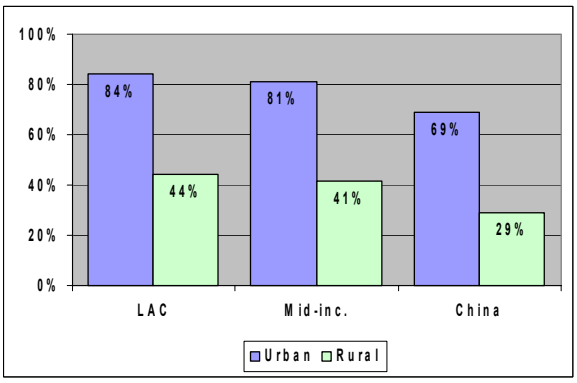
A1.13 **The region is also well ahead for sanitation coverage, but recent expansion has been relatively slow, and some countries in LAC still have a long way to go.** Overall, access to improved sanitation facilities rose from 68% in 1990 to 74% in 2002 (Annex Figure 9a.) But by 2002, while 100% of the inhabitants of Trinidad and Tobago and 98% of Cubans had access, this was true for only 34% of Haitians, 45% of Bolivians and 57% of those in the Dominican Republic.

Annex Figure 9: Population with access to improved sanitation facilities[5]

a) by region or income group



b) urban/rural (2002)



Source: WHO and UNICEF

[4] Access to an improved water source refers to reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling.

[5] Access to improved sanitation facilities refers to at least adequate excreta disposal facilities (private or shared, but not public) that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained.

A1.14 **For both water and sanitation, rural areas are far behind urban zones, although the gap has narrowed.** Whereas in 1990, only 58% of LAC's rural inhabitants had access to safe water and 35% to improved sanitation facilities, these levels had jumped to 69 and 44 respectively, by 2002. For urban areas, the increases were slower: from 93 to 96% for water and 83 to 84% for sanitation. But by 2002, the urban-rural gap was still larger, in percentage point terms, in LAC than in comparators for safe water access (Annex Figure 8b), while for sanitation, the disparity was similar to that in middle-income countries and China (Annex Figure 9b). The largest rural shortfalls are now in the region's largest countries: in Brazil, urban sanitation access is 83%, but just 35% in rural areas; and in Mexico the corresponding levels are 90% and 39%.

Annex Table 4: Improved water sources in LAC (percentage of population with access)

	1990			2002		
	Urban	Rural	**Total**	Urban	Rural	**Total**
Argentina	97	73	**94**	97	..	**..**
Bolivia	91	48	**72**	95	68	**85**
Brazil	93	55	**83**	96	58	**89**
Chile	98	49	**90**	100	59	**95**
Colombia	98	78	**92**	99	71	**92**
Costa Rica	100	..	**..**	100	92	**97**
Cuba	95	..	**..**	95	78	**91**
Dominican Rep.	97	72	**86**	98	85	**93**
Ecuador	81	54	**69**	92	77	**86**
El Salvador	88	47	**67**	91	68	**82**
Guatemala	88	69	**77**	99	92	**95**
Guyana	..	..	**..**	83	83	**83**
Haiti	77	43	**53**	91	59	**71**
Honduras	89	78	**83**	99	82	**90**
Jamaica	97	86	**92**	98	87	**93**
Mexico	90	54	**80**	97	72	**91**
Nicaragua	92	42	**69**	93	65	**81**
Panama	99	..	**..**	99	79	**91**
Paraguay	80	46	**62**	100	62	**83**
Peru	88	42	**74**	87	66	**81**
Trinidad & Tobago	93	89	**92**	92	88	**91**
Uruguay	98	..	**..**	98	93	**98**
Venezuela, RB	..	..	**..**	85	70	**83**

Source: WHO, UNICEF (from World Development Indicators Database, World Bank)

Annex Table 5: Improved sanitation facilities in LAC (percentage of population with access)

	1990			2002		
	Urban	Rural	**Total**	Urban	Rural	**Total**
Argentina	87	47	**82**	..	..	**..**
Brazil	82	37	**70**	83	35	**75**
Bolivia	49	13	**33**	58	23	**45**
Chile	91	52	**85**	96	64	**92**
Colombia	95	52	**82**	96	54	**86**
Costa Rica	..	97	**..**	89	97	**92**
Cuba	99	95	**98**	99	95	**98**
Dominican Rep.	60	33	**48**	67	43	**57**
Ecuador	73	36	**56**	80	59	**72**
El Salvador	70	33	**51**	78	40	**63**
Guatemala	71	35	**50**	72	52	**61**
Guyana	..	..	**..**	86	60	**70**
Haiti	27	11	**15**	52	23	**34**
Honduras	77	31	**49**	89	52	**68**
Jamaica	85	64	**75**	90	68	**80**
Mexico	84	20	**66**	90	39	**77**
Nicaragua	64	27	**47**	78	51	**66**
Panama	..	..	**..**	89	51	**72**
Paraguay	71	46	**58**	94	58	**78**
Peru	68	15	**52**	72	33	**62**
Trinidad & Tobago	100	100	**100**	100	100	**100**
Uruguay	95	..	**..**	95	85	**94**
Venezuela, RB	..	..	**..**	71	48	**68**

Source: WHO, UNICEF (from World Development Indicators Database, World Bank)

Annex Table 6: GDP and constituents of comparator groups

GDP per capita, PPP (current international $)		
	1985	**2003**
China	823	5,003
Korea, Rep.	4,354	17,971
Latin America & Caribbean	4,320	7,400
Middle income	2,580	6,110
High income (OECD)	13,800	30,180

Annex Table 7: Countries in LAC and middle income aggregates

LAC	Middle-income countries		
Antigua & Barbuda	Albania	Georgia	Peru
Argentina	Algeria	Grenada	Philippines
Barbados	American Samoa	Guatemala	Poland
Belize	Antigua & Barbuda	Guyana	Romania
Bolivia	Argentina	Honduras	Russian Federation
Brazil	Armenia	Hungary	Samoa
Chile	Azerbaijan	Indonesia	Saudi Arabia
Colombia	Barbados	Iran, Islamic Rep.	Serbia & Montenegro
Costa Rica	Belarus	Iraq	Seychelles
Cuba	Belize	Jamaica	Slovak Republic
Dominica	Bolivia	Jordan	South Africa
Dominican Republic	Bosnia & Herzegovina	Kazakhstan	Sri Lanka
Ecuador	Botswana	Kiribati	St. Kitts & Nevis
El Salvador	Brazil	Latvia	St. Lucia
Grenada	Bulgaria	Lebanon	St. Vincent & Grenadines
Guatemala	Cape Verde	Libya	Suriname
Guyana	Chile	Lithuania	Swaziland
Haiti	China	Macedonia, FYR	Syrian Arab Republic
Honduras	Colombia	Malaysia	Thailand
Jamaica	Costa Rica	Maldives	Tonga
Mexico	Croatia	Marshall Islands	Trinidad & Tobago
Nicaragua	Cuba	Mauritius	Tunisia
Panama	Czech Republic	Mayotte	Turkey
Paraguay	Djibouti	Mexico	Turkmenistan
Peru	Dominica	Micronesia, Fed. Sts.	Ukraine
St. Kitts and Nevis	Dominican Republic	Morocco	Uruguay
St. Lucia	Ecuador	Namibia	Vanuatu
St. Vincent & Grenadines	Egypt, Arab Rep.	Northern Mariana Islands	Venezuela, RB
Suriname	El Salvador	Oman	West Bank & Gaza
Trinidad & Tobago	Estonia	Palau	
Uruguay	Fiji	Panama	
Venezuela, RB	Gabon	Paraguay	

Notes: Middle-income economies are those in which 2003 GNI per capita was between $765 and $9,385. Latin America and Caribbean regional aggregate does not include high-income economies.

ANNEX II: INFRASTRUCTURE INVESTMENT "NEEDS"

A. Setting the objective against which needs are to be measured

A2.1 **How much infrastructure investment is needed depends on the objective set, and the objective can be set in a variety of ways.** The objective can be to achieve a particular level of coverage or quality of service, deemed desirable or attainable. Or it can be an income growth or productivity gain objective, for which improved infrastructure is deemed necessary. As such the expression "investment need" should be used in tandem with the question "for what"? Annex Table 8 illustrates this, using the example of Mexico, where this exercise was recently undertaken in the context of a public expenditure review.

A2.2 **A first option is to use simple benchmarking.** This can entail comparing a country to its peers (as defined say by income levels) or to a country that offers a promising example (say a newly industrialized country such as Korea), and asking how much it would cost to achieve the service coverage or quality of the comparator country. The comparison can be on the basis of coverage or quality or of expenditure flows.

Annex Table 8: Different approaches to estimating expenditure needs in infrastructure – the example of Mexico.

	"Benchmarking"	Set target
Costing exercise	Ex: - **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.	Ex: What would it cost for Mexico to achieve universal service coverage in water and sanitation, electricity and access to year round roads?
Model	**Econometric:** **Growth:** What level of infrastructure coverage is needed to achieve x% level of growth and reduce inequality by z%. Model developed by Calderon and Serven (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.	**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 **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 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.

Source: World Bank 2005

A2.3 **The benchmarking can also be sophisticated, and rely on econometric models.** This is what Fay and Yepes (2003) do when they ask the question of how much investment may be needed to satisfy firm and consumer demand triggered by predicted GDP growth. This is benchmarking inasmuch as the relationship between income level and infrastructure service demand is established on the basis of past observed behavior in a sample of countries and extrapolated to the future using predicted income growth.

A2.4 **Objectives can also be set arbitrarily, on the basis of social desirability for example.** The Millennium Development Goals are an example of objectives set on the basis of a combination of social desirability and feasibility.[6] Alternatively, in Mexico, the question was how much it would cost to achieve universal coverage of water, sanitation, and electricity.

A2.5 **Objectives can be based on economic-engineering "rules" about networks and their integrity.** The electricity sector has sophisticated economic-engineering models that estimate the investments required to maintain the integrity of a network facing demand expansion. 7 In Mexico, roads investments needs were based on the estimated cost of rehabilitation needs (bringing the entire federal network to good or fair conditions) and the completion of what sector experts defined as major corridors. While it wasn't as formal a model as in the electricity sector, the investment needs were defined on the basis of recognized methodology for defining major corridors and appropriate quality targets.

A2.6 **In addition, maintenance expenditures must be included in any calculation of expenditure needs.** Rather than investment needs, countries should focus on overall expenditure needs which includes maintenance expenditures. Maintenance expenditure standards are well known and result in very predictable annual expenditure outlays when averaged over an entire network. Appropriate, but by no means generous, standards are approximately 2% of the replacement cost of the capital cost for electricity, roads and rail; 3% for water and sanitation and about 8% for mobile and fixed lines.

B. Costing the goal of bringing LAC to Korea's level of productive infrastructure coverage

A2.7 **For LAC to reach productive infrastructure coverage levels similar to Korea's would require annual investments of 4% and 6% of GDP per annum over the next twenty years (Annex Table 9).** Using data from Calderón and Servén (2004), we look at the stocks of roads (paved or total), electricity generating capacity, and telephone (fixed and cellular) for Latin American countries to reach the coverage level that Korea has today. In the case of roads, the goal is set to one third the road density of Korea –Korea's population density is much higher than that of most Latin American

[6] The one Millenium development goal pertaining directly to infrastructure is to "halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation."

[7] Mexico uses the Wien automatic system planning package (WASP IV), a widely used model that analyzes generating system expansion options, primarily to determine the least costly expansion path that will adequately meet the demand for electric power, subject to user-defined constraints. Other similar models are SUPER/OLADE/BID and MPODE, which are used by Colombia and Ecuador for example.

countries so that achieving the same road density may not be an appropriate goal. We also assume a rather optimistic growth scenario of 2.7% annual GDP growth.

Annex Table 9: How much would be needed for LAC to reach levels of infrastructure per worker levels similar to those of Korea (as a share of GDP)

	Total cost for Telephones (fixed and cellular) electricity generating capacity and		Annual cost if spread over 20 years/1	
	all roads	paved roads	With all roads	With paved roads
Argentina	75%	123%	3%	4%
Brazil	155%	234%	6%	8%
Chile	99%	153%	4%	5%
Colombia	180%	246%	6%	9%
Costa Rica	63%	77%	2%	3%
Mexico	48%	63%	2%	2%
Peru	202%	315%	7%	11%
Venezuela	73%	107%	3%	4%
Latin America	106%	156%	4%	6%

Source: own calculations based on data from Calderón and Servén (2004).
Notes: The cost for total roads, paved roads and rail is that of reaching a road/paved road/rail density equal to **one third** that of Korea - this is because for Korea's population density is much superior to that of LAC. This assumes an annual growth of GDP of 2.7% per annum over the next 20 years. See Annex Table 12 for detailed country and sector results.

A2.8 **While ambitious, this is not unrealistic.** 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, Argentina's or Brazil's at the time. And if Calderón and Servén (2004) are right, the payoffs in terms of growth and decreased inequality would be substantial.

C. Universal water, sanitation and electricity coverage

A2.9 **Achieving the socially desirable goal of universal water and electricity coverage by 2015 would cost Latin America a mere 0.24% of GDP (Annex Table 10).** This includes 0.12% of GDP for electricity, 0.04% of GDP for water and about 0.08% for sanitation. This relied on UN population projections and a GDP growth scenario of 2.7% per annum. It is unfortunately impossible to estimate the needed rehabilitation and upgrading, which is likely to be very large particularly in water and sanitation given the generally poor maintenance in these two sectors.

Annex Table 10: Investments needed to achieve universal coverage in water, electricity and sanitation in Latin America by 2015 (percent of GDP)

	Safe Water	Sanitation	Total Water and Sanitation	Electricity	Total water, sanitation, electricity
Argentina	0.02%	0.03%	0.05%	0.05%	0.10%
Brazil	0.03%	0.09%	0.12%	0.11%	0.23%
Chile	0.02%	0.02%	0.04%	0.06%	0.10%
Colombia	0.06%	0.13%	0.19%	0.30%	0.49%
Costa Rica	0.03%	0.05%	0.08%	0.11%	0.19%
Mexico	0.02%	0.06%	0.08%	0.05%	0.13%
Peru	0.08%	0.16%	0.24%	0.28%	0.52%
Venezuela	0.04%	0.09%	0.13%	0.08%	0.21%
LAC	**0.04%**	**0.08%**	**0.12%**	**0.12%**	**0.24%**

Source: Own calculations based on World Development Indicators Data.
See Annex Table 13 for full sample.

A2.10 **These estimates are modest partly because they rely 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 $1,000 per new connection (and for associated network costs), which implies that households too far from an existing network to be connected at a price inferior or equal to $1,000, would be served by alternative off-grid technologies.8 In the case of water and sanitation, it also assumes that households in low density areas would not have access to sewerage connections but alternative sanitation systems (e.g. latrines) and that a proportion of households would have access to water but not necessarily in house connections

D. Responding to firms and individuals' demand for infrastructure services

A2.11 **Responding to the derived demand of firms and individuals would require a more modest 1.3% of GDP per annum (Annex Table 11).** Adding maintenance expenditures would increase the annual need for resources to about 2.4% of GDP per year**.** The Fay and Yepes (2004) approach described above develops an econometric model that estimates the relationship between a number of economic variables (income per capita, urbanization and sectoral composition of GDP) and infrastructure coverage for electricity, telephones, roads and rail. This is then used in combination with World Bank and UN population and GDP growth projection to estimate the derived demand for infrastructure services – which in turn is priced.

[8] Since there are still some households to be connected that are relatively close to existing grids and could be connected at lower prices (say $500 or so), the price that determines a switch to alternative off-grid technologies could be somewhat above $1000. However, what is certain, is that an average price of $1,000 per connection would not allow universal connection to a grid.

Annex Table 11: Investment needed over the 2005-2015 period to respond to firm and individual demand (as % of GDP)

	Electricity	Telephone (fixed and cellular)	Roads	Rail	Safe Water	Sanitation	Total
Investments	0.7%	0.3%	0.2%	0.0%	0.1%	0.1%	1.3%
Maintenance	0.4%	0.3%	0.2%	0.0%	0.0%	0.1%	1.1%
Total	1.1%	0.6%	0.4%	0.0%	0.1%	0.1%	2.4%

Source: Own calculations based on Fay and Yepes (2004) methodology, using World Development Indicators data except for water and sanitation for which the target is the one set for the Millenium Development Goals (half the proportion of the population without access to water and sanitation by 2015).
Note: the model assumes a 2.7% per annum GDP growth. See Annex Table 3 for other regions.

E. Pulling it all together

A2.12 **Annual expenditures of about 3% of GDP should suffice to respond to expected growth in demand from firms and individuals, maintain existing infrastructure and achieve universal service for water, sanitation and electricity over 10 years.** This is based on adding up the Fay and Yepes projections (2.4%) to the estimated cost of universal coverage (0.24% of GDP). Note that this does not include the cost of rehabilitation, nor does it cover urban transport, ports and airports.

A2.13 **A much higher amount (5% to 7% of GDP) would be required to bring LAC to Korea's level of coverage over 20 years and fund adequate maintenance.** This is based on the estimated cost of bringing LAC to Korea level (4% to 6% of GDP) to which the estimated cost of maintenance is added (about 1% of GDP per annum). Again, this does not include the cost of rehabilitation.

Annex Table 12: The cost of investments needed for LAC to reach infrastructure coverage per worker levels similar to those of Korea (as a share of GDP)

	Telephone Mainlines	*Mobile Phones*	*Electricity Generating Capacity*	*Total Road/1*	*Paved Road/1*	*Railroad/1*	*Total (excluding rail)*		*Total (excluding rail) Annual investment if spread over 20 years/2*	
							(all roads)	*(paved roads)*	*(all roads)*	*(paved roads)*
Argentina	2%	4%	23%	45%	94%	20%	75%	123%	3%	4%
Bahamas, The	1%	2%	14%	12%	26%	5%	30%	43%	1%	2%
Barbados	2%	4%	23%	1%	2%	0%	30%	31%	1%	1%
Belice	4%	7%	40%	116%	241%	50%	167%	291%	6%	10%
Bolivia	16%	30%	177%	600%	1246%	258%	823%	1469%	30%	53%
Brazil	6%	11%	65%	74%	153%	32%	155%	234%	6%	8%
Chile	4%	7%	39%	50%	104%	21%	99%	153%	4%	5%
Colombia	9%	16%	94%	61%	127%	26%	180%	246%	6%	9%
Costa Rica	4%	7%	39%	14%	28%	6%	63%	77%	2%	3%
Dominican Rep.	7%	12%	71%	10%	21%	4%	100%	110%	4%	4%
Ecuador	9%	17%	99%	59%	123%	25%	184%	247%	7%	9%
El Salvador	8%	14%	83%	7%	14%	3%	111%	118%	4%	4%
Guatemala	8%	14%	85%	23%	47%	10%	129%	154%	5%	6%
Guyana	18%	33%	193%	1323%	2747%	569%	1567%	2991%	56%	108%
Haiti	37%	69%	404%	34%	70%	15%	544%	580%	20%	21%
Honduras	15%	27%	160%	77%	159%	33%	278%	361%	10%	13%
Jamaica	6%	12%	69%	6%	12%	3%	93%	99%	3%	4%
Mexico	2%	5%	27%	14%	29%	6%	48%	63%	2%	2%
Nicaragua	20%	37%	215%	141%	293%	61%	412%	564%	15%	20%
Panama	4%	7%	42%	28%	58%	12%	82%	112%	3%	4%
Paraguay	12%	22%	127%	260%	540%	112%	421%	701%	15%	25%
Peru	7%	13%	77%	105%	218%	45%	202%	315%	7%	11%
Suriname	8%	14%	85%	922%	1914%	397%	1029%	2021%	37%	73%
Trin. and Tobago	3%	5%	27%	3%	5%	1%	37%	40%	1%	1%
Uruguay	3%	6%	34%	42%	86%	18%	84%	129%	3%	5%
Venezuela	3%	6%	33%	32%	66%	14%	73%	107%	3%	4%
Latin America	4%	8%	47%	47%	97%	20%	106%	156%	4%	6%

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

Notes: 1/ The cost for total roads, paved roads and rail is that of reaching a road/paved road/rail density equal to **one third** that of Korea. This is because for Korea's population density is much superior to that of LAC (187 for Korea as opposed to 26 for LAC) and the difference is even larger when using labor force rather than population (245 vs 11).

2/ This assumes an annual growth of GDP of 2.7% per annum over the next 20 Years.

Annex Table 13: Estimated annual investment needs to achieve universal access to water, sanitation and electricity in LAC by 2015 (% of GDP)

	Safe Water	Sanitation	Total Water and Sanitation	Electricity	Total water, sanitation, electricity
Argentina	0.02%	0.03%	0.05%	0.05%	0.10%
Belize	0.05%	0.16%	0.21%		
Bolivia	0.20%	0.47%	0.67%	0.92%	1.59%
Brazil	0.03%	0.09%	0.12%	0.11%	0.23%
Chile	0.02%	0.02%	0.04%	0.06%	0.10%
Colombia	0.06%	0.13%	0.19%	0.30%	0.49%
Costa Rica	0.03%	0.05%	0.08%	0.11%	0.19%
Dominican Rep.	0.03%	0.09%	0.12%	0.29%	0.41%
Ecuador	0.11%	0.37%	0.48%	0.36%	0.84%
El Salvador	0.10%	0.15%	0.25%	0.31%	0.56%
Guatemala	0.12%	0.24%	0.36%	0.44%	0.80%
Guyana	0.07%	0.18%	0.25%		
Haiti	0.68%	1.52%	2.20%	2.20%	4.40%
Honduras	0.18%	0.43%	0.61%	0.89%	1.50%
Jamaica	0.07%	0.09%	0.16%	0.10%	0.26%
Mexico	0.02%	0.06%	0.08%	0.05%	0.13%
Panama	0.03%	0.05%	0.08%	0.14%	0.22%
Paraguay	0.18%	0.23%	0.41%	0.60%	1.01%
Peru	0.08%	0.16%	0.24%	0.28%	0.52%
Trin. and Tobago	0.02%	0.03%	0.05%	0.02%	0.07%
Uruguay	0.01%	0.02%	0.03%	0.04%	0.07%
Venezuela	0.04%	0.09%	0.13%	0.08%	0.21%
LAC	**0.04%**	**0.08%**	**0.12%**	**0.12%**	**0.24%**

Source: Own calculations based on data from World Development Indicators

ANNEX III. SUBNATIONAL GOVERNMENT FINANCING[9]

A3.1. **Local government bodies (LGBs) access to private capital depends critically on significant improvement in their credit-worthiness.** No amount of credit enhancement or financial engineering can substitute for a sound legal, institutional and regulatory framework underpinning and incentivizing sound local body finances. The central issue in setting up mechanisms to channel private savings to local bodies for the financing of infrastructure is the assurance to lenders that they will be repaid. Factors that often reduce creditworthiness of local bodies include an inadequate accounting and risk management framework for asset-liability management, lack of autonomous authority to set realistic tax-rates and tariffs or user charges for the basic services they provide and inflexibility in wage structures and hiring-firing policies. Box III.1 below provides Fitch Ratings best and worst practices with rating value in terms of the financial management of sub-sovereign bodies. This provides a useful checklist of financial management reforms that local governments can pursue.

A3.2. **A major impediment to the development of subnational credit markets is the moral hazard of explicit or implicit guarantees of a federal government bailout of subnational debt.** For this reason, the development of subnational credit markets requires, inter alia, a strict no-bail-out policy for LGBs in trouble. This is easier said than done. Inman (2003) points out that in the US, it took about 70 years of the federation for the principle of hard budget constraints for US states and local governments to be generally accepted. The turning point was the federal government's refusal to bailout eight defaulting states and the Territory of Florida in the 1840s. Mexico and South Africa have both formulated no bailout systems for their LGBs in which national governments do not guarantee sub-sovereign debt. In the case of Mexico, the capital risk weighting of bank loans to LGBs is linked to local credit ratings. South Africa has established a Municipal Financial Emergency Authority for technical assistance, resources and legal remedies to LGBs in distress. (Weist 2002) A related legal issue is the need for orderly bankruptcy/ work-out procedures as well as a time-bound procedure for foreclosure. In 1995, Hungary introduced a US style Chapter-11 type bankruptcy "stand-still" procedure to regulate debt clearance procedures in case of default by local governments. Since the law was introduced, eight small cities went through the procedure, and are now in stable financial condition. (Noel 2000).

A3.3. **Pooling credit risk of small and medium local governments offers great potential for enhanced access to infrastructure finance.** A common method of credit risk pooling is to set up bond banks that sell its own securities and on-lends the proceeds to local governments. A common feature of all bond banks is that they rely on their member municipal governments to repay their issued debt but also provide a number of credit enhancements to lower the overall cost of borrowing. In Denmark (***KommuneKredit***) and Sweden (***Kommuninvest i Sverige Aktiebolag***), the bond bank debt is secured by the "joint and several" obligation of member municipalities to pay the debt, in case an individual member defaults. British Columbia's Municipal Finance Authority has an obligation to levy property taxes on all land and improvements in the province — including the City of Vancouver, the only municipality in the province that issues its own securities to finance capital projects. ***Japan Finance Corporation for Municipal Enterprises*** and Norway's ***Norges Kommunalbank***, both have sovereign guarantees. The ultimate guarantor of debt issued by Finland's ***Municipality Finance Plc*** is MGB, a public institution with member

[9] This section was written by Abhas Jha.

municipalities consisting of 98% of the national population. In New Hampshire, the New Hampshire Municipal Bond Bank issues two types of bonds, one with a guarantee of the state government and the other without such a guarantee. (Moody's 2001)

A3.4. **An offshoot of the bond bank model that has worked especially well in the US is the State Revolving Funds**. In 1984, as a consequence to the "Federal Clean Water Act", the US Federal Government set up state revolving funds (SRFs) for wastewater and water projects in the US. The federal government makes capital grants to the state government, matched by a contribution from the state (currently at 20%). Several states use these subsidies to create dedicated reserve funds to collateralize pooled bond flotation to support financing needs of local governments in the state. The pooled SRF bonds of New York State are AAA rated even when many participating local governments have lower ratings or are not rated at all. SRFs typically provide a number of credit enhancements like debt service reserve funds and state transfers payment intercept provisions to provide additional comfort to lenders and thereby lowering the cost of borrowing. Another key advantage of the SRF model is the low overheads. The Maine Municipal Bond Bank (which administers the SRF) raises US$ 100 million/year with a staff of four. Typical savings from pooling range from 250-650 basis points. Small and medium municipalities often are unable to identify and prepare bankable projects. The SRFs provide 3-year interest free loans to local governments for project preparation. This has helped create a strong pipeline of creditworthy projects using SRF resources.

A3.5. **There is a lot that policy-makers can do to strengthen municipal primary and secondary bond markets.** Close to 50% of total US municipal bond issues (75% of BBB, A, or better) are covered by bond insurance (El Daher 1997). Policy makers could consider setting up a bond insurance facility (either in the private or public sector) to facilitate small issuers, considered less creditworthy, to access the domestic markets for high investment grade debt. Leigland (1997) lists several measures to promote the secondary market in sub-sovereign debt. Among direct measures, countries are exploring ways to facilitate the listing of bonds on domestic stock exchanges and to encourage the development of pre-indication posting or other municipal finance information systems similar to those used in the US to support placement and sales function (e.g. Blue List and Munifax). Amongst indirect measures, removing minimum holding requirements by institutional investors for government securities, including municipal bonds eliminates the bias toward private placement inherent in the system and increases the incentive of institutional investors for trading. This is one of the objectives pursued by the government of South Africa in abandoning its prescribed investment regime for institutional investors. Municipal assets are an often underused and overlooked source for enhancement of municipal bonds. Municipalities in China and Poland have used public land as collateral for raising money and then successfully disposing of the assets at higher prices on completion of the project.

A3.6. **The experience with Municipal Development Funds has been decidedly mixed.** More than 60 countries have set up specialized financial intermediaries or municipal development funds for raising capital to on-lend to subnational governments. However, as Peterson (1996) points out, very few MDFs have evolved into market-oriented suppliers of credit capable of mobilizing private sector savings. Some common features of many successful MDFs (e.g. MUFIS in the Czech Republic and FINDETER in Colombia) include the transfer of credit risk to the private sector, "unbundling" functions like payment collections and credit analysis to specialized private sector firms, separating subsidies from lending and providing technical assistance and capacity building for project preparation. Standard and Poor's developed ratings criteria for state revolving funds in 1990 and refined them in 1994. These criteria include significant credit enhancements like significant equity,

reserve funds, tax base access, and legislative provisions and are usually seen in institutions like Dexia and the Municipal Bank of Netherlands that have successfully raised private capital.

A3.7. **Increasing local currency financing and better mitigation of foreign exchange risk will be important for enhanced access to capital for subnationals.** Subnationals often lack capacity to manage and mitigate foreign exchange risk. The macroeconomic fragility and external debt overhang of the 1990s has left federal ministries of finance wary of taking on any additional foreign currency denominated debt even more so the contingent claims of subnational government debt. However local currency debt in Latin America is characterized by short tenors, volatile interest rates and an absence of deep and liquid secondary markets. In such a situation investors have been traditionally unwilling to take on the long tenors typical of infrastructure projects. However, a number of positive developments in the recent past have improved the situation dramatically. The maturation of domestic pension fund industry and other institutional investors has created a sophisticated investor class looking for local currency debt instruments all along the yield curve. Subnationals offer such investors an opportunity to diversify their portfolio. Countries like Mexico have taken tangible steps to improve their legal and regulatory framework for securitization which mitigates interest rate and credit risk-thus opening up demand from investors previously not interested in simple debt offerings from subnationals. Credit enhancements by international financial institutions like local currency partial credit guarantees, monoline wraps will further deepen local currency debt markets.

Box III. 1: Best Practices with Significant Rating Value for Fitch

- Cash reserve policy /working capital reserves /budgetary cushions.
- Multiyear financial forecasting.
- Monthly or quarterly financial reporting and monitoring.
- Contingency planning policies.
- Policies regarding nonrecurring revenue.
- Depreciation of fixed assets.
- Debt affordability reviews and policies.
- Pay-as-you go capital finding policies.
- Debt retirement speed.
- Five-year capital improvement plan integrating operating costs.

Worst Practices with Significant Rating Concern for Fitch

- Cash basis accounting.
- Qualified audit opinion for material weakness.
- Deficit financing for two of last five years.
- Debt retirement speed.
- Unfunded accrued pension liability.
- Short-term borrowing growing significantly faster than annual spending
- Debt reprogramming that defers a small share of current debt service.
- Over reliance on nonrecurring revenue.
- Aggressive investment policy for operating funds.
- Pension contribution deferral in the current budget year.
- Budgetary impasse beyond legal completion date.
- Lack of capital improvement plan.
- Excess borrowing from related entitles, with **no capacity to repay in near future.**

Source: Fitch Ratings, "International Rating Methodology for Regional and Local Governments", April 4, 2002, *http://www.fitchratings.com/corporate/reports/report.cfm?rpt_id=141098*

Infrastructure Finance Corporation Limited of South Africa

Infrastructure Finance Corporation Limited, trading as INCA, is the only infrastructure debt fund in South Africa that is 100 per cent privately owned and operated. INCA was established in response to the South African government's call for increased private sector involvement in infrastructure funding. As a result of its unique position INCA has become a primary mobiliser of funds for lending to infrastructure providers. The main funding sources it draws on are local and international market funds, raised through a series of INCA bond issues and long-term loans extended to the corporation by international financial institutions. Another source of funding available to INCA is shareholders' capital.

The infrastructure providers to which INCA lends funds include municipalities, water boards and other statutory institutions in South Africa whose main business is the establishment of social and economic infrastructure in South Africa. This funding has mainly been in the form of long-term fixed interest rate loans.

INCA's mandate allows it to fund fixed and movable assets of all entities within the statutory sector. INCA, however, focuses mainly on balance sheet funding to the municipal sector and its appraisal and lending process is tailored to the needs of municipalities, water boards and other utilities. After specifically assessing the management capacity, economic future, current financial position and future prospects, with an emphasis on reliable free cash flows generated by the borrower, INCA provides a shadow rating to a borrower. Based on the shadow rating of the borrower and the pure size of the free cash flows generated by the borrower, INCA approves a long-term and short-term credit facility available to borrowers. These facilities are annually reviewed and adjusted if needed. INCA provides fixed and/or floating rate finance for terms from 1 to 20 years. Transactions are concluded by way of standardized loan agreements.

Source: INCA's website: *http://www.inca.co.za/*

An Example of a Well -run Municipal Development Fund: The Tamil Nadu Urban Development Fund (TNUDF)

(TNUDF) has established itself as one of the best run municipal funds in the world. The Fund which has lent over Rs. 4.93 billion to urban local bodies in Tamil Nadu has achieved repayment rates of over 96% and made a profit of Rs. 848 million in the financial year ending March 31, 2003. The TNUDF is a trust fund established under the Indian Trusts Act, 1882, by GoTN, ICICI, HDFC and IL&FS with a line of credit from the World Bank. GoTN's equity in the venture is restricted to 49%, to allow private sector management in investment decisions. Other shareholders of TNUIFSL are ICICI (21%), HDFC (15%) and IL&FS (15%). ICICI, the lead institution, has taken up management responsibility, putting in place appraisal systems and key personnel.

TNUDF can lend to urban local bodies (ULBs), statutory boards, public sector undertakings and private corporates for water supply, sanitation, solid waste management, roads / bridges, transportation, sites and services and integrated area development projects. It can only fund capital expenditure, civil works, services and goods / materials. It cannot fund land acquisition costs, O&M expenditure / other revenue expenditure such as salaries etc. For a ULB to be eligible for funding from the Fund, its total expenditure should be less than its total revenue and annuity payments / total revenue should be less than 30%. In case where ULBs fail to meet above criteria, the project specific returns (IRR) should be greater than 18.5% p.a. For private sector borrowers, long term debt to net worth ratio should be less than 1.5, net fixed assets to long term debt should be greater than 1.5 and average debt service coverage ratio (DSCR) should be greater than 1.5.
Various credit enhancement measures such as escrow accounts of property tax, water charges etc. and hypothecation of movables are put in place. In the case of commercial complexes, a default option of conversion of up to 40% of loans outstanding into office space is stipulated.

Source : Jha (2004)

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ANNEX IV: INFRASTRUCTURE INVESTMENT IN LATIN AMERICA, 1980-2001 (% OF GDP)

		Telecommunications			Power			Land Transportation 1/			Total Infrastructure 2/		
Country	**Period**	**Total**	**Public**	**Private**	**Total**	**Public**	**Private**	**Total**	**Public**	**Private**	**Total**	**Public**	**Private**
Argentina	1980-85	0.33%	0.33%	0.00%	1.57%	1.57%	0.00%	0.84%	0.84%	0.00%	2.96%	2.96%	0.00%
	1996-01	0.53%	0.00%	0.53%	0.40%	0.03%	0.36%	0.32%	0.15%	0.17%	1.45%	0.22%	1.24%
	Change	0.20%	-0.33%	0.53%	-1.18%	-1.54%	0.36%	-0.51%	-0.69%	0.17%	-1.51%	-2.74%	1.24%
Brazil	1980-85	0.69%	0.32%	0.37%	3.32%	2.53%	0.79%	0.84%	0.47%	0.37%	5.17%	3.64%	1.53%
	1996-01	1.16%	0.30%	0.86%	0.76%	0.37%	0.39%	0.14%	0.04%	0.10%	2.39%	1.02%	1.37%
	Change	0.47%	-0.01%	0.49%	-2.56%	-2.16%	-0.40%	-0.70%	-0.43%	-0.27%	-2.78%	-2.62%	-0.16%
Chile	1980-85	0.41%	0.41%	0.00%	1.59%	1.59%	0.00%	1.01%	1.01%	0.00%	3.24%	3.24%	0.00%
	1996-01	1.42%	0.00%	1.42%	1.78%	0.34%	1.44%	1.96%	1.00%	0.96%	5.58%	1.72%	3.86%
	Change	1.01%	-0.41%	1.42%	0.20%	-1.24%	1.44%	0.95%	-0.01%	0.96%	2.34%	-1.52%	3.86%
Colombia	1980-85	0.36%	0.36%	0.00%	2.32%	2.32%	0.00%	0.99%	0.99%	0.00%	3.85%	3.85%	0.00%
	1996-01	1.25%	0.58%	0.67%	3.32%	1.91%	1.41%	0.89%	0.69%	0.21%	5.76%	3.48%	2.28%
	Change	0.89%	0.22%	0.67%	1.00%	-0.41%	1.41%	-0.09%	-0.30%	0.21%	1.91%	-0.37%	2.28%
Mexico	1980-85	0.24%	0.24%	0.00%	0.49%	0.49%	0.00%	1.54%	1.54%	0.00%	2.45%	2.45%	0.00%
	1996-01	0.73%	0.03%	0.70%	0.11%	0.11%	0.00%	0.34%	0.08%	0.27%	1.24%	0.27%	0.98%
	Change	0.49%	-0.21%	0.70%	-0.38%	-0.38%	0.00%	-1.19%	-1.46%	0.27%	-1.21%	-2.18%	0.98%
Peru	1980-85	0.31%	0.31%	0.00%	1.29%	1.28%	0.01%	0.33%	0.30%	0.03%	1.98%	1.94%	0.04%
	1996-01	1.07%	0.24%	0.83%	0.94%	0.32%	0.63%	0.25%	0.12%	0.13%	2.28%	0.68%	1.60%
	Change	0.76%	-0.07%	0.83%	-0.35%	-0.96%	0.61%	-0.08%	-0.19%	0.11%	0.30%	-1.26%	1.56%
Bolivia	1980-85	0.89%	0.70%	0.19%	1.90%	1.75%	0.14%	2.81%	2.40%	0.41%	5.79%	5.04%	0.76%
	1996-01	1.74%	0.00%	1.74%	1.75%	0.22%	1.53%	2.78%	2.61%	0.17%	7.28%	2.93%	4.35%
	Change	0.85%	-0.70%	1.55%	-0.15%	-1.53%	1.39%	-0.03%	0.21%	-0.24%	1.49%	-2.11%	3.60%
Weighted Avg.	**1980-85**	**0.45%**	**0.30%**	**0.15%**	**1.95%**	**1.64%**	**0.31%**	**1.06%**	**0.91%**	**0.15%**	**3.71%**	**3.10%**	**0.61%**
(by GDP)	**1996-01**	**0.94%**	**0.17%**	**0.77%**	**0.71%**	**0.31%**	**0.37%**	**0.36%**	**0.16%**	**0.20%**	**2.24%**	**0.83%**	**1.41%**
	Change	**0.50%**	**-0.13%**	**0.62%**	**-1.25%**	**-1.33%**	**0.06%**	**-0.69%**	**-0.74%**	**0.05%**	**-1.46%**	**-2.27%**	**0.80%**

1/ Land Transportation includes investment in roads and railways.

2/ Total investment in infrastructure includes telecommunications, power, roads, railways, and water. In Argentina, it includes also the gas sector.

Source: Calderón and Servén (2004a)

ANNEX V STATISTICAL ANNEX: INFRASTRUCTURE INDICATORS

This statistical annex provides an overview of the state of economic infrastructure in the seven countries of Latin America and the Caribe. It contains information for selected years on stock, access, affordability, efficiency, the state of reform, and financial performance of the energy, water supply and sanitation (WSS), telecom, and transport sectors. The annex comprises 4 tables and 302 infrastructure indicators.

This statistical Annex was commissioned from Ernst & Young Italy and Cohen & Co as part of the background work for this report. The data was compiled from a variety of sources, usually country specific. It is fully documented in the original work of Ernst &Young and Cohen & Co which is available upon request from MFay@worldbank.org.

Table 1: Transport

	Units	Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
ACCESS															
Vehicle ownership															
Motorized vehicles	% households	71.1%	67.8% (a)					11.5% (c)	n.a.					n.a.	10.1% (b)
Rural	% households							7.3% (c)	n.a.					n.a.	1.6% (b)
Non-motorized vehicles	% households	41.1%	n.a.					32.2% (c)	n.a.					n.a.	21.2% (b)
Rural	% households							30.0% (c)	n.a.					n.a.	16.4% (b)
Vehicle ownership		181.10	187.76 (b)	184.82	174.35	137.94	171.71	71.55	n.a.			145.77	192.26	49.11	56.14
Road density in terms of															
Population	Road km/1000 people	5.96	6.14 (a)	10.07	10.01 (a)	10.20	8.96	1.28	1.17	7.36	7.21 (a)	3.35	3.51 (a)	3.10	2.97 (a)
Land	Road km/1000 sq km	78.72	84.12 (a)	197.49	n.a.	729.98	691.39	127.79	129.52	1,727.00	1,727.00 (a)	167.10	182.59 (a)	61.03	61.12 (a)
Rail density in terms of															
Population	Rail km/1000 people	0.99	0.95	0.18	0.17	0.16	n.a.	0.13	0.12 (b)	0.03	0.03 (a)	0.28	0.25	0.08	0.08
Electric lines		0.0046 (c)	n.a.	0.01 (c)	n.a.							0.003 (c)	n.a.		
Land	Rail km/100 sq Km	1.31	1.31	0.36	0.36	1.14	n.a.	1.28	1.28 (b)	0.60	0.60 (a)	1.39	1.40	0.16	0.17
Electric lines		.0070 (c)	n.a.												
AFFORDABILITY															
Average pump price for super	US$/liter	0.94	0.48	0.80	0.55	0.41	0.64	0.41	0.48	0.37	0.52	0.36	0.62	0.55	0.74
Average pump price for diesel	US$/liter	0.33	0.34	0.34	0.31	0.28	0.44	0.32	0.32	0.33	0.44	0.28	0.47	0.33	0.48
Spending on transport	%hh expenditure	3.97%	5.16%	n.a.	15.10%										
Average Rail Tariff															
Freight	US$/tn-km	.02 (c)	.02 (a)											0.02	0.02(a)
Passenger	US$/Passenger-km													0.06	0.13(a)
Inter-city	US$/Passenger-km	n.a.	0,142 - 0,157[1]	0.03	0.02										
Intra-city	US$/Passenger-km	n.a.	0.013	0.02	0.013										
Ports handling costs	US$	n.a.	3,30 - 1,80												
Ports handling costs	Freight t/km (US$)			n.a.	24.75										
QUALITY															
Travel time to work in main cities	Min/one-way work trip	42	n.a.					n.a.	n.a.						
Paved roads	% of total roads	29.50%	27.6% (a)	9.60%	11.37%	21.00%	22.01% (a)	31.00%	38.90%	70.10%	70.10% (a)	32.53%	33.55%	12.97%	13.36% (a)
National	% of total paved roads	n.a.	44.7% (b)												
Secondary/regional	% of total paved roads	n.a.	55.3% (b)											1.42%	1.41% (a)
Roads in good/fair condition	km								45.00%	n.a.	13.00% (b)			n.a.	43,876
National roads in good condition	% of national roads	53.00%	59.00% (b)	n.a.	69.00%					n.a.	48.00% (b)	n.a.	70.00%		
Annual fatalities in car accidents	Fatalities/10,000 vehicl.	0.56 (c)	0.47	6.50	6.20	5.45	3.87			360.00	278.00	3.63	2.48	2.69	1.95
Railway traffic density	Traffic units/railway km	317.7 (c)	n.a.	0.43	0.44 (a)							n.a.	2928.12	1.34(c)	0.44(a)
Commercial perception	Index based on quality perception														
Services delivered by road dept		59.4% (c)	n.a.	34.3% (c)	n.a.	23.4% (c)	n.a.	n.a.	n.a.			n.a.	n.a.	80.0% (c)	n.a.
Railroad services				64.3% (c)	n.a.										
Services delivered by road dept		n.a.	5.0 (a)	n.a.	4.4 (a)	n.a.	3.7 (a)	n.a.	3.9 (a)	n.a.	4.1 (a)	n.a.	5.0 (a)	n.a.	4.3 (a)
Port facilities		n.a.	4.3 (a)	n.a.	3.2 (a)	n.a.	2.8 (a)	n.a.	2.8 (a)	n.a.	5.1 (a)	n.a.	3.3 (a)	n.a.	2.8 (a)
Railroad services		n.a.	3.5 (a)	n.a.	2.5 (a)	n.a.	1.4 (a)	n.a.	1.4 (a)	n.a.	1.4 (a)	n.a.	2.7 (a)	n.a.	1.9 (a)
Air transport services		n.a.	4.6 (a)	n.a.	5.4 (a)	n.a.	4.5 (a)	n.a.	3.9 (a)	n.a.	5.8 (a)	n.a.	4.8 (a)	n.a.	3.6 (a)

Table 1: Transport (continued)

	Units	Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
Railway employee productivity	Annual output/employee	n.a.	1,209 (b)	n.a.	3,970 (b)							3,925	n.a.	363 (c)	n.a.
Road length	Thousands of kms	215.4	230.2 (a)	1,670.1	1,744.4	37.3	35,9 (a)	13.9	14,1 (a)			319.0	348,5 (a)	78.1	79.3
Motorways	Thousands of kms	0.7	n.a.			n.a.	n.a.	0.10	n.a.			6.3	n.a.	0.0	n.a.
Highways	Thousands of kms	38.4	38.6	n.a.	165.0 (a)	7.4	7,4 (a)	0.0	0.0			41.7	n.a.	17.0	17.2
Secondary/regional	Thousands of kms	176.3	192,6 (b)	n.a.	1,580.2	29.8	28.0	4.2	n.a.			61.4	n.a.	14.3	14.1
Other roads	Thousands of kms							9,486.0	n.a.			209.6	n.a.	46.9	47.0
Information on seaport traffic	Thous. of freight tons		75,080	443,005	502,829	n.a.	9,574	12,033	14,640	n.a.	16,963	237,380	254,613	14,689 (c)	16,061
Urban transport modes – modal structure	%work trips per mode														
(a) private car	%work trips per mode	33.50%	n.a.					n.a.	6.63% (b)						
(b) train/tram	%work trips per mode	16.40%	n.a.												
(c) bus or minibus	%work trips per mode	42.20%	n.a.					n.a.	8.11% (b)						
(d) motorcycle	%work trips per mode							n.a.	0.77% (b)						
(e) bicycle, foot and other modes	%work trips per mode							n.a.	84.49% (b)						
FISCAL COSTS															
Annual central gov. spending on transportation	Millions US$	1,244.4	160.3												
Annual central government spending on roads	Millions US$	613.9	528.4 (b)	1,460.3	467.8			65.6	n.a.					362.4	n.a.
New construction	Millions US$	206.9	115.9 (b)	n.a.	n.a										
Maintenance/rehabilitation	Millions US$	217.4	110.6 (b)	n.a.	n.a			59.8	n.a.	n.a.	134.1			70.9	30.0
Others	Millions US$	54.1	131.4 (b)	0	0										
Administration	Millions US$	135.5	170.5 (b)	n.a.	n.a										
Annual local government spending on Transportation	Millions US$	1,484.2	1,217.7 (a)	3,100.3	1,742.2										
Annual local government investment on roads	Millions US$	404.5	423.1 (a)												
Road Fund	Millions US$	316.6	261.0 (a)												
Provincial spending	Millions US$	87.9	162.1 (a)												
Road Recurrent and Capital Expenditure	Milions of US$									1,906 (c)	1,434				
FINANCIAL AUTONOMY															
Annual expenditure by private sector in owning/operating vehicles	US$	765.56		n.a.	522										

Table 1: Transport (continued)

	Units	Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
INSTITUTIONAL DEVELOPMENT															
National roads boards exists and reports annually	Y/N	n.a.	Y		Exist	Y	Y	Y (exists) N (reports)	Y (exists) N (reports)		Y	Y	Y	Existence: Y Rep.: poor	Existence: Y Rep.: poor
National road safety action plan	Y/N	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y		Y
Social assessment of road projects mainstreamed	Y/N				Y	Y	Y							Y	Y
Environmental assessment of road projects mainstreamed	Y/N	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ECONOMIC REGULATION															
Transport formal economic regulatory framework															
For road	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
For airport	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
For ports	Y/N	Y	Y	Y	Y	Y	Y				Y	Y	Y		Y
For railway	Y/N	Y (Pass.) / N (Loads)	Y (Pass.) / N (Loads)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Transport regulatory agency with some degree of independence															
For road	Y/N	N	N		Some	Some	Some	N	N	N	N	N	N		Some
For airport	Y/N	N	N	N	N	Some	Some	N	N	N	N	N	N	N	N
For ports	Y/N	N	N		Some	Some	Some	N	N	N	N	N	N	N	N
For railway	Y/N	N	N		Some	Some	Some	N	N	N	N 2)	N	N		Some
Geographical scope of regulation															
For road	National/Subnational	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N	N	N/S	N/S	N/S	N/S
For airport	National/Subnational	N	N	N	N	N	N	N	N	N	N	N	N		N
For ports	National/Subnational	N/S	N/S	N/S	N/S	N	N				N	N	N		N
For railway	National/Subnational	N/S	N/S	N/S	N/S	N	N	N	N	N	N	N	N		N
ENVIRONMENTAL REGULATION															
Specific environmental regulation for transportation projects	Y/N	Y	Y	Y	Y	N	N	N	N		Y			Y	Y
Environmental assessment of transportation projects mainstreamed	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Engineering design specifications related to environmental factors	Y/N				Y				Y						
Regulations requiring population resettlement in transport projects	Y/N				Y										
Relevant internat. environmental agreements affecting transportation projects	Y/N	n.a.	N	Y	Y										

Note: (a) data from 2001; (b) data from 2000; (c) data from 1999.

Table 2: Water and Sanitation

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
ACCESS															
Access to improved water sources	% population	n.a.	78.6% (b)	n.a.	89.0% (b)	n.a.	95.0% (b)	n.a.	80.3% (b)	n.a.	80.5% (b)	n.a.	86.5% (b)	n.a.	80.0% (b)
Rural	% population	n.a.	29.8% (b)	n.a.	65.0% (b)	n.a.	91.5% (b)	n.a.	70.3% (b)	n.a.	59.4% (b)	n.a.	64.6% (b)	31.7%	42.4% (a)
Urban	% population	n.a.	84.7% (b)	n.a.	95.7% (b)	n.a.	99.6% (b)	n.a.	98.8% (b)	n.a.	97.7% (b)	n.a.	94.5% (b)	80.9%	82.9%
Urban access to improved sanitation	% population	n.a.	88.5% (b)	n.a.	93.6% (b)	n.a.	88.8% (b)	n.a.	94.7% (b)	n.a.	90.0% (b)	n.a.	87.0% (b)	n.a.	79.0% (b)
Sewerage	% population	n.a.	n.a.	n.a.	n.a.	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	71.5%	74.3%
On-site Sanitation	% population	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	15.5%	19.2%
Rural access to improved sanitation	% population	n.a.	47.7% (b)	n.a.	53.0% (b)	n.a.	97.1% (b)	n.a.	71.3% (b)	n.,a.	91.0% (b)	n.a.	32.1% (b)	n.a.	49.0% (b)
Sewerage	% population	n.a.	n.a.	n.a.	n.a.	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.7%	5.5%
On-site Sanitation	% population	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	40.0%	50.2%
AFFORDABILITY															
Spending on water services	% of HH expenditure	n.a.	1.9%	n.a.	0.78%				0.33% (b)						
Rural	% of HH expenditure			n.a.	0.23%				0.18% (b)						
Urban	% of HH expenditure			n.a.	0.82%				0.52% (b)						
Spending on water and sewerage services	% of HH expenditure	n.a.	2.60%			n.a	0.42 (b)								
Water average tariff	US$/m3-year	n.a.	0.14	0.55 (c)	0.42	n.a.	0.05 (b)	n.a.	0.39(b)	n.a.	1.07 (b)	n.a.	0.25	0.45	0.38
Sanitation average tariff	US$/m3-year					n.a.	245 (b)			n.a.	1.07 (b)				
Average water bill	US$/month	21.86	8.62			n.a.	0.06 (b)								
Average water connection charge	US$	n.a.	116	n.a.	n.a.	n.a.	220 (b)	n.a.	0.14(b)			n.a.	0.33 (b)		
Average sanitation connection charge	US$	n.a.	103			n.a.	245 (b)								

Table 2: Water and Sanitation (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
QUALITY															
Water supply time	hours/day	n.a.	24.0 (b)	n.a.	24.0 (b)	n.a.	24.0 (b)	n.a.	16.7 (b)	n.a.	16.0 (b)				13.7 (b)
Rural	hours/day	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	18.5 (b)			n.a.	9.9 (b)		
Urban	hours/day	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	15.2 (b)			n.a.	20.0 (b)	12.9	17.5
Source of drinking water in rural areas															
Piped water	% of rural households			19.0% (c)	n.a.	n.a.	94.5% (b)	61.0% (c)	58.5% (b)	61.3%	62.3% (b)			31.70%	39.70%
Well water	% of rural households			32.4% (c)	n.a.	n.a.	n.a.	20.1% (c)	22.9% (b)	0.30%	0.50% (b)			13.50%	11.40%
Surface water	% of rural households			n.a.	n.a.	n.a.	n.a.	9.1% (c)	12.6% (b)	9.6%	6.3% (b)			51.90%	45.10%
Rainwater	% of rural households			n.a.	n.a.	n.a.	n.a.	0.02% (c)	0.99% (b)	25.7%	23.6% (b)			n.a.	n.a.
Tanker truck	% of rural households			n.a.	n.a.	n.a.	n.a.	0.01% (c)	0.39% (b)	n.a.	n.a.			0.40%	0.70%
Bottled water	% of rural households			n.a.	n.a.	n.a.	n.a.	7.0% (c)	n.a.	n.a.	n.a.			n.a.	n.a.
Others (Rainwater, Bottled water, others)	% of rural households													2.50%	3.10%
Source of drinking water in urban areas															
Piped water	% of urban households			n.a.	n.a.	n.a.	99.4% (b)	63.1% (c)	91.2% (b)	92.4%	92.7% (b)			85.60%	83.70%
Well water	% of urban households			n.a.	n.a.	n.a.	n.a.	7.1% (c)	3.3% (b)	0.10%	0.00% (b)			2.30%	3.80%
Surface water	% of urban households			n.a.	n.a.	n.a.	n.a.	2.01% (c)	0.43% (b)	0.10%	0.87% (b)			2.40%	2.00%
Rainwater	% of urban households			n.a.	n.a.	n.a.	n.a.	0.00% (c)	0.02% (b)	5.10%	2.33% (b)			n.a.	n.a.
Tanker truck	% of urban households			n.a.	n.a.	n.a.	n.a.	0.02% (c)	0.52% (b)	n.a.	n.a.			4.70%	6.40%
Bottled water	% of urban households			n.a.	n.a.	n.a.	n.a.	25.0% (c)	n.a.	n.a.	n.a.			n.a.	n.a.
Others (Rainwater, Bottled water, others)	% of urban households													5.00%	4.10%
Source of drinking water															
Piped water	% of households	n.a.	80.1% (a)												
Well water	% of households	n.a.	17.1% (a)												
Surface water	% of households	n.a.	0.8% (a)												
Rainwater	% of households	n.a.	1.1% (a)												
Tanker truck	% of households	n.a.	0.9% (a)												
Time to water source from hh's with in dwelling hand-washing material															
Less than 2 minutes	% of households							43.6% (c)	n.a.					n.a.	17.2% (b)
2-5 minutes	% of households							4.3% (c)	n.a.					n.a.	6.0% (b)
5-9 minutes	% of households							13.3% (c)	n.a.					n.a.	25.6% (b)
10 or more minutes	% of households							38.7% (c)	n.a.					n.a.	51.2% (b)
Disinfected water/produced water	percentage											82.0%	96.0% (a)	14.20%	20.00%
% urban population with disinfected water	% urban population	n.a.	90.0% (b)	n.a.	92.0% (b)	n.a.	50.0% (b)	n.a.	45.0% (b)			n.a.	91.0% (b)		
% urban systems with disinfection	% urban systems	n.a.	98.0% (b)	n.a.	n.a.	n.a.	100.0% (b)	n.a.	25.0% (b)	n.a.	90.0% (b)				
% urban treated residual water before discharge	percentage	n.a.	10.0% (b)	n.a.	20.0% (b)	n.a.	3.0% (b)	n.a.	9.0% (b)			n.a.	13.0% (b)		
% collected volume which is treated	percentage	n.a.	10.0% (b)	n.a.	10.0% (b)	n.a.	4.0% (b)	n.a.	1.0% (b)			n.a.	15.0% (b)		
Public distribution of water - total												n.a.	85.3% (b)		
TECHNICAL DIMENSIONS															
Unaccounted-for water	percentage	32.6% (c)	n.a.	32.6% (c)	30.7%	n.a.	48.0% (b)		43.0% (b)	65.0%	67.0%			45.00%	45.10%
Water supplies that are functioning in rural areas	% of total supplies	n.a.	100.0% (b)	n.a.	n.a.	n.a.	56.0% (b)	n.a.	96.0% (b)	n.a.	40.0% (b)				
Water utility labor productivity	employees / 1000 connections	n.a.	1.95	3.00	3.46	n.a.	5.07							1.78	1.53

Table 2: Water and Sanitation (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
FISCAL COSTS															
Total national spending on water & sanitation	US$ million	95.52	7.34												
Total subnational spending on water & sanitation	US$ million	362.08	82.62												
Operating subsidies	US$ million			398.54	1,196.72										
Rural	US$ million			n.a.	n.a.										
Urban	US$ million			n.a.	n.a.										
Last ten years mean investment in water & sanitation (1990-2000)	US$						20.0 (b)								
Urban	US$						10.8 (b)								
Rural	US$						9.2 (b)								
Capital investment	US$ million	n.a	300,000 (b)	2,808.24	946.51	n.a.	161.8 (b)		73.0 (b)		14.0 (b)	n.a.	268.3 (b)		
Rural	US$ million	n.a	20,000 (b)	n.a.	n.a.	n.a.	75.0 (b)		58.3 (b)		1.0 (b)	n.a.	60.1 (b)		
Urban	US$ million	n.a	280,000 (b)	n.a.	n.a.	n.a.	86.8 (b)		14.7 (b)		13.0 (b)	n.a.	208.2 (b)		
Water supplies recurrent and capital expenditure	US$ million									402 (c)	298				
Total public spending on water & sanitation of the central administration	US$ million							29.50				n.a.	39.51		
FINANCIAL AUTONOMY															
Water utilities working ratio	operating costs/op. revenues	0.84	0.90	0.67	0.49									0.70	0.67
INSTITUTIONAL DEVELOPMENT															
Existence of policy requiring tariff to cover O&M costs	Y/N	Y	Y	N	N	Y	Y	Y	Y		Y	Y	Y		Y
ECONOMIC REGULATION															
Formal economic regulatory framework															
- For tariff	Y/N	Y	Y	Decentralz	Decentralz	Y	Y	Y	Y			Y	Y	Y	Y
- Coverage	Y/N	Y	Y	Decentralz	Decentralz	Y	Y	Y	Y						
- Service Quality	Y/N	Y	Y	Decentralz	Decentralz	Y	Y	Y	Y			Y	Y (DF)	Y	Y
- Sanitary Quality	Y/N	Y	Y		Decentralz		Y		Y	Y			Y (DF)		
Regulatory agency with some degree of independence	Y/N	N	N	N	Some	Some	Some	N	N	N	N	N	N	Some	Some
Geographical scope of regulation	National/subnational	N	N	N	S	N	N	N	N	N	N	N/S	N/S	N	N
ENVIRONMENTAL REGULATION															
Environmental assessment of water and sanitation projects mainstreamed	Y/N	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Standards and regulations of environmental quality															
- water quality standards	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
- contamination of water resources	Y/N	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y
- disposal of hazardous or toxic wastes	Y/N	Y	Y	Y	Y						Y	Y	Y		Y
- disposal of liquid wastes	Y/N	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y		
- disposal of solid wastes	Y/N	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y		Y

Note: (a) data from 2001; (b) data from 2000; (c) data from 1999.

Table 3: Energy

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
ACCESS															
Access to electricity network	% of population	n.a.	94.6% (b)	n.a.	95.4%	94.4%	97.0%	56.8%	79.6%	n.a.	92% (b)	n.a.	95% (b)	70.0%	75.3%
Households reporting access to electricity	% households	99.5% (c)	n.a.	99.5% (c)	96.3%	n.a.	98.4%	65.0%	73.1% (b)	80.8%	87.0%	n.a.	97.2% (b)	67.0%	71.9%
Rural	% households	n.a.	n.a.	71.3%	79.5%	n.a.	99.8%	46.0%	56.2% (b)	n.a.	79.5% (b)	n.a.	n.a.	30.7% (c)	30.8%
Urban	% households	100%	99.57%	99.1%	99.4%	n.a.	96.3%	89.0%	95.3% (b)	n.a.	92.0% (b)	,	n.a.	92.2% (c)	93.7%
Households using as main cooking fuel:															
Modern fuels	% total hh	n.a.	95.0% (a)	90.7% (c)	n.a.	n.a.	89.5%	26.6% (c)	n.a.			n.a.	81.0% (b)	n.a.	57.2% (b)
Urban	% total hh			97.3% (c)	n.a.	n.a.	96.6%	57.7% (c)	n.a.			n.a.	n.a.	n.a.	85.2% (b)
Rural	% total hh			61.7% (c)	n.a.	n.a.	78.7%	11.6% (c)	n.a.			n.a.	n.a.	n.a.	10.0% (b)
Solid fuels	% total hh	n.a.	5.0% (a)	8.1% (c)	n.a.	n.a.	9.3%	72.1% (c)	73.0% (b)	n.a.	47.0% (b)	n.a.	18.3% (b)	n.a.	37.2% (b)
Urban	% total hh			1.9% (c)	n.a.	n.a.	2.5%	40.5% (c)	n.a.			n.a.	n.a.	n.a.	9.2% (b)
Rural	% total hh			35.6% (c)	n.a.	n.a.	19.6%	87.4% (c)	n.a.			n.a.	n.a.	n.a.	86.1% (b)
AFFORDABILITY															
Average electricity end-user prices															
Residential	US$/MWh	103.00	32.00	103.00	64.00	54.40	63.60	67.50	79.60	130.50	161.20	47.60	80.30	108.00	97.00
Commercial	US$/MWh	120.00	35.00	92.00	59.00	80.00	71.70	91.30	75.00	101.80	108.60	43.30	62.90	95.00	73.00
Industrial	US$/MWh	68.00	22.00	54.00	33.00									78.00	50.00
Spending on electricity	% of hh expenditure	n.a.	4.60%	2.60%	2.21%									n.a.	6.3%
Spending on alternative sources of energy	% of hh expenditure	n.a.	2.43%	3.09%	7.18%										
Electric power consumption	kwh per capita	1,941.22	2,106.87 (a)												
Expenditure in electricity per capita	US$	n.a.	779.54 (a)												
Percentage of GDP per capita spent on electricity	Percentage	n.a.	2.44% (a)									n.a.	1.40% (a)		
QUALITY															
Electricity supply time	hours/day			23.93	23.95	23.92	23.95	n.a.	23.43 (b)						
Frequency of interruptions	number per consumer-year	5.60 (c)	2.94	20.00	15.00										
Duration of interruptions	hours per consumer-year	8.7 (c)	5.15									160.00	124.42		

Table 3: Energy (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
TECHNICAL DIMENSIONS															
Energy production	MWh													20.33	21.72 (a)
Electricity production	MWh	75.06	84.07	321.75	344.60	5.79	7.46	4.46	5.86 (a)	6.48	6.66 (a)	170.98	200.36	18.58	21.98
Total net electricity generation	Billion KWh	71.88	80.89	317.08	339.05	5.23	6.61	4.28	6.61	6.10	6.29	172.28	203.65	18.15	21.74
Net production by fuel type															
Hydropower	% of total production	43.4%	50.8%	90.6%	81.7% (a)	80.8%	81.5% (a)	36.2%	32.9% (a)	1.8%	1.74% (a)	13.6%	13.6% (a)	74.3%	84.7% (a)
Coal	% of total production	1.2%	0.2%	2.2%	3.1% (a)	n.a.	n.a.	0.7% (c)	8.5% (a)	n.a.	n.a.	9.8%	11.1% (a)	n.a.	0.94% (a)
Oil	% of total production	4.1%	0.3%	3.9%	4.0% (a)	7.0%	1.4% (a)	48.7%	44.1% (a)	96.7%	96.7% (a)	51.4%	44.2% (a)	21.0%	9.7% (a)
Gas	% of total production	41.7%	42.0%	n.a.	2.6% (a)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	16.9%	24.0% (a)	4.0%	3.8% (a)
Nuclear	% of total production	9.6%	6.7%	1.0%	4.4% (a)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.1%	4.2% (a)	n.a.	n.a.
Net electricity generation by type															
Hydroelectric	% of total generation	37.0%	43.7%	91.0%	83.2%	82.4%	84.4%	37.4%	31.5%	1.9%	1.8%	14.2%	12.1%	75.3%	82.1%
Conventional thermal	% of total generation	52.8%	48.7%	4.9%	8.4%	6.8%	1.0%	47.7%	56.4%	96.6%	96.6%	77.4%	80.6%	24.1%	17.1%
Nuclear	% of total generation	10.0%	6.6%	1.0%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.1%	4.5%	0.0%	0.0%
Geothermal, solar, wind and wood and waste	% of total generation	0.2%	1.0%	3.1%	4.3%	10.8%	14.6%	14.9%	12.1%	1.6%	1.6%	3.3%	2.8%	0.7%	0.8%
Main energy source for households															
Piped gas	% of households	60.9%	66.5%	n.a.	n.a.										
Gas in containers	% of households	12.0%	7.9%	n.a.	n.a.										
Coal	% of households	4.3%	3.3%	n.a.	n.a.										
Electricity	% of households	19.8%	21.1%	94.2% (c)	n.a.										
Oil/kerosene	% of households			5.5% (c)	n.a.										
Other/Not stated	% of households			0.34% (c)	n.a.										
Natural gas	% of households			0.4%	0.7%										
Firewood	% of households			31.4%	37.1%			53.4% (c)	n.a.						
Liquefied petroleum gas	% of households			31.3%	29.5%										
Kerosene	% of households			0.1%	0.3%			0.3% (c)	n.a.						
Gasworks gas	% of households			0.4%	0.1%			15.6% (c)	n.a.						
Electricity	% of households			34.5%	30.2%			29.0% (c)	n.a.						
Charcoal	% of households			1.9%	2.1%			1.9% (c)	n.a.						
Energy consumption per unit of GDP	Kg of oil equivalent/1000 PPP GDP	137.72	139.74 (b)	160.13	148.48 (c)	87.37	85.49 (c)	142.78	141.73 (b)	426.48	424.9 (b)	204.99	182.94 (c)	110.21	105.71 (b)
Electricity transmission and distribution losses	% of total output	15.1%	13.6% (a)	16.8%	17.24% (a)	7.9%	7.2% (a)	20.5%	23.0% (a)	9.9%	8.5% (a)	14.6%	14.4% (a)	12.9%	10.8% (a)
FISCAL COSTS															
Public expenditure on energy, fuel and mines	US$ millions	335.67	119.11											103.07	84.46
Total federal budget spending on energy	US$ millions			865.85	2,673.44	835.54	1,508.81	29.48	2.22						
Total federal budget spending on energy/GDP	Percentage			0.1%	0.6%	5.9%	9.0%	0.2%	0.0%						
Private investment in energy	US$ millions	3,299.80	299.80	10,319.60	2,611.70	58.50	n.a.	540.40	60.00			1,201.50	1,184.00	358.72	132.34
Private investment in energy/GDP	Percentage	1.10%	0.29%	1.3%	0.6%	0.4%	n.a.	2.8%	0.3%			0.3%	0.2%	0.7%	0.2%
FINANCIAL AUTONOMY															
Return on equity	Percentage	11.1%	-35.7%	7.7%	-21.9%	10.50	15.11 (a)					2.6%	-1.5%	3.0%	5.4%

Table 3: Energy (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
INSTITUTIONAL DEVELOPMENT															
Oil industry															
Supply corporatized	Y/N	Y	Y	Y	Y	N	N	Y	Y	N	0 (official), see Local PSTN	N	N	Y	Y
Board of directors autonomous from executive branch	Y/N	n.a.	n.a.	N	N	N	N			N	N	N	N	N	N
Legislation requiring transparent and arm's length	Y/N	Dereg./ Commodity 1)	Dereg./Commodity	Commodity	Commodity	N	N	Transparency	Transparency			N	N	Dereg./ Commodity	Dereg./ Commodity 2)
Is this legislation properly implemented?	Y/N											N	N		
Seasonality of supply quality	Y/N	N	N	N	N	n.a.	n.a.			n.a.	n.a.			N	N
Seasonality of demand	Y/N	N	N	N	N	N	N							N	N
Gas industry															
Supply corporatized	Y/N	Y	Y	Y	Y	n.a.	n.a. 1)	Y	Y	n.a.	n.a.	N	N	Y	Y
Board of directors autonomous from executive branch	Y/N	n.a.	n.a.	N	N	n.a.	n.a. 1)			n.a.	n.a.	N	N	N	N
Legislation requiring transparent and arm's length	Y/N	N	N					Transparency	Transparency	n.a.	n.a.		Y	N	Y
Is this legislation properly implemented?	Y/N									n.a.	n.a.				
Seasonality of supply quality	Y/N	N	N	N	N	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.			N	N
Seasonality of demand	Y/N	Y	Y	Y	Y	n.a.	only LPG	n.a.	n.a.	n.a.	n.a.	Y	Y	Y	Y
Power industry															
Supply corporatized	Y/N	Y	Y	Y	Y	10%	15%	Y	Y	N	Y	N	N	Y	Y
Board of directors autonomous from executive branch	Y/N	n.a.	n.a.	N	N	N	N	N	N (35% EGEE)		n.a.	N	N	N	N
Legislation requiring transparent and arm's length	Y/N	N	N	N	N	N	N	N	N					N	Y
Is this legislation properly implemented?	Y/N														
Seasonality of supply quality	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	N	N			Y	Y
Seasonality of demand	Y/N	Y	Y	Y	Y	N	N	Y	Y			Y	Y	Y	Y
Market structure															
Independent system operator	Y/N	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y
Single buyer	Y/N	N	N	N	N	Y	Y	N	N	Y	Y	Y	Y	N	N
Bilateral contracting	Y/N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Power pool	Y/N	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y
Industry structure															
Vertical unbunding	Y/N	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y
Horizontal unbundling in generation	Y/N	Y	Y	Y	Y	Little (see Supply	Little (see Supply	Y	Y	Y	Y	N	N/10%	Y	Y
Horizontal unbundling in distribution	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N/Minor	Y	Y

Table 3: Energy (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
ECONOMIC REGULATION															
Formal economic regulatory framework															
- For power	Y/N	Y	Y	Y	Y	Y	Y	Y	Y		Licence	Y	Y	Y	Y
- For gas	Y/N	Y	Y	Y	Y	Y	y	Y	Y	n.a.	n.a.	Y	Y		Y
- For oil	Y/N	Up-Down: N / Tpt: Y	Up-Down: N / Tpt: Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Up-Down: N / Tpt: Y
Regulatory agency with some degree of independence															
- For power	Y/N	Y	N	N	N 3)	Some	Some	Some	Some	N	N	N	N		Some
- For gas	Y/N	Y	N	N	N 3)	Some	Some	N	N	n.a.	n.a.	N	N		Some
- For oil	Y/N	n.a.	N	N	N 3)	Some	Some	N	N	N	N	N	N		Some
Geographical scope of regulation															
- power and gas distribution	National/subnational	Gas: N, Power: N/S	Gas: N, Power: N/S	N/S	N/S	N	N	N	N	N	N	N	N	N	N
- power and gas transportation	National/subnational	N	N	N	N	N	N	N (applicable to power)	N (applicable to power)	N	N	N	N	N	N
- power and gas production	National/subnational	N	N	N	N	N	N	N	N	N	N	N	N	N	N
- For oil	National/subnational	N	N	N	N	N	N	N	N	N	N	N	N	N	N
ENVIRONMENTAL REGULATION															
Environmental regulation for hydroelectric power generation	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Environmental regulation for fuel power generation	Y/N	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y
- SO2 Control	Y/N	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y
- NOx Control	Y/N	Y	Y									Y	Y		
- other	Y/N	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y
Environmental regulation for power transmission	Y/N	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Environmental regulation for gas pipeline	Y/N	Y	Y	Y	Y	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Y	Y		Y
Environmental assessment of energy projects mainstreamed	Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y
Worker health and safety laws and regulations in gas manipulation	Y/N	Y	Y	Y	Y	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		Y (internal)	Y	Y

Note: (a) data from 2001; (b) data from 2000; (c) data from 1999.

Table 4: Telecommunications

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
ACCESS															
Telephone subscribers per 100 inhabitants		28.06	39.64	16.49	42.38	22.16	36.15	5.82	20.20	21.36	70.22	13.85	40.12	9.27	14.82
Main telephone lines per 100 inhabitants		20.86	21.88	12.05	22.32	19.33	25.05	4.79	7.05	18.26	16.97	10.36	14.67	6.27	6.69 (b)
Cellular subscribers per 100 inhabitants		7.21	17.76	4.44	20.06	2.83	11.10	1.03	13.15	3.10	53.30	3.50	25.45	2.99	8.62
Mainlines per 100 inhab. outside largest city		18.40 (c)	n.a.	14.70 (c)	n.a.					14.70 (c)	0.00			4.38 (c)	n.a.
International voice traffic	Million minutes	793.84	754.28	1339.96	2,072.2 (a)	196.00	296.87	294.3 (c)	963.60	409.90	2,072.2 (a)	4,285.91	7,833.80	379.16	1,235.48
Personal computers per 1000 inhabitants		54.54	81.97	30.15	74.76	78.10	197.20	8.33	14.42	39.45	53.86	36.52	81.99	30.23	42.97
Internet users per 100 inhabitants		0.85	11.20	1.51	8.22	2.60	19.31	0.46	3.33	1.97	22.92	1.28	9.85	1.21	8.97
Internet hosts per 100 inhabitants		0.19	1.35	0.13	1.29	0.08	0.19	0.01	0.08	0.01	0.05	0.12	1.09	0.02	0.07
Number of internet service providers		47 (c)	n.a.	197 (c)	1219	2 (c)	n.a.	n.a.	5.0 (b)	197 (c)	n.a.	167 (c)	n.a.	15 (c)	n.a.
Number of mail items posted per inhab.		11.38	8.44	42.35	54.50	5.22	6.58	n.a.	2.59	18.64	n.a.	9.75	6.94	1.32	0.48
Total postal savings account deposits	% of GDP														
Radios per 1000 inhabitants		n.a.	681 (a)	n.a.	433 (a)	816 (c)	816 (a)	n.a.	79 (a)	2)	433 (a)	n.a	310 (a)	n.a.	269 (a)
Ownership in rural areas															
- TV	% of rural households			63.0%	69.0%			34% (c)	n.a.					47.2%	40.8%
- Radio	% of rural households			85.0%	82.0%			73.1% (c)	n.a.					91.4%	90.3%
- Telephone	% of rural households			6.0%	18.0%			6% (c)	n.a.					0.6%	0.4%
Ownership in urban areas															
- TV	% of urban households			92.0%	94.0%			77.1% (c)	n.a.						
- Radio	% of urban households			93.0%	89.0%			86% (c)	n.a.					82.8%	74.6%
- Telephone	% of urban households			36.0%	68.0%			27.0% (c)	n.a.					35.6%	31.9%
Ownership															
- TV	% of households	91.8%	97.0% (a)	86.9%	89.9%	80.8%	84.2% (a)	36.5%	40.4% (a)	67.6%	70.0%	85.8%	93.6%	66.3%	66.8% (b)
- Radio	% of households	88.4%	n.a.	90.1%	87.9%	99.7% (c)	n.a.	79.5% (c)	n.a.	88.7%	n.a.	n.a.	81.5% (b)	n.a.	74% (a)
- Telephone	% of households	73.94	74.60 (a)	0.32	58.9%	n.a.	54.3%	15.6% (c)	15.6%	n.a.	n.a.	33.9%	45.3%	24.0%	20.4%
AFFORDABILITY															
Cost of local phone call	US$ per 3 mins	0.10	0.03	0.05	0.03 (a)	0.04	0.03	0.10	0.08 (a)	0.06	0.03 (a)	0.13	.16 (a)	0.08	0.08
3 minute local call (peak rate)				0.06	0.07			0.66	0.66 (a)	0.00	0.00	1.21	1.48 (a)		
Cost of phone call to the US	US$ per 3 mins	2.77 (c)	2.80	2.77 (c)	n.a.	2.82	1.35	0.76 (c)	n.a.	2.77 (c)	n.a.	1.58	3.04 (a)	2.45 (c)	n.a.
Cost of cellular local call	US$ per 3 off-peak min.	1.23	0.39	0.67	0.36	0.23	0.19	0.43 (c)	0.38 (a)	n.a.	0.50	0.84	0.83 (a)	0.78	n.a.
Internet service provider access charges	$ per 30 off-peak hours	n.a.	77.90												
Internet service provider access charges	Monthly fee US$	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Table 4: Telecommunications (continued)

		Argentina		Brazil		Costa Rica		Guatemala		Jamaica		Mexico		Peru	
		1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002	1998	2002
QUALITY															
Phone faults per 100 mainlines		17.29	n.a.	4.63	3.00 (a)	5.70	5.30	n.a.	n.a.	63.60	3.00 (a)	2.81	1.90	23.80	n.a.
Unmet demand		0.79%	1.17% (b)	7.84%	0.53% (a)	5.21%	1.50%	n.a.	n.a.	31.27%	0.53% (a)	1.36%	n.a.	2.99%	2.06% (a)
EFFICIENCY															
FISCAL COSTS															
Total national spending on telecoms.	US$ millions							10.85	10.92						
ICT sector revenue	US$ millions	8,447.0	2,358.4	n.a.	1,071.5					0.0	0.0			1,445.8	1,394.7 (a)
Total telecommunication service revenue	US$ millions	8,451.2	7,547.0 (a)	19,948.3	20,428.0 (a)	229.7	364.3	262.4	448.3 (a)	456.7	20,428.0 (a)	9,211.4	16,938.4	n.a.	0.1
Postal net revenue	SDR	960.1	264.9	n.a.	84.5	n.a.	1.511	n.a.	0.187	n.a.	n.a.	n.a.	-34.312		
ICT sector return on equity	Percentage	19.0%	-59.0%	-29.9% (c)	-4.4%	13.2%	7.5%			-29.9% (c)	0.0%			501.9	187.5
														0.89%	0.33%
INSTITUTIONAL DEVELOPMENT															
Independence of telecom regulator	Y/N	N	N	Y	Y	Some	Some	N	N	N	N	N	N	N	Some
Private ownership of telecom incumbent op.	% of total capital	100.0%	100.0%			0%	0%					n.a.	100%	100%	100%
Local PSTN service competition	full, partial, monopoly	F	F	M	M	M	M	F	F		M (official)	M	M	F	F
Mobile competition	full, partial, monopoly	F	F	P	P	M	M	F	F	M	P	F	F	M, 2 Co's in Lima	F to M dep on province
International long distance competition	full, partial, monopoly	F	F	M	M	M	M	F	F	M	P	F	F	M	F
Leased phone lines competition	full, partial, monopoly	M	M	M	P	M	M	F	F	M	M		19 op's (partIAL)		M
ISP competition	full, partial, monopoly	F	F	F	F	n.a.	M	F	F	M	F				
Monopoly threshold of item to be mailed	grams					2,000	2,000					1000	1000.00	n.a.	n.a.
Number of other op. in the letter-post sector		277	250	0	0	0	0			0	0	0	0	288	472
ENVIRONMENTAL REGULATION															
Environmental regulation for telecommunication projects	Y/N					Y	Y	Y	Y					Y	Y
Environmental assessment of telecommunication projects mainstreamed	Y/N		Y			Y	Y	Y	Y			Y	Y	Y	Y
Engineering design specifications related to environmental factors	Y/N														

Note: (a) data from 2001; (b) data from 2000; (c) data from 1999.