

REGIONAL INFRASTRUCTURE

As the Latin American and Caribbean economies have opened up to their neighbors in recent years, demand has increased for regional infrastructure. This in turn has led to significant progress in the supply response of the public and private sectors. Infrastructure concessions have played a major role in that improvement, and there has been greater willingness on the part of public, local and foreign capital to support infrastructure development.

However, much remains to be done. Trade, investment, and the movement of people are still obstructed and sometimes deterred by physical, institutional and social barriers at borders, and in the main intra- and inter-regional trade corridors. In addition, countries have not yet developed a shared and integrated strategic vision of how to cooperate and plan for infrastructure networks that would not only spur regional integration but also support international (extra-regional) and domestic activity as well.

THE IMPORTANCE TO DEVELOPMENT OF REGIONAL INFRASTRUCTURE

Latin American infrastructure deteriorated significantly in the 1980s and early 1990s, when the region lost considerable ground relative to industrial countries and faster growing emerging economies (Servén, 2001). High levels of debt, structural adjustments, and serious fiscal imbalances led to an overall decline in infrastructure investment beginning in the mid-1980s. With private sector involvement lacking in most countries,

the result was a decline in overall investment, leading to a widening infrastructure gap. This gap contributed to lower productivity, higher transport and logistics costs, reduced competitiveness and slower growth.

Given public sector constraints, Latin America made major efforts to increase the extent of private participation in infrastructure. Indeed, Latin America has been the leading region in opening infrastructure to private capital, with a total investment of over \$250 billion. This represents more than 43 percent of the total for all developing regions (IDB, 2001a). This has led to a partial recovery in infrastructure investment, but the results have been uneven across sectors and countries. In Chile and Colombia, infrastructure investment rose markedly, while other countries still show flat to declining trends in infrastructure spending, with investment at 2 percent of GDP or less (Servén, 2001).

Investment has been concentrated in energy and telecommunications, which have been the most attractive to private investors while providing services that are in the public interest and in demand. High private rates of return are in some cases a function of the transfer of previous state monopolies to private control, and in part due to exclusivity provisions provided in some concessions.

Infrastructure investment in Latin America is entering a new stage. Much progress has been made in reducing public sector funding shortfalls and in improving productivity in infrastructure operations (Foster, 2001). These initiatives shared common features, such as private participation, entry of new operators and sources of capital, a reduction in the State's

management role, and the creation of new instruments for regulating and overseeing public services. The participation of the private sector through privatization and concession has helped meet crucial infrastructure needs. However, infrastructure demands remain large and ongoing, and the financial capacity to undertake new projects has clearly been affected by the financial crises in major economies of the region since the late 1990s.

Fay (2001) has forecast infrastructure needs in Latin America for 2000-2005 based on income levels. She projects a doubling of telephone mainlines per capita, a steady increase in electricity generating capacity, and steady expansion of road infrastructure, with rail transport becoming less important. Investments of \$57 billion annually (roughly 2.6 percent of Latin America's GDP) will be needed over the period for electricity (\$22 billion), roads (\$18 billion), and telecommunications (\$6 billion). Private investment exceeds predicted need for telecommunications (although the model did not include costs associated with the emergence of cellular phones), covers about half the demand for roads, and meets just a fraction of needs in power and water and sanitation. Moreover, these projections are likely to be on the low side because they cover new investments rather than rehabilitation or maintenance.

The fact that infrastructure networks remain incomplete limits the ability of some areas to participate in economic growth. In addition, insufficient capacity across all infrastructure sectors in major corridors linking the region's metropolitan areas has resulted in bottlenecks that create delays, raise costs, and limit potential gains from trade and development. Thus, the current situation might be viewed as a stage to complete, consolidate and extend the recent reforms.

CONCEPTUAL ISSUES IN REGIONAL INFRASTRUCTURE DEVELOPMENT

Trade, Infrastructure and Development

There is a well-established relationship across countries between income levels and the quality of infrastructure (IDB, 2001a). Infrastructure is an important determinant of productivity and development. Higher income

levels and growth feed back into larger demands for transport, telecommunications and energy services. These linkages are particularly pronounced in facilitating trade that is critical for regional integration.

The opening up of Latin American economies has led to marked increases in international trade, financial capital and foreign direct investment. There has also been an upswing in regional trade: both the share and the growth rates of intra-regional trade in the 1990s grew much faster than extra-regional activity (see Chapter 2).

This growing commercial interdependence has been associated with various kinds of regional cooperation, especially in terms of regional trade agreements. Even the regional orientation to international markets has spurred greater specialization and intra-industry regional trade. This trade also has been in higher value-added goods and services. The higher value in turn requires higher quality infrastructure, especially in telecommunications, data transfer, roads and multimodal transport (Guasch and Kogan, 2001).

This expanded activity also has focused attention on the need for greater integration of trade infrastructure, both in terms of physical investments and institutional coordination. For example, border crossings remain a major impediment to transport connections within Latin America. Working to resolve these issues will not only make regional infrastructure linkages more effective, but also spur new opportunities for integration.

The level of regional trade depends critically on the quality of supporting infrastructure. Poor infrastructure represents 40 percent or more of transport costs in developing countries, with substantial effects on trade. But regional provision of infrastructure has lagged behind. Even with the investments in the 1990s, transport, telecommunications and electricity networks remain incomplete, with underdeveloped linkages across some borders, or with insufficient capacity in key corridors. Transport costs in the region remain high relative to the rest of the world (Guasch and Kogan, 2001). Moreover, improvements in infrastructure (ports, roads, telecommunications) in developing countries can help to significantly reduce inventory levels and thus the cost of doing business.

National Legacies, Regional Projects and Externalities

Regional integration flows are rarely channeled through specific infrastructure, but rather use networks that are shared with domestic and global traffic. In practice, services of differing geographical scope share segments of the same infrastructure network. For example, vehicles connected with interurban and international traffic use the same roads; domestic and international air passengers use the same airport; electricity, oil and gas share interconnection lines and pipelines; and local and international data can move over the same fiber optic network. As a result, infrastructure investment has tended to be viewed in national terms, both in the form of public provision and for private concessions.

Many of the infrastructure problems that constrain regional integration also hinder domestic development and international trade. These include the need to upgrade and complete service networks, such as electricity; add capacity to eliminate bottlenecks in key transport corridors, especially at border crossings; link transport modes at ports, airports and trucking terminals; expand oil and natural gas access; and increase access to Internet and telecommunications services.

Infrastructure projects generally are characterized by network and scale economies. For example, in Central America the small size of countries and national markets has prevented infrastructure investments from achieving scale and network economies, thereby raising the costs and associated required rates of return. These scale effects could also bring environmental benefits, because fewer physical sites are necessary for a given output level. Similarly, the extension and completion of regional infrastructure networks can help relieve congestion and improve environmental aspects associated with current patterns of concentrated development and urbanization.

Even when regional activity has been sizable, though, there has not been a shared vision of regional planning to develop a network of regional infrastructure. Indeed, this situation has become more complex, given the now-established role of private participation in most infrastructure sectors in the region. These new private stakeholders are likely to have different views about the needs and priorities for investment. They often operate

under different legal, contractual and organizational structures, thereby making coordination and integration of national infrastructure networks more difficult.

Regional infrastructure projects present other issues as well. In addition to traditional domestic externalities, transnational projects are likely to have costs and benefits that are distributed asymmetrically across countries. This creates an incentive for a country to make individual decisions taking into account only costs and benefits within its borders. As a result, some potentially valuable regional projects are likely to be ignored or abandoned (Bond, 2001). A combination of factors makes the development of such projects difficult (Beato, Benavides and Vives, 2002). First, it is difficult for one country to identify the benefits it may obtain from a regional project. Second, even if benefits are known, for political reasons countries may be unwilling to pay for regional investments outside their borders even if the domestic benefits exceed these costs. Third, there currently are few socially acceptable institutional mechanisms to distribute regional benefits and costs across affected countries.

Another issue regarding regional infrastructure projects involves potential problems in establishing and managing a portfolio of regional projects (Beato, Benavides and Vives, 2002). Country authorities may view regional initiatives as a mechanism for low-cost financing of national projects. This also creates incentives to overestimate the regional benefits of predominantly national projects.

To date, there have been very few successful transnational infrastructure projects that were developed as such. The most successful projects have been those where key inputs are in one country while user markets are in another, such as the Brazil-Bolivia gas pipeline. Other successful efforts have involved linking existing network components by upgrading or expanding access to existing corridors. One such project is the road connecting Manaus, Brazil and Caracas, Venezuela. This is a "success story" with many lessons: each country knew exactly what it had to do and to gain; the money was provided by development funds and spent inside the countries; the construction companies liked it; the beneficiary states (as well as the national governments) were in favor of it; and the performance has met investment expectations (Guasch and Strong, 2001).

Figure 6.1 Principal Current Hubs of the Volume of Flows in South America



Source: IDB (2000).

Where projects are financed on national accounts, or where national contributions are required for private sector projects, there is a “free rider” problem—each party is trying to maximize its benefits and limit its commitments. This is particularly the case when many project benefits go primarily to one country while costs are incurred by another nation. This issue has surfaced in the recurring discussions about the Buenos Aires-Colonia Bridge between Argentina and Uruguay with respect to Brazil’s benefits and (lack of) contribution to and participation in the Binational Bridge Study Commission. This situation also occurs when an intermediate country serves as a “crossing corridor” between origin and destinations. This creates “hold up” incentives in the absence of benefit-sharing or cost-sharing mechanisms. In addition, the role of states and local governments in affecting the success of transnational projects should not be underestimated. For example, differences in political party affiliations

between federal and state governments in Mexico have slowed connections between road corridors and bridge and border crossings into the United States.

In short, regional projects present a number of challenges. They have more potential for compounding problems and conflict. There is the ongoing temptation to press for projects based on politics rather than in terms of trade benefits, and to justify bundling purely domestic projects under the umbrella of complementarity with the international network. This is particularly problematic in cases where national bottlenecks or constraints limit regional activity.

STARTING POINTS: THE ECONOMIC CONTEXT OF REGIONAL INFRASTRUCTURE

Development of regional infrastructure initiatives should take into account existing networks, organization and governance, and financing patterns, each of which will be discussed in turn.

Infrastructure Networks: Hubs and Corridors of Development

Evaluating the prospects for regional projects should take into account the prevailing geographic structure of demand, the network of already existing infrastructure, and the roles of the public and private sectors in infrastructure investment, operation and regulation. Trade flows in South America are dominated by a few major corridors and associated hubs of activity (IDB, 2000), as shown in Figure 6.1 and discussed in Box 6.1.

Exchange hubs with smaller current volumes but still with significant growth potential complement these hubs (Figure 6.2). The economic patterns reflected in Figures 6.1 and 6.2 have been shaped by physical geography, historical ties, urban development and, especially recently, by policy initiatives aimed at opening markets and borders. To the extent that current trade flows could be further enhanced, these hubs and corridors indicate where additional investment might have the highest returns by reducing bottlenecks and expanding capacity. Using an approach that takes these hubs into account would help in defining policy and investment priorities more carefully (IDB, 2001a). In addition, approaching regionalism via a framework of hubs and

Box 6.1 Major Hubs and Corridors in South America

Mercosur-Chile hub: The largest in the region, linking Rio de Janeiro-São Paulo-Montevideo-Buenos Aires-Santiago. Rather than a main route, the density of this corridor has produced a grid with numerous nodes and routes. In 1998, the corridor carried 18 million tons of freight, including 8 million tons of petroleum moved through pipelines. The remainder, mostly general cargo, was transported by truck. Rail transport remains marginal.

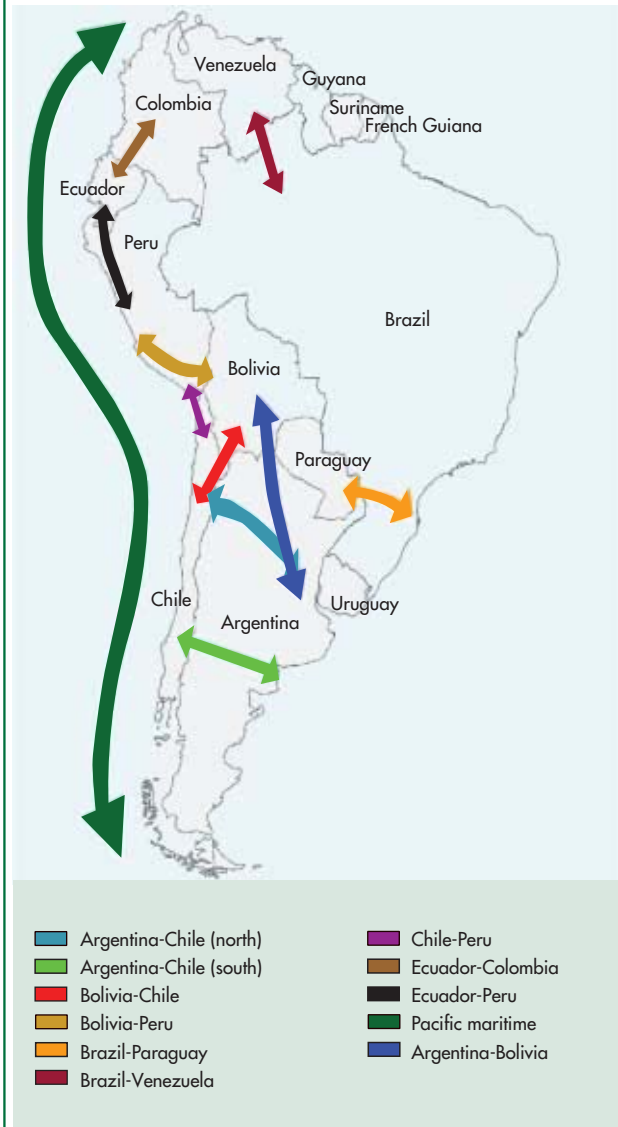
Colombia-Venezuela hub: Links Bogota and Caracas and carries more than 3 million tons of cargo annually, about half by truck and half by river and sea transport. There also is an electricity transmission line with 380 MW of capacity.

Paraguay-Parana waterway hub: This 3,000 km navigable network carries about 10 million tons annually, comprised of cereals, oil, agricultural products, minerals and fuel. One-third of the corridor traffic is transnational, with the other two-thirds serving import or export markets. There are three binational power stations with 17,500 MW capacity, as well as transmission lines between countries.

Southern transverse hub: The Bolivia-Brazil corridor is dominated by the gas pipeline, which can potentially transport 30 million cubic meters daily. About a million tons of land cargo move through the corridor along road and rail networks.

Atlantic and Pacific maritime hubs: The Atlantic corridor, spanning the coast from Venezuela through Argentina, saw cargo traffic of over 25 million tons in 1998, mostly solid and liquid bulk commodities. Submarine cables along the corridor also enable extensive voice and data transmission. The Pacific maritime hub is similar in nature, although with lower cargo volumes and less telecommunications traffic.

Figure 6.2 Exchange Hubs with Significant Growth Potential in South America



Source: IDB (2000).

corridors would help identify potential flows that could be spurred by more integration, taking into account complementarities between economies and developing plans to tie other regions into the existing network.

Regional Infrastructure and Concessions

Private participation in transport infrastructure in Latin America today has a significant role, if not a domi-

nant one. As concessions have developed, issues of traffic flows and transport network planning have become more important, both nationally and across borders. This does not imply that concessions are the preferred structure for organizing or financing regional infrastructure; in fact, many "next generation" concessions will require some form of public support to be sustainable. However, since much of the existing infrastructure is in private hands, regional linkages must

take into account how to tie these concessions together. Multilateral institutions should support initiatives by these concessions to analyze, craft and work towards linkages with each other. This will require a supportive environment with respect to transborder linkages between national concessions. In addition, the private incentives that served to improve performance are also likely to serve a valuable role in planning major corridor initiatives.

Financing Issues

Infrastructure is expensive. Fiscal difficulties, over-indebtedness, multilateral conditionality on new obligations, and country risk premia will continue to limit the capacity of the public sector to provide infrastructure. In addition, financial crises and the volatility of real exchange rates have substantially increased country risk premia since the late 1990s. Also, most infrastructure services are only tradable within the region and thus generate revenues in local currencies, while a substantial portion of their costs and financing are contracted in hard currencies. Therefore, multilateral credit institutions should provide new forms of financing and financial instruments, not only to channel funds but also to mitigate risks and costs. Social security reforms based on individual savings and professional management might constitute a new source for financing infrastructure. By matching the long time span of such savings and allowing for sector and country diversification, regional infrastructure investment could be an attractive alternative for pension funds.

Even when regional projects have superior operating economics, however, private capital markets are likely to be wary of the risks of operating across countries. In many parts of the world, infrastructure projects that involve different countries have required special treaties that established rules and governance frameworks that supersede national structures. This has been true of highway and energy projects in Eastern Europe and the countries emerging from the former Soviet Union.

Multilateral institutions will also play a major role in providing technical and financial support for regional infrastructure initiatives, especially in terms of managing political and regulatory risks. Some of the major innovations in risk management in the past

decade have been partial risk and policy guarantees by multilateral institutions. There is a growing need to develop multi-country guarantee instruments with respect to policy and sectoral reforms and operations. This is especially true for regional projects in which country guarantees are not seen as credible in financial markets.

Institutional Development and Harmonization

The strategic vision behind infrastructure policy must be consistent with a regional approach. This will require countries to identify regional integration projects and forge complementary agreements with other economies. This common approach includes defining shared priorities; identifying both physical and regulatory institutional bottlenecks; achieving balanced sub-regional coverage; and defining the nature and scope for private sector participation. It also will require governance structures that restrict the “veto power” of an individual country over regionally attractive projects.

The difficulties in federal/state relations in infrastructure projects also provide lessons for transnational projects. Disagreements between states and the federal government about priorities, contributions and levels of support can doom projects before regional aspects are brought into account.

Any transnational undertaking requires strong common shared objectives between the countries involved. Established multilateral agreements might become more durable than bilateral agreements because of the greater collective loss that might be sustained and the less idiosyncratic dispute resolution mechanisms that are put in place. But in general, a good rule of thumb seems to be that the difficulty of agreement increases by the square of the number of parties involved.

These objectives must be strong enough to survive changes in political parties and governments. A resilient public/private coalition must exist in countries to keep the project going despite political shakeouts and unsettled macroeconomic times. The participation and commitment of multilateral institutions in coordinating technical and financial support could play a role in guaranteeing the sustainability of the process.

Another key aspect involves harmonizing the regulatory functions of governments. This is a significant challenge in light of the fact that reform efforts in

Table 6.1 | Sectoral Priorities for Regional Infrastructure Development

	Roads	Railways	Ports	Airports	Gas	Electricity	Telecoms
Regulatory changes to deal with industry dynamics	–	–	Lower	Medium	Lower	Medium	High
Regulatory harmonization	Medium	Lower			High	High	High
Concession integration	Medium	Medium			High	High	Medium
Border crossings	High	Medium	Medium	Medium			
Completion or upgrading of national networks	High	High	Medium	Medium		High	Lower
Regional project development and financing	Medium	Lower		Medium	Medium	High	Lower
Multimodal initiatives	High	High	High	Lower	Lower		
Network planning and strategy	High	Medium	Lower	Lower	Medium	High	Medium

Latin American countries vary widely in terms of their scope, institutional requirements, programming horizons and the degree of local market openness. Europe's experience with regional integration, particularly in the energy and telecommunications sectors, does not point towards the emergence of competitive markets. Vertical and horizontal reintegration processes may be at work, and ownership may be concentrated. This will make it necessary to proactively create a single market by establishing a community legal framework based on regulatory consistency, not only in those areas specific to the subsector, but also in terms of accounting practices, taxation and the environment. For this reason, the European Community has established guidelines to assist national regulatory authorities in developing a competitive internal market (Lutz, 2001). Harmonization of regulatory and institutional processes is the deciding factor in moving from bilateral activity to a common market.

REGIONAL INFRASTRUCTURE INTEGRATION ISSUES BY SECTOR

In addition to facing the general issues described above, each infrastructure sector must address specific issues with respect to regional investment initiatives. These sector-specific challenges are outlined below, while cross-cutting policy needs and priorities are shown in Table 6.1.

Transport

By the late 1980s, much of Latin America's transport sector was in crisis. Railways were falling into irrelevance and disrepair, while requiring huge subsidies from the state (Thompson, 2001). State-owned airlines lost huge amounts of money, while airports and sea-ports required substantial ongoing subsidies for operating expenses, especially labor. Perhaps even more importantly, these operational financial drains severely limited governments' ability to fund urgently needed investments for capital-starved public enterprises, inevitably resulting in poor service and inefficiency that had consequences for competitiveness, economic development and equity (since the poorest groups often suffered the worst services).

Since then, Latin America has been in the vanguard of restructuring transport and mobilizing private sector participation (Kerf, 1998; Basañes, Uribe and Willig, 1999; Estache and de Rus, 2000; Asian Development Bank, 2000). At the beginning of the 1990s, virtually all of the region's railways were under public ownership and control. Ten years later, there were only a few, small publicly operated railways. Sea-ports generally have been concessioned under alternative models. Most airlines have been privatized and airport concessions of varying types have been put in place throughout the region. Toll roads have been developed or extended with varying degrees of success. While the reforms in the transport sector in Latin Amer-

ica have been considerable, there are a number of issues that remain unaddressed. The most notable is the lack of a strategic vision for the transport sector, including network planning, multimodal needs, and regulation. There also is a need to develop strategies for the financing of regional transport projects that are not fully financially viable by the private sector, such as smaller airports, ports, secondary and rural roads, and parts of transnational corridors that have not been government priorities. If improvements are to be made in the operation of those services, governments will have to bridge the gap to make the concession viable (Guasch and Strong, 2001).

A much better understanding, modeling and forecasting of the effects of national macroeconomic shocks on transport infrastructure projects is also needed. The interaction of price, income, GDP, trade and financial market elasticities has undermined major corridor projects. It also has proven difficult to forecast traffic demand in such projects without a full trade model that incorporates the hidden costs of border crossings.

Road transport. Regional road programs suffer from most of the problems that plague roads at the national level. The national orientation of planning has made it difficult to exploit major corridor opportunities, such as linking Central America and the poorer states of southern Mexico with the markets of northern Mexico and the United States (IDB, 2000).

The hubs that account for most of the traffic suffer from a lack of capacity. The most serious road capacity problems are in the Mercosur hub, where increasing levels of local traffic are compounded, in some cases, by international flows (Amjadi and Winters, 1997). Smaller hubs principally are affected by poor road surfaces, maintenance, standards and design. Many highways are old, with sections in mountainous terrain. In some potential hubs, roads are not paved or cannot be used all year round. Less than 30 percent of the road network in Latin America is paved, the lowest of any developing region in the world.

Other problems continue to raise regional transport and logistics costs. Cargo reservation schemes have increased in recent years, requiring unloading and reloading of trucks at the border. In many cases, these schemes are forced on companies under pressure from national truckers trying to avoid

regional competition. In addition, there are problems stemming from national design standards that are inadequate for the movement of vehicles from another country. For example, the capacity of bridges on Uruguay's road network is being improved to allow the transit of Argentine, Brazilian and Chilean trucks.

Border crossings are especially problematic for integration, as there typically are independent, dual controls in each country. For example, the Buenos Aires-São Paulo corridor (2,400 kilometers) by way of the Paso de los Libres-Uruguayana border accounts for more than 20 percent of the total tonnage of international freight transported on highways in the Southern Cone plus Bolivia and Peru.¹ Currently, only 30 percent of the trucks delivering merchandise into Brazil are able to take in the load in the same day and, as result, 13.1 percent of the total trip time is spent at the border. Greater transparency and efficiency in border service operations (customs clearance process, immigration procedures, etc.), including private agent activities (dispatchers, importers, freight collection), could reduce delays from 12 to 5 hours (Olivieri et al., 2001). A recent study of 11 transportation routes in the Andean Community arrived at a similar finding and concluded that, on average, trucks spend more than half of total trip time at border crossings (Pardo, 2001). Greater efficiency at the border might cut crossing time by half or more, significantly reducing freight costs and improving efficiency.

Rail transport. Railway restructuring and reform has taken place in most Latin American countries, with perhaps the most extensive changes in Mexico, Brazil, Argentina and Peru. After years of decline, traffic has stabilized or grown slightly, labor productivity has increased markedly, and financial performance generally has improved.

Access issues and regional integration are surfacing as next-generation issues. Balancing concession network interconnections without creating cartels is a significant issue for some commodities and for compe-

¹ Total bilateral highway-based trade between these six countries in 2000 was 39 percent and 22 percent of total trade, respectively, by value and volume, while the estimated margin was close to 6 percent of the value of goods traded.

tion policy, although road freight transport continues to provide important competitive alternatives for many types of goods that move by rail.

Poor network infrastructure constrains the use of trains large enough to develop economies of traffic density. The condition of the network limits cargo capacity and speed limits. Although most of the network has been shifted to private control, railway concessions have found it difficult to make the significant investment to overcome infrastructure deficiencies. At a regional level, gauge differences between countries and the lack of multimodal regulations and linkages to road and port infrastructure also severely limit the potential contribution of railways to regional integration.

Air transport. Privatizations and industry consolidation among airlines have led to more air service between countries. Although growing, both regional and domestic air cargo and passenger flows between South American countries remain small compared with air transport in the rest of the world. The capacity problems evident in several airports generally stem from growing domestic demand rather than regional or international traffic. Capacity difficulties are matched by problems of service quality (IDB, 2000).

The reliability, safety and security of air transport also serves as an impediment to regional integration. There is a need to harmonize regulatory and operating standards for both airports and airline operations, especially to ensure that regional civil aviation meets or exceeds international standards. If these standards are not met, aviation will continue to be limited in its participation in international traffic and trade. Air traffic control systems need to be upgraded to make air networks more dependable, while additional investments are needed to ensure passenger and cargo safety. As with other modes of transport, the streamlining of customs clearances would facilitate air cargo flows.

The major regulatory impediments to regional air transport are in market reservation policies enacted through bilateral air agreements. Although some progress has been made in the Andean region toward open skies, the rest of the region still retains effective limitations on who can provide air services. These agreements tend to keep passenger and cargo tariffs high and thus constrain traffic and trade growth.

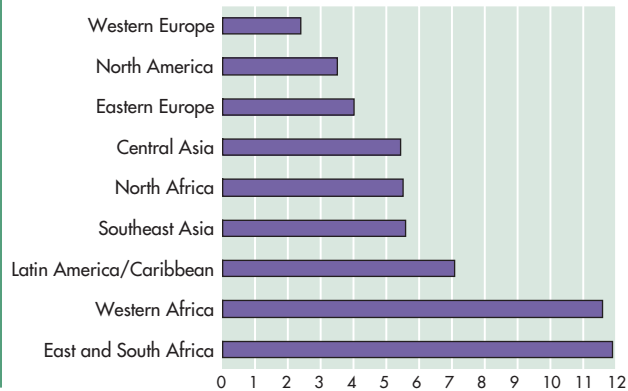
River and maritime transport. Maritime trade has become increasingly global and concentrated. The

world's largest shipping companies achieve economies of scale and density through hub-and-spoke operations via a system of global mega-ports, supported by different levels of feeder ports. In contrast, the port systems in Latin America have developed on a national basis, with only limited specialization and regional linkages. The need is to move from a linear system of shipping routes to networks in which smaller ports might serve as feeders to the region's largest facilities, particularly in the Caribbean. This hub-and-spoke port system typically requires more cooperation and coordination to facilitate growth of transshipment and operate at higher activity levels.² Therefore, there is a need to develop better intermodal linkages and to ensure that key shipping corridors have adequate capacity and maintain safe and reliable navigability (IDB, 1998).

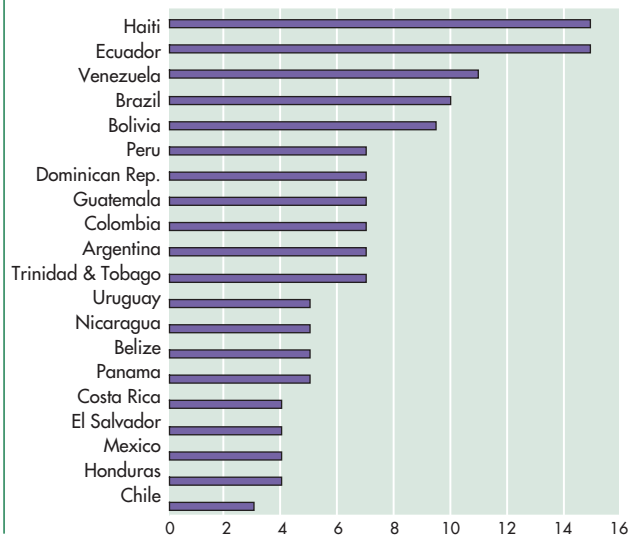
South America's river networks have enormous transport potential. There is a significant amount of river transport in the three main basins (Amazon, Orinoco and Paraguay-Parana). These rivers serve as large estuaries that facilitate the access of overseas shipping. Given this international role, only a limited amount of traffic can be thought of as regional in nature. Some of the river traffic between ports of different countries is subsequently transferred to other overseas ports. Another important but specialized aspect is trans-border river crossing traffic. While important locally, the facilities serving river crossings generally are poor.

The region's seaports serve as terminals in which numerous flows converge. Intra-regional traffic is a relatively small share of total waterborne traffic. The port system of South America is in transition, with growing private sector involvement. Port infrastructure suffers from a number of problems, such as land access and the lack of multimodal terminals. However, international trade is likely to continue to drive port investments and development. Fortunately, much of what is needed to facilitate global imports and exports will help support regional trade as well.

² Economies of scale are relevant in maritime transportation. On average, a vessel 50 percent larger, if fully utilized, can generate savings in unit cost per ton-mile up to 20 percent. In addition, fixed costs related to port operations can be significantly reduced by specialization by type of cargo and vessel type.

Figure 6.3 Average Number of Days for Port Clearance by Region

Source: Cámara Marítima y Portuaria de Chile (1999).

Figure 6.4 Average Number of Days for Port Clearance in Latin America

Source: IDB (2001).

Delays related to customs and port handling continue to be a major constraint to trade and integration. Figures 6.3 and 6.4 show that the regional average is over seven days for customs processing, with many countries even higher, ranking the region's processing time as among the highest in the world.

Although significant progress has been made in recent years, regulatory restrictions persist in river and maritime transport. The most important of these

has been the continuation of cargo reservation policies. In addition, river navigation regulations limit the size of convoys or impose service contracts for non-essential services.

Energy

Gas. Natural gas promises to grow in importance in world energy markets, given its relatively favorable reserve levels, lower transport costs, environmental advantages, wide range of uses, and technical advantages over other energy sources in certain applications. During the last decade, more than \$12 billion was invested in 37 natural gas transportation projects (Izaquirre, 1999). The sharp increase in gas reserves and regional production has encouraged both public and private firms to develop regional gas transport links to neighboring countries. In the Southern Cone countries, 12 gas pipelines currently are operating or under construction, covering almost 8,000 kilometers and with a potential transportation capacity of 85 million cubic meters per day.³ The two major pipeline networks run between Argentina, Brazil, Chile and Uruguay; and from Bolivia to Brazil. Additional projects have been proposed that would almost double both current longitude and capacity (7,000 kilometers and 75 million cubic meters per day).

In spite of this physical integration, serious institutional and regulatory problems impede the formation of a regional gas market. The lack of harmonized technical standards and the dominant power of some producers and transporters make integration difficult. For example, in Brazil, Petrobras has a dominant position in the importation and local production of gas, as well as being the main transporter of it. Similarly, Bolivian concession agreements give priority transport to the gas fields operated by Petrobras and Repsol-YPF (IDB, 2001b).

These market structures and preferences need to be addressed through greater harmonization of regulatory frameworks at the regional level. These national frameworks vary widely in their scope and effectiveness (Guasch and Spiller, 1999).

³ Private sponsors have also participated in domestic transportation of natural gas in Colombia and Mexico.

Electricity. Regional integration can help to improve electricity services in a number of ways. Regional wholesale electricity markets make it easier to achieve scale economies and thus lower-cost generation projects, as in the case of the Central American Electricity Interconnection Project (SIEPAC). Interconnecting networks also allow for diversifying the energy sources used in generation. This reduces the risk of shortages by linking different hydrographic regimes or providing alternatives, such as balancing predominant hydroelectric systems with natural gas. However, physical integration is not sufficient to create a regional market and needs to be coupled with adequate institutional and regulatory frameworks.

The economic organization and ownership structure of the region's electricity sector underwent a radical transformation in the past decade, so that new electricity projects are almost exclusively operated by the private sector. The electricity sector undoubtedly has become an engine of economic integration in the Southern Cone, with clear potential to do so in the Andean and Central American subregions as well.

Structural reform and the privatization of public companies in the energy sector have enabled many countries in the region to begin to develop national energy markets. However, the nature, intensity and performance of sectoral reforms have varied by country. Given these differences, it is not surprising that the international projects currently underway to connect electricity networks stem mainly from bilateral agreements on interconnection and energy provision, rather than from open markets. Thus, the generation, transmission and distribution facilities are for specific use, limiting the sector to exchange and supply contracts.

Regional initiatives have traditionally been accomplished through bilateral agreements, such as the 1997 Brazil-Argentina agreement to integrate electricity markets. But these agreements tend to be through ad hoc contracts and not part of a plan to integrate markets. More recently, larger initiatives have been undertaken, such as the 1998 Mercosur Memorandum of Understanding on Electricity, which fosters the creation of an integrated electricity market in the Southern Cone. The Cartagena Agreement in the Andean region in 2001 also represents a positive step toward regional regulatory harmonization of transmission intercon-

nections. The Regional Commission for Power Integration (CIER⁴) estimates that the economic benefits of electricity integration could reach \$1 billion annually. The SIEPAC system in Central America is finally becoming a reality, spurred by the increased incentive of links to Southern Mexico.

Latin America's hydroelectric resources offer significant potential for power generation and opportunities for regional integration. Binational hydroelectric projects include the Itaipú project linking Brazil and Paraguay; the Yacretá hydroelectric project linking Argentina and Paraguay; and the Salto Grande hydroelectric project linking Argentina and Uruguay. Transmission line connections exist between Colombia and Venezuela (the Cuatricentenario-Cuestecitas lines, El Corozo-San Mateo lines and Tibu-La Fria lines). Links also exist between Colombia and Ecuador via the Ipiales-Tulcan lines. Connections between Pasto and Quito and between Ecuador and Peru are in the planning stages.

Much larger benefits might be possible through the development of regional energy markets. The evolution of exchanges from binational deals to regional markets requires mechanisms regarding the use of the system of interconnection, operating security and the energy purchase-sale operations. A regional market would likely require common regulations for the international exchanges (Rufin, 2001). These requisite minimums involve an energy purchase-sale method based on economic principles with transparent rules, the elimination of subsidies (especially if there is prominent state participation), the application of nondiscrimination principles relating to export and access, and implementation of a regulatory structure for transmission covering use and payment of the internal network (European Commission, 1999).

Regulatory reforms instituted by Chile and Argentina illustrate the complexity of harmonizing national regulations. Chilean reforms include the elimination of monopolies and the corresponding deregulation of generation. Argentina mandates the

⁴ CIER (Comisión de Integración Energética Regional) is a non-profit international organization that includes electric utilities and non-profit entities linked with the national energy sectors of 10 South American countries.

unbundling of generation, transmission and distribution, with no one firm permitted to participate in more than one segment of the market. Maximum generation produced by one company may not exceed 10 percent of the total market. However, ownership of the dispatch of electricity differs significantly in both systems. In Chile, dispatch is generator owned, while in Argentina it is jointly owned by all segments of the industry (generation, transmission, distribution, government and large users). Until these are harmonized, interconnection will be more difficult (Woolf and Halpern, 2001).

Telecommunications

Telecommunications has quickly and aggressively responded to changes arising from restructuring and deregulation. Latin American countries generally have been able to restructure the telecommunications sector, separating telephony from the government and establishing new regulatory systems. Because access and service levels lagged far behind developed countries, private investment was able to quickly step in, improving access and introducing new services and technological innovation. The reforms have improved efficiency, expanded network coverage and access, and improved the quality of services. They also have generally led to increased prices, although it is difficult to assess when and how much, considering the improvements in the quality of service and taking into account the effects of periods of exclusive market power and other regulatory aspects (IDB, 2000).

There continues to be significant technological innovation and integration in global telecommunications. Telecommunications networks have sprung up as a result of market liberalization, and are being expanded by service carriers and companies that build and operate trunk networks for both specific and general use. At the same time, separate firms are being formed to provide infrastructure support for those operating the service networks. Another emerging issue is the trend toward mergers and consolidation of telecommunications, television, Internet and IT services. Voice and data transmission services, which are increasingly operated by private companies, have often converged, making traditional regulatory definitions and boundaries obsolete. In addition, the fact that many of these companies are regional, multinational

or even global in scope creates pressures for regulatory harmonization that can address monopoly and access issues while recognizing the dynamic nature of the sector (Guasch and Spiller, 1999).

Latin America is no exception to such international trends. In the early 1990s, foreign firms that were usually fixed-telephone monopolies in their home countries were attracted to the region by the high levels of pent-up demand coupled with low productivity levels and outdated technology, as well as investor-friendly privatization programs (Moguillansky and Bielschowsky, 2001). During the first years of the concession, coverage and quality standards improved dramatically, and indicators of technological progress and productivity such as telephone density, digitalization percentage and lines in service per employee doubled or tripled. However, exerting market power on fixed-lines and long distance calls under weak regulatory environments allowed significant monopoly rents. On the other hand, the Chilean experience after 1994 and the subsequent Brazilian telecom market liberalization tended to foster competition in the different segments through regulation and bidding processes (Calderón and Mortimore, 2001).

In the late 1990s, fierce competition among the main transnational operators for global market share was a major factor behind the second wave of telecom investments in the region. New investments in cellular services and the Internet attracted hemispheric giants, which started to compete on a regional scale with the European operators (see Table 6.2). The entry of these global firms with hemispheric interests in the most dynamic segments of the regional telecommunications market will eventually trigger major changes. It will also pose a complex challenge to harmonize technology, even within organizations that have developed through mergers and acquisitions.

The outlook for the sector in terms of integration depends on the coordination and effectiveness of both governments and national regulators in attracting investments to keep up the fast pace of technological change, increase efficiency, and maintain competitive markets (European Commission, 2001). In addition, equity considerations require governments to encourage service expansion and market access to the new information technologies, especially for low-income households and rural areas.

Table 6.2 | Telecom Operations in Latin America, 2000

	Countries	Markets ¹	Millions of clients
Telefónica de España ²	9	22	40
Telecom Italia	8	13	18
Verizon	5	5	10
SBC Communications	4	4	14
América Móvil ³	7	10	13
Bell Canada International	4	8	1.5
Bell South	11	14	9

¹ Participation by firms in different market segments.

² Includes partnerships with Portugal Telecom.

³ Spinoff from Telmex in 2000.

Source: Calderón and Mortimore (2001) and IDB (2000).

INFRASTRUCTURE INITIATIVES: INTEGRATION OF REGIONAL INFRASTRUCTURE IN SOUTH AMERICA AND THE PUEBLA-PANAMA PLAN

The conceptual issues and frameworks for regional infrastructure development are being put into practice in two major initiatives: the Integration of Regional Infrastructure in South America (IIRSA); and the Puebla-Panama Plan (PPP), which links Mexico with Central America. IIRSA and PPP represent a new planning approach, coordinating national sectoral policies as well as implementing projects consistent with the policies of the regional partners. These initiatives also attach high priority to protecting the environment and respecting local communities.

Integration of Regional Infrastructure in South America (IIRSA)

IIRSA was launched at a summit in Brazil in September 2000 by the nations of South America, with the support of the IDB, the Andean Development Corporation (CAF), and the Financial Fund for the Development of the River Plate Basin (FONPLATA). The goal is to improve integration infrastructure to foster productivity and competitiveness in three areas: energy, transportation and telecommunications. IIRSA is a multinational, multisectoral and multidisciplinary initiative for setting up coordination mechanisms between governments, multilateral financial institutions and the private sector. South America is an important pole of growth and

development in the world economy. It is extremely rich in natural resources, with a diversified climate and long stretches of Pacific, Atlantic and Caribbean coast. More than 300 million people of rich cultural diversity live and work in an area of 18 million square kilometers, with a GDP of \$1.1 trillion. The countries of South America also have important historical, commercial and political ties with the main industrial centers of Europe, North America and, increasingly, Asia.

Integration and development hubs and sectoral processes. IIRSA is a political and strategic regional vision based on the development of a hub strategy encompassing—for the first time in history—the 12 countries of South America. To meet this objective, and using the multilateral institutions as catalysts and coordinators, an action plan was developed specifying policies based on three premises: i) strengthening national investment planning and coordinating among countries to increase its synergies; ii) standardizing and harmonizing regulatory and institutional aspects; and iii) developing a portfolio of projects that encourage private sector participation and innovative financing schemes.

In practice, IIRSA organizes 12 integration hubs serving all of South America, complemented by six sectoral integration processes that deal with issues common to the development hubs, particularly technical harmonization and institutional and regulatory coordination among countries (Table 6.3).

Implementation mechanisms. The action plan calls for the commitment of senior government author-

Table 6.3 IIRSA Development Hubs and Sectoral Integration Processes

Development hubs	Sectoral processes
Mercosur-Chile hub	Multimodal transport operating systems
Andean hub (Caracas-Bogotá-Quito-Lima-La Paz)	Air transport operating systems
Brazil-Bolivia-Peru-Chile inter-oceanic hub	Facilitating border crossings
Venezuela-Brazil-Guyana-Suriname hub	Harmonization of Internet technical and regulatory policies
Orinoco-Amazon-River Plate Multimodal hub	Instruments for financing regional physical integration projects
Amazon multimodal hub (Brazil-Colombia-Ecuador-Peru)	Normative frameworks for regional energy markets
Atlantic maritime hub	
Pacific maritime hub	
Neuquén-Concepción hub	
Porto Alegre-Asunción-Jujuy-Antofagasta hub	
Bolivia-Paraguay-Brazil hub	
Peru-Brazil hub (Acre-Rondônia)	

Source: IIRSA (2000).

ities, technical and financial support from regional multilateral organizations, and technical working groups of national experts, including those in the private sector. The goal is to identify and prioritize projects by establishing timetables, sequential objectives and specific tasks for the working groups regarding the integration hubs and sectoral processes.

Puebla-Panama Plan (PPP)

The Mesoamerican region between Puebla and Panama, with a population of 64 million and a GDP of \$143 billion, shares valuable characteristics such as a cultural and historical affinity, integrated ecosystems, a strategic location, common social and economic challenges, and a shared potential for development.

The region covers 503,200 square kilometers in southern and southeastern Mexico, with an average GDP per capita of \$2,300 and exports totaling \$13.5 billion. The Central American portion, which includes Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala, Belize and Panama, has a total area of 522,900 square kilometers, with an average GDP per capita of \$1,900 and exports totaling \$12.8 billion.

Despite the common ground between these countries, intra-regional trade levels between Southern Mexico and Central America are relatively low. And while cooperation in social and environmental areas is increasing, it continues to be below its potential. This initiative will produce the demand necessary to gener-

ate economies of scale in basic infrastructure, thereby improving regional competitiveness.

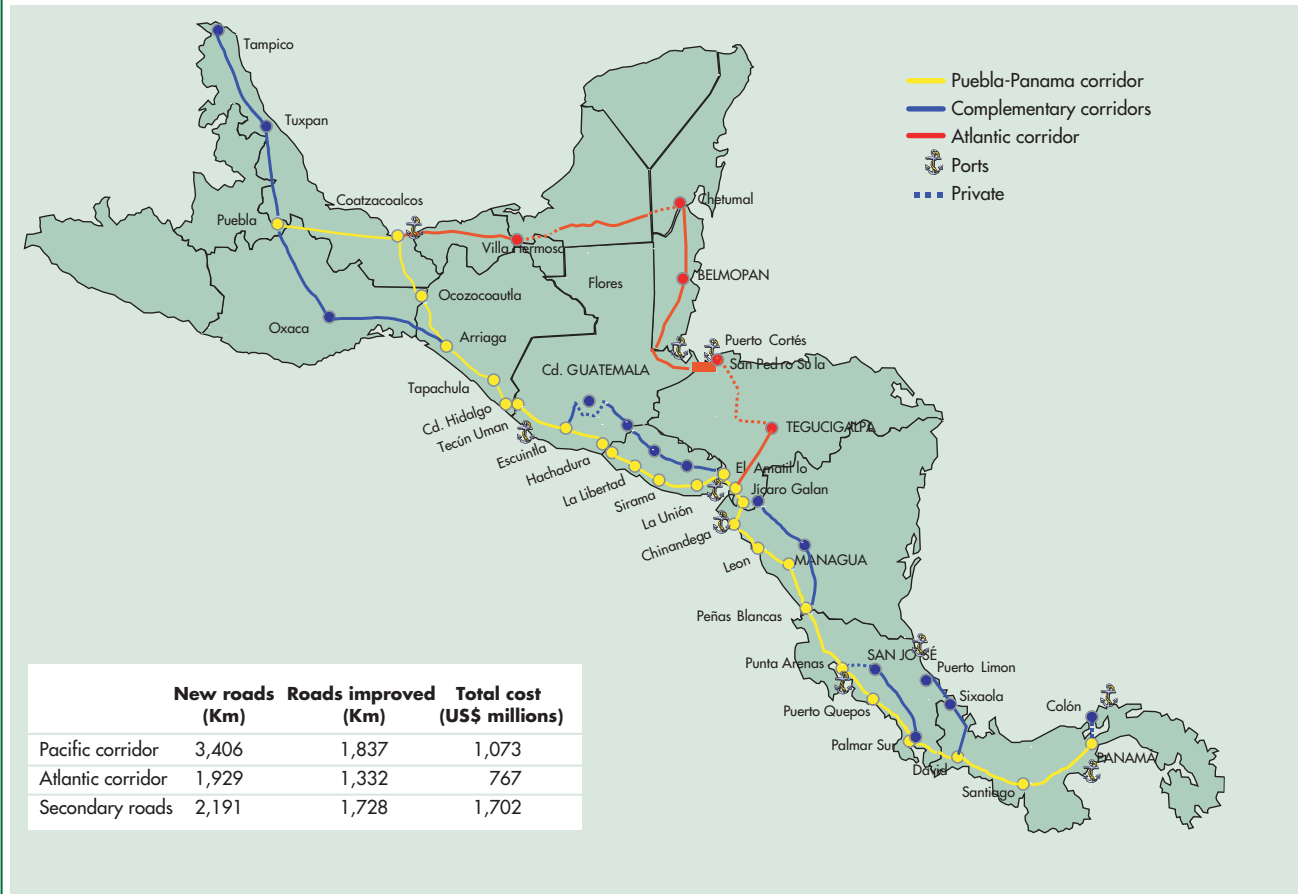
The Puebla-Panama Plan is managed by an Executive Commission, which is composed of one delegate from each of the eight countries involved, and an Inter-institutional Technical Group that provides support in areas relevant to regional development. The group includes representatives from the IDB, the Economic Commission for Latin America and the Caribbean (ECLAC), and the Central American Bank for Economic Integration (CABEI).

Infrastructure objectives and proposals. The proposed integration infrastructure and targets outlined in the plan are highway integration and energy and telecommunications interconnections. The initiative also sets out proposals in other important regional development areas such as sustainable development, human capital development, disaster prevention and mitigation, promotion of ecological, cultural and historical tourism, and the facilitating of trade.

Highway integration. The initiative calls for integration projects involving main highway construction, rehabilitation and improvements in the region; modernization of customs and border points; and the harmonization of transportation codes and technical regulations.

To establish the location of priority corridor and secondary roads to meet the integration objective, minimum infrastructure requirements were taken into account as well as realistic fiscal assumptions. The five-

Figure 6.5 Puebla-Panama Plan: Road Integration



Source: Puebla-Panama Plan (2001).

year work plan covers over 8,000 kilometers, including some 5,000 kilometers slated for improvements, at a total estimated cost of \$3.5 billion, 50 percent of which is in Mexico. The transportation plan covers the Pacific and Atlantic highway integration corridors, as well as the secondary roads of the Puebla-Panama corridor. These projects are intended to facilitate port access to better integrate southern Mexico with Central America, and to improve the transport corridor linking the region with markets of northern Mexico and the United States (Figure 6.5).

Energy interconnection. This is aimed at unifying and interconnecting electricity energy markets with a view to promoting increased investment in the sector and lower electricity rates. The size of the region's electricity market is relatively small. In 2000, the region

had a maximum capacity of 4,600 MW⁵ and electric energy requirements totaling 25,000 gigawatts per hour (GWh). It is estimated that by 2005, maximum installed capacity will be 6,400 megawatts, with requirements increasing to an estimated 34,800 GWh. These levels of demand are best met by constructing larger plants than those currently in operation, and by attracting private plants that can generate electricity on more favorable terms and prices than is currently pos-

⁵ In comparison, neighboring countries such as Mexico and Colombia have installed capacity of 36,400 MW and 13,200 MW, respectively.

Figure 6.6 Puebla-Panama Plan: Energy Interconnection

Source: Puebla-Panama Plan (2001).

sible. To this end, the countries decided to create a regional electricity market and to build a new regional electricity interconnection grid (Figure 6.6).

The Central American Electric Interconnection Project (SIEPAC) involves developing a wholesale electricity market in Central America, including regional transmission systems. The regional market involves an interconnected network supported by a single 230 Kw line from Guatemala to Panama with a total length of 1,830 kilometers. In this regional market, qualified agents would be free to buy and sell electricity, with nondiscriminatory access to the transmission network, in exchange for payment of a flat fee. The market would develop gradually, providing a permanent way of effecting commercial transactions for electricity,

through short-term transactions, based on the provision of electricity using regional economic criteria and through medium- and long-term contracts between agents.

The development of a regional electricity market will face two major challenges: design and implementation of the regional regulatory framework, and establishment of regional institutions. Political independence and technical capacity of the regulating agencies is essential to ensure effective competition, particularly in the generation and distribution of electric power, and to promote investment by reducing project risk. In addition, the project will promote the convergence of national liberalization plans as well as greater coverage of services.

Telecommunications. The strategy in this area is to develop the region's computer interconnection infrastructure and provide citizens, particularly rural and vulnerable groups, with greater access to global information. This requires developing telecommunications infrastructure and establishing a regional regulatory framework to promote private and public investment in connectivity. From a technical standpoint, the project calls for a fiber optic network with a total length of approximately 5,500 kilometers linking the Central American nations to the southern and southeastern states of Mexico and the rest of the world. There may be opportunities to jointly develop these telecommunications networks simultaneously with the initiatives for the regional electricity transmission grid. A second fiber optic network to strengthen the Central American system is currently in the planning stages and will be based on the SIEPAC line wiring. Both networks will support information transmission speeds of up to 2.5 gigabytes/second.

LOOKING AHEAD

Historically, transnational projects in Latin America largely have been bilateral in nature, due to key input or market locations or to political, historical or economic ties. As these ties become increasingly regional in scope, there will be greater needs and significant

opportunities for regional infrastructure projects. These projects will be critical to strengthening and extending existing economic and trade networks, and thereby supporting improved competitiveness and development.

There is a need for a shared strategic vision that addresses infrastructure priorities; identifies physical and institutional bottlenecks; promotes policies that support regional economic, financial and political stability; and envisages the form and extent of private sector participation.

Regional initiatives based on this shared strategic vision can spur infrastructure projects by providing better information about benefits, creating regional mechanisms to allocate the costs and benefits of the investments, and harmonizing regulatory and institutional frameworks for sectoral and concession activities. These efforts will increase the confidence of countries in the likelihood of gaining long-term benefits from projects that are (at least partially, if not wholly) physically located outside their borders.

Long-term support for regional development will best be spurred by concrete examples of successful regional infrastructure initiatives. IIRSA and the Puebla-Panama Plan, just to cite two examples, are of critical importance not only because of the specific benefits they will bring, but also to show the value of regional coordination in infrastructure planning and investment.

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