



# Part II

## Infrastructure for transition

### Chapter 3. Inherited supply, market demands and the environment

- 3.1 Infrastructure for transition – 34
- 3.2 Telecommunications – 35
- 3.3 Electric power – 37
- 3.4 Water and waste water – 41
- 3.5 Transportation – 44
- 3.6 Concluding remarks – 47

### Chapter 4. Commercial infrastructure: pressures and potential

- 4.1 Public provision and private participation – 49
- 4.2 Approaches to commercial infrastructure – 54
- 4.3 Private participation and progress in transition – 57
- 4.4 Mobilising private finance – 58
- 4.5 Concluding remarks – 60

### Chapter 5. Regulation and competition in infrastructure

- 5.1 Design of regulatory institutions – 63
- 5.2 Tailoring reforms to sectors and challenges – 64
- 5.3 Concluding remarks – 75



# Inherited supply, market demands and the environment

Provision of infrastructure services in centrally planned economies was distinguished from that in market economies in at least three ways. First, services, such as electric power, water and rail freight transport, were abundantly supplied to enterprises as part of a strategy of directed growth involving a mechanical approach to the “required” inputs. This strategy focused more heavily on expanding inputs than on achieving gains in productivity. As a result, infrastructure services were supplied to enterprises with little regard for their costs of production, including consequences for the environment. Second, with an ideological bias in favour of material production and a neglect of services, there was relatively little investment in telecommunications, despite its potential for improving productivity. Third, basic infrastructure services, such as electricity, water and waste water and urban transportation where available, were provided to households for free or for a nominal charge as part of an approach to allocating resources in which basic consumer goods and services were supplied at prices below costs.

The transition to a market economy thus has profound effects on infrastructure. The provision of infrastructure services must adapt to recognise costs, to meet new market demands and to address concerns for the environment. Tariff levels and structures must adjust to ensure a more socially efficient allocation of infrastructure services and to guide new investment decisions throughout the economy. In some infrastructure sectors, such as railways and electric power, market adjustment involves lower service levels, albeit of greater reliability and higher environmental standards. Other sectors, such as telecommunications and road transportation, must respond to expanding demands. In the old system, infrastructure sectors played a central role in the process of environmental degradation, both through their own production and in their encouragement of wasteful use of resources, particularly electricity and water. Achieving higher environmental standards is an important part of the transition.

This chapter focuses on four infrastructure sectors in transition economies where the imbalances between inherited supplies and market demands and environmental concerns were large and the gaps between administered tariffs and socially efficient prices were wide. The sectors covered are telecommunications, electric power, water and waste water and transportation. To describe supply in infrastructure as inherited refers to the fact that the existing capital stock in infrastructure was, for the most part, put in place under central planning. The flow of new investment has been small relative to this stock, particularly in early and intermediate stages of transition when uncertainty was high.

Assessments of prevailing imbalances in markets for infrastructure services are made in three ways. First, measures of infrastructure network size indicate the extent of inherited supply capacities. Second, changing patterns of demand for infrastructure services relative to GDP or indicators of unmet demands point to the required directions of change in infrastructure supply. Third, tariff levels and structures compared with benchmarks in industrialised and developing market economies identify reform requirements. The chapter also examines the impact of infrastructure on the environment, both under central planning and in the transition towards market principles.

While this chapter aims to characterise key challenges in infrastructure in transition economies, the following two chapters analyse approaches to meeting these challenges. Chapter 4 examines pressures for a more commercial approach to infrastructure and the potential it creates for restructuring infrastructure, including increased investment and access to private finance and greater operational efficiency. Chapter 5 considers government’s role in supporting a more commercial approach to infrastructure in the four sectors examined by this Report. This role involves establishing boundaries between competition and regulation in infrastructure and providing effective regulation where competition is not possible.

Before turning to a detailed analysis of infrastructure in transition economies, Section 3.1 briefly examines the ways in which infrastructure can promote the transition. Sections 3.2 to 3.5 analyse the transition-related challenges in telecommunications, electric power, water and waste water and transport. Section 3.6 provides conclusions.

## 3.1 Infrastructure for transition

Infrastructure has a pervasive influence on the whole economy. Telecommunications, electricity and water are used in the production of virtually every sector of an economy, while transportation is necessary for the distribution of commodities. The quantity and quality of infrastructure services is therefore an important determinant of private sector productivity and output. In fact, there is a strong association between the availability of certain infrastructure – telecommunications (in particular), power, surfaced roads and safe water – and per capita GDP.<sup>1</sup> The relationship involves both the supply side, in terms of the contribution of infrastructure to the generation of higher GDP, and the demand side, as higher incomes in turn generate higher demands for infrastructure services. Infrastructure thus makes an important contribution to expanding output.

<sup>1</sup> See World Bank (1994), Chapter 1.



The impact of infrastructure on transition, however, extends beyond enhancing productivity and output to include the way in which markets and market institutions develop. Many relationships among enterprises and between producers and consumers which were inherited from central planning have not withstood the test of the market, and infrastructure plays a pivotal role in their change. Adequate telecommunications and flexible transportation services, in particular, are necessary for forging new business relationships, including those with trading partners. Infrastructure can also enhance the effectiveness of markets, in particular by lessening the restraining effect of distance on competition.<sup>2</sup>

Promoting higher environmental standards is also crucial to the transition. Infrastructure has a positive impact on the environment largely through waste-water treatment and through an efficient transport network. Raising the effectiveness of waste-water treatment and improving water resource management are major challenges in the region. While problems of urban congestion were to some extent avoided under central planning, the sharp increase in personal transportation in the transition is now raising concerns about them. Infrastructure can also have a negative impact on the environment. The most significant contributors to air pollution in the region are electric power plants, many of which are fired by coal, lignite and oil shale. The safety of nuclear power plants is also a significant environmental concern. Addressing these environmental legacies of central planning is a priority.

3.2 Telecommunications

With a bias towards material production and a neglect of services, central planning placed a low priority on provision of public telecommunications services.<sup>3</sup> Hierarchical network structures reflected concerns for security and bureaucratic control of the economy, with relatively limited access to telecommunications by both enterprises and households. Much of the technology was antiquated (analog rather than digital) and unreliable. While some countries have invested significantly in network expansion in recent years, particularly those taking a commercial approach to the sector, there are long waiting lists for services in much of the region. There is also a definite willingness to pay for services, particularly by business users, despite tariff structures being designed to cross-subsidise household users from the income from business users.

Networks

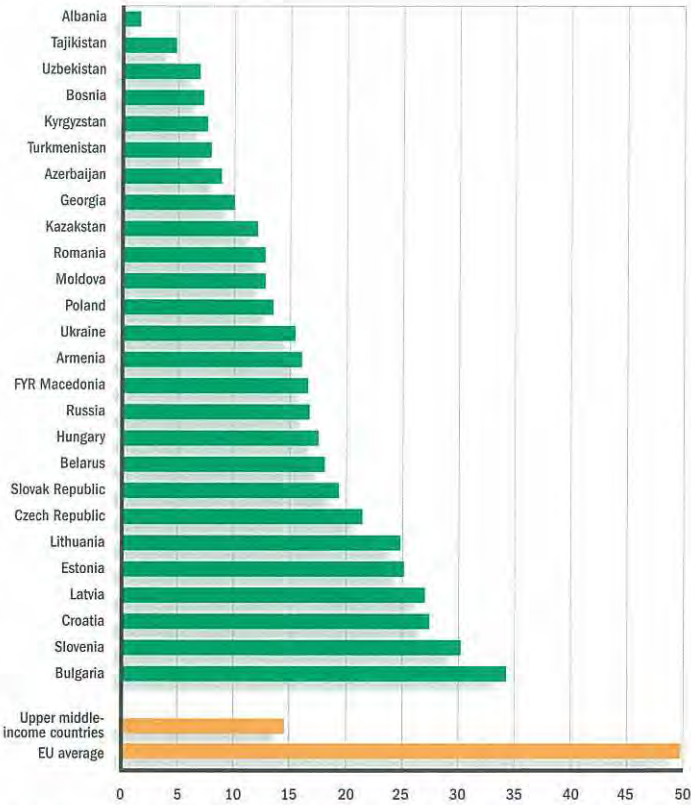
The size of a country's telephone network is typically measured by the number of telephone lines relative to the size of the population, the so-called network penetration rate. Chart 3.1 shows that the network penetration rates in transition economies are on average similar to those in upper middle-income developing countries with comparable per capita income levels. However, the rates are only between one-quarter and one-half of those in the European Union. The low penetration levels persist despite a

belated effort under central planning to place a higher priority on telecommunications services as awareness of their importance to enterprise productivity increased.

The chart also shows considerable variation within the region. These differences among countries are associated in part with variations in per capita GDP.<sup>4</sup> In part, GDP per capita may serve as an indicator of the extent of a country's rural population, which tended to receive fewer infrastructure services under central planning than urban areas did. It may also reflect the affordability of services in the transition. However, one transition country, Bulgaria, is providing services beyond the level expected from this perspective. This country was a major supplier of telecommunications equipment within the former trading block and pursued a significant expansion of telecommunications under central planning.

While network penetration rates in transition economies tend to be relatively low, at least compared with those in the EU, most countries are currently investing in network expansion, sometimes substantially.<sup>5</sup> The countries with the largest investment in telecommunications networks relative to GNP (at purchasing-power-parity exchange rates) are typically those that have pursued

Chart 3.1  
Telecommunications network penetration rates, 1994  
Main telephone lines per 100 of population



Source: International Telecommunications Union.

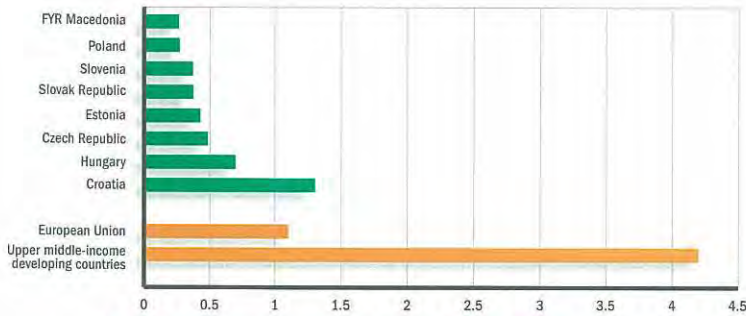
<sup>2</sup> See Aghion and Schankerman (1996).  
<sup>3</sup> See International Telecommunications Union/OECD (1992, 1994a) and Campbell (1995) for analyses of telecommunications in transition economies.  
<sup>4</sup> See International Telecommunications Union/OECD (1994a).  
<sup>5</sup> Davies et al. (1995) examines key technological options in expanding telecommunications networks in transition economies.



Chart 3.2

Telecommunications network expansion, selected countries, 1994

Investment in per cent of GNP at purchasing-power-parity exchange rates



Sources: International Telecommunications Union and World Bank.

a commercial approach to the sector (see Chart 3.2). These countries either have opened telecommunications to private sector participation, as in the Czech Republic, Estonia and Hungary, or have strengthened the commercial orientation of public utilities, as in Croatia, FYR Macedonia, Poland and Slovenia.

In terms of quality, inherited networks are burdened with a high percentage of outmoded equipment and high fault rates. The information on faults per number of main lines, a standard measure of service quality, is incomplete for the region. For those countries where data are available, the average is 45 faults per 100 main lines in 1994, compared with an average rate of 34 for upper-income developing countries and 13 for those in the EU. The recorded fault rates in the region, however, range widely, from 10 (Latvia) to 95 (Romania).

The most effective route to increasing service quality is the installation of digital exchanges, and there are extensive efforts being made to replace the most unreliable equipment. The extent to which main lines are connected to digital exchanges is rapidly increasing in some countries, with several (Croatia, Hungary and Slovenia) reaching about two-thirds of the EU average.

Waiting lists and cellular services

Official waiting lists show that between 1 and 8 per cent of the population of transition countries are on a waiting list for network access, but the demand for telephone connections is in all likelihood considerably higher. The average expected waiting time for services is three years, compared with an average of one year in upper middle-income developing countries and less than one month in the EU (see Chart 3.3). With such long waiting times in transition economies, there may well be a significant number of discouraged potential subscribers who have not yet joined the queue for services.

Development of cellular networks in transition economies provides one example of customers' willingness to pay for quick access to reliable services. This willingness is particularly true of businesses and high-income households. While the cellular

network penetration rates in transition economies are still comparatively small, the growth rates in the number of subscribers are considerable in some countries. In Estonia, Hungary and Slovenia, these network penetration rates have reached levels which approach those in Belgium, France and Spain. This level of demand has been achieved despite the fact that charges for cellular services are substantially above both those for fixed services in the region and those for cellular services in the EU. Surveys of business users in the region confirm this willingness to pay for quick access to reliable telecommunication services.<sup>6</sup>

Tariffs

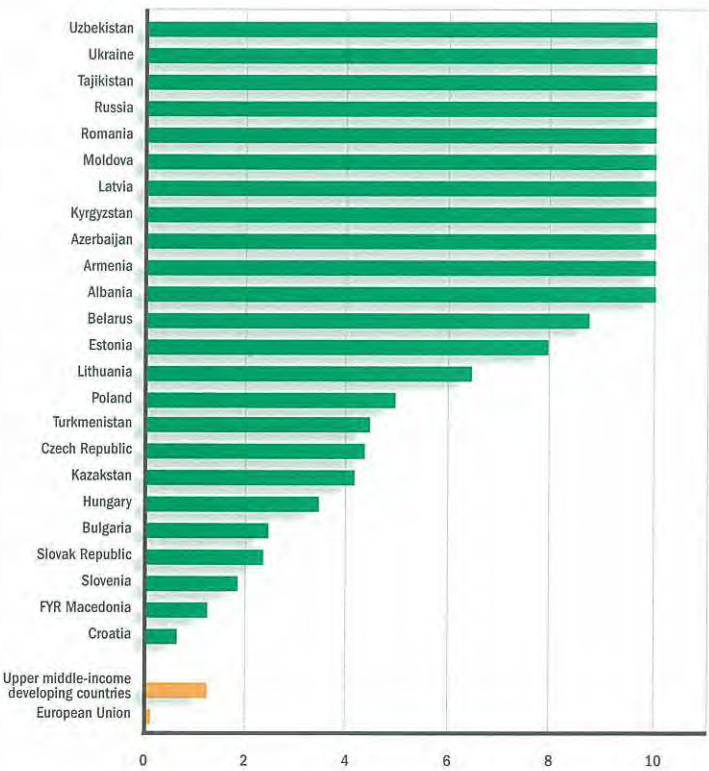
The tariff structure under central planning consisted of subsidised but limited services for households (local calls were largely unmetered and free) while high charges were levied on enterprises for long-distance and international services. However, this tariff structure does not reflect the cost of services, for which the distance of a telephone call is not the dominant factor. The major component of service cost is connection to the network itself.

While detailed data on long-distance and international tariffs are not available, average monthly subscription charges for households and businesses provide some indication of tariff levels and structures. Chart 3.4 shows average monthly subscription charges for both household and business consumers for countries in the

Chart 3.3

Average waiting times for connection to telecommunications services, 1994

In years



Source: International Telecommunications Union.

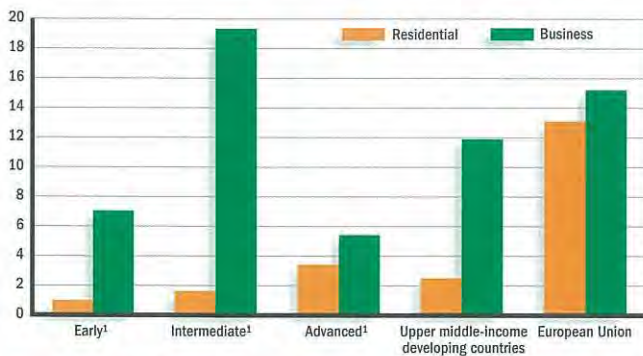
<sup>6</sup> See International Telecommunications Union (1994b).



Chart 3.4

### Average telecommunications tariffs by countries' stages of transition, 1994

Monthly subscriptions in US dollars



Source: International Telecommunications Union.

<sup>1</sup> Average of countries for which data are available.

region grouped by their stages of transition.<sup>7</sup> A comparison across these stages reveals how tariff levels and structures have evolved during the transition. As a rule, those countries at more advanced stages of transition have adjusted tariff structures to allow for more balanced charges between households and businesses and have raised the overall level of tariffs. An exception to this rule is the very high tariffs levied on business users in countries at intermediate stages of transition. Nevertheless, tariff levels in countries at advanced stages of transition remain below the average for household and business users in both upper middle-income developing countries and those in the EU.

Tariff rebalancing raises a number of difficult issues. The first is the impact on households paying for the full cost of services. Those countries in the region that have gone the furthest in rebalancing the structure of tariffs and raising their level are also those with higher per capita incomes. Second, there are benefits to all users as more subscribers join the networks. A case may be made, therefore, for subsidising new subscribers, particularly where the density of networks is low, as in transition economies. However, the argument for subsidising access is weaker where there are long waiting times for new connections. In such circumstances, the priority should be on speeding up connection times. Third, competition in international services is beginning to erode the current cross-subsidisation of services. While very high international tariffs continue to provide the bulk of revenues for dominant service providers, the advent of advanced international call-back services, the Internet, and other services are placing strong competitive pressure on international tariffs worldwide.

Together with tariff rates and collection efforts, telephone usage determines the revenue performance of the service providers. In some countries at more advanced stages of transition, dominant telecommunications operators have raised revenue per line substantially. Those countries with the highest revenue per line, in

the range of US\$ 300 to US\$ 400 in 1994, include Croatia, the Czech Republic, Estonia, Hungary, Poland and Slovenia. In comparison, the average revenue per line in the EU is US\$ 881, while that in upper middle-income developing countries is US\$ 641. The relatively low levels of tariffs in much of the region limit the extent to which internal cash flows and private finance can be raised for new investments.

### Summary

Low network densities compared with those in the EU (but comparable with those in upper middle-income developing countries), long waiting times for access to services and clear willingness of some users to pay for access to the service illustrate the significant shortage of telecommunications services in the region. The structure of tariffs falls relatively heavily on businesses and more lightly on households, and the overall level of tariffs remains low in most countries. The need for investment in this sector to expand capacity and to improve service quality is substantial. In the EU, investment in telecommunications in 1994 amounted to about 1 per cent of GNP (at purchasing power exchange rates), while in upper middle-income developing countries the figure was 4 per cent. With investment financing requirements in this range, the necessary expansion in networks will not be achieved without recourse to private finance. However, unlocking this finance will require a commercial approach to telecommunications and credible reform of tariff structures. These issues are taken up in Chapters 4 and 5.

### 3.3 Electric power

Lenin stated: "Communism is Soviet power plus the electrification of the whole country".<sup>8</sup> Accordingly, central planning in the former Soviet Union and eastern Europe placed a high priority on abundant supplies of electric energy for material production and household consumption. Electricity supply was shaped primarily by quantitative planning requirements, with little attention to costs. With this history, electricity intensity per unit of output in transition economies remains well above levels in industrialised market countries. At the same time, tariffs for electricity generally remain well below levels that are consistent with cost recovery. The structure of tariffs is often inverted in the sense that residential tariffs are below those for industrial users, even though the cost of supplying services is less for industrial users than for households. The electric power sector is a major source of air pollution in the region, particularly in those countries that rely on coal, lignite and oil shale as the primary energy source. Also, nuclear plants in some countries raise important safety issues.

### Generation and networks

The installed generation capacities in the countries of eastern Europe, the Baltics and the CIS were designed to meet electric energy requirements prior to the transition. Since demand has declined in most transition economies since 1989, the installed capacity now exceeds present requirements in the region as a whole and in most individual countries. However, many thermal

<sup>7</sup> See Chapter 2 for a discussion of measuring stages of transition and the classification of countries.

<sup>8</sup> Report of the Eighth All Russia Congress of Soviets on the work of the Council of People's Commissars, 1920.



plants in transition economies are comparatively old and often not well maintained. In addition, the coal and lignite used in these plants are often below the quality for which the boilers of existing power plants were designed. As a result, the effective capacity of power plants is often below their design levels.

The electric power systems in the region are also inefficient in the sense that they use larger amounts of primary energy per kilowatt hours (kWh) of electric energy output than do the power supply systems in industrialised market economies. The overall thermal efficiency of coal- or lignite-fired power stations in the transition economies is usually below 30 per cent and in many cases only in the 20 to 25 per cent range. This compares with thermal efficiencies of about 35 per cent for modern coal-fired plants in the EU and up to 50 per cent for gas-fired combined cycle plants. Furthermore, technical transmission and distribution losses in power supply systems of transition economies are often in the order of 10 per cent of net generation and sometimes as high as 15-20 per cent, whereas in western Europe they are usually between 4-9 per cent.

The structure of power generation by primary energy source varies greatly among transition economies, as it does among industrialised market economies (see Table 3.1). Among those countries that rely heavily on thermal generation, Estonia uses mainly high-sulphur oil shale, while hard coal and lignite together account for 94 per cent of power generation in Poland. Natural gas is the single most important primary energy in the power sector of Moldova, the Russian Federation and Uzbekistan. Two nuclear reactors accounted for 77 per cent of total electricity generation in Lithuania, while the share of nuclear plants in Bulgaria, Hungary and the Slovak Republic is also substantial. Hydroelectric power accounts for over 90 per cent of generation in Albania and Kyrgyzstan.

The transmission system of the former Soviet Union was dominated by the Integrated Power System (IPS), which consisted of six large interconnected regional grids covering the more densely populated parts of the Soviet Union. This system is technically still in operation, although the newly independent countries now operate their own dispatch centres and the volumes of electric energy exchanged between countries have been reduced, as each participant tries to be self-sufficient in electricity.<sup>9</sup> However, imports and exports are significant relative to consumption and production in a few countries, such as Estonia, Kyrgyzstan and Lithuania (net exports), and the western region of Kazakhstan and Latvia (net imports). The power grids of the former communist countries in eastern Europe were also synchronised with the IPS. However, in 1992 Poland, Hungary, the Czech Republic and the Slovak Republic formed an association aimed at making a joint simultaneous connection with the continental west European grid, to which they were joined in 1995.

<sup>9</sup> Although this may be politically understandable, it is often not efficient.

<sup>10</sup> Northern America refers to Canada and the United States.

Table 3.1

### Production of electricity by primary energy source, 1994

	Total production GWh	Thermal	Nuclear (in per cent)	Hydro
<b>Transition countries</b>				
Albania (1993)	3,450	3	0	97
Armenia	5,658	38	0	62
Azerbaijan	2,400	0	0	100
Belarus	—	0	0	0
Bulgaria	38,133	56	40	4
Croatia	8,174	40	0	60
Czech Republic	58,705	75	22	3
Estonia	9,151	100	0	0
FYR Macedonia	5,511	87	0	13
Georgia	—	0	0	0
Hungary	33,486	58	42	0
Kazakhstan	—	0	0	0
Kyrgyzstan	12,499	6	0	94
Latvia	4,440	26	0	74
Lithuania	10,055	16	77	7
Moldova	8,228	97	0	3
Poland	135,347	97	0	3
Romania	55,136	76	0	24
Russia	875,942	69	11	20
Slovak Republic	24,740	32	49	19
Slovenia	12,681	37	36	27
Tajikistan	—	0	0	0
Turkmenistan	—	0	0	0
Ukraine	202,994	60	34	6
Uzbekistan	47,000	86	0	14
<b>Eastern Europe<sup>1</sup></b>	375,363	74	16	10
<b>Baltics<sup>1</sup></b>	23,646	50	33	17
<b>CIS<sup>1</sup></b>	1,154,721	67	14	19
<b>European Union</b>	2,267,240	51	35	14
<b>United States</b>	3,473,616	72	20	8

Source: International Energy Agency.

<sup>1</sup> Average of countries for which data are available.

### Changing demands

In 1994 the electricity intensity of output, as measured by the consumption of electric energy per unit of GNP at purchasing-power-parity (PPP) exchange rates, was twice as high in eastern Europe and the Baltics as in the EU (see Chart 3.5). The electricity intensity in the CIS was even greater, exceeding that in northern America by a factor of two.<sup>10</sup> The electricity intensity in northern America is about 50 per cent greater than that in the EU, reflecting differences in costs of primary energy (including transport costs) and in energy taxation.

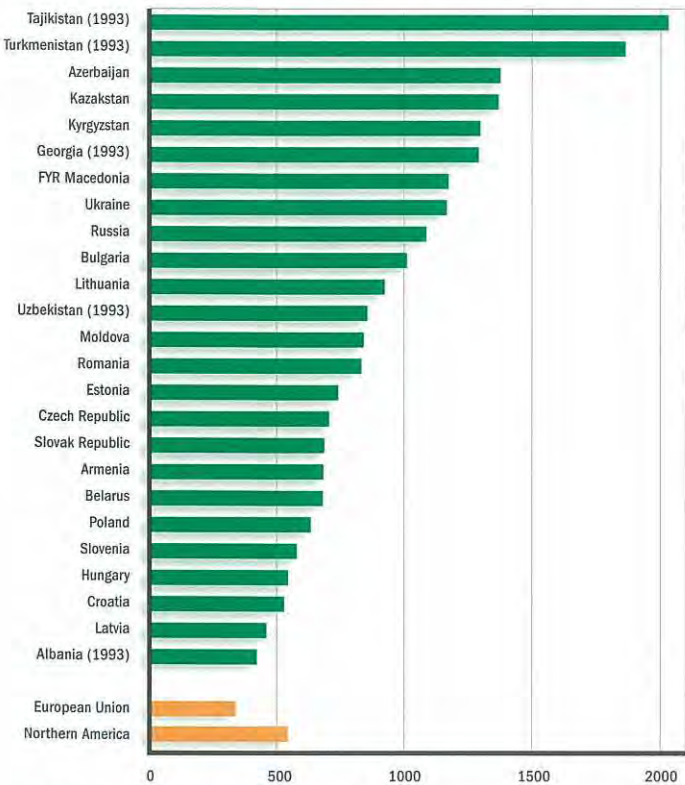
Variations in electricity intensity among the transition economies are significant, as they are among the industrialised market economies. The Central Asian countries and Azerbaijan, which are rich in primary energy resources, show on average higher electricity intensities than much of eastern Europe and the Baltics.



Chart 3.5

Electricity intensity of output, 1994

Electricity consumption per US\$ 1,000 of GNP at PPP exchange rates



Sources: International Energy Agency and World Bank.

Two countries in eastern Europe and the Baltics which have relatively high energy intensities (Bulgaria and Lithuania) also rely heavily on nuclear power generation.

In the EU, industry typically accounts for between one-third and one-half of total electricity demand, with households and small-scale commercial users each accounting for about half of the remainder. In transition economies, particularly in the CIS, industry's share of electricity consumption was typically higher at the beginning of transition. In 1990, for instance, industry accounted for 60 per cent of electric energy demand in Russia<sup>11</sup> and 65 per cent of the demand in Ukraine,<sup>12</sup> reflecting the priority attached to abundant supply of power for material production. Much of the high energy intensity of the transition economies can be attributed, therefore, to industry.

Since 1989, consumption of electric power has declined in all countries in the region, with the exception of Kyrgyzstan. The cut-backs have been the greatest in the Baltics, where electricity consumption has fallen by over 30 per cent. In the CIS and eastern Europe the declines have been 22 per cent and 16 per cent respectively (see Chart 3.6). The fall in energy consumption matches the decline in real GDP in eastern Europe as a whole as well as in most countries of that region. However, in the CIS and the Baltics, GDP has fallen much more than electricity consumption. This may reflect in part the difficulties in measuring real

output, particularly in the CIS, where statistical coverage of the new private sector is often weak.

While industrial consumption of electric energy has declined substantially in the region, households in transition economies consumed more electric energy in 1994 than in 1989, despite the fall in disposable incomes over the period. The reasons for the increase in residential electricity consumption include the improved access of households to electrical appliances and in some cases a switch from coal and oil to electricity for heating – for example, in cases where primary energy prices have increased relative to effective electricity tariffs.

Tariffs

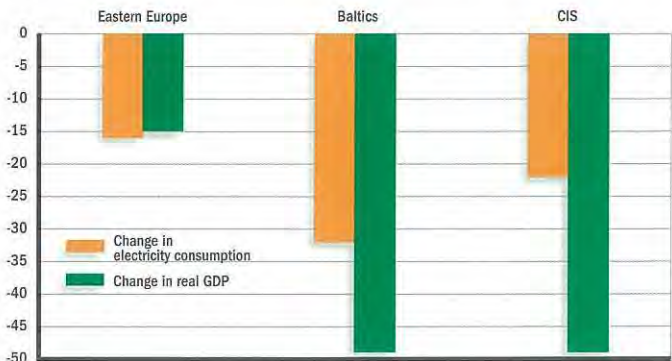
Electricity tariffs should be set at a level which aims to ensure the financial viability of power utilities and to encourage efficient use. Financial viability requires an adequate return on invested capital, with depreciation based on appropriately valued assets. Efficiency in distribution demands that tariffs reflect the cost of supply, including the external costs associated with electricity generation. It is important to recognise that households are more costly to supply than large industrial consumers per unit of electricity. Reasons for this include the higher distribution costs to households and the fact that households contribute much of the peak-load demand, which is normally supplied by the generation capacity with the highest marginal costs.

In most advanced industrialised countries, power utilities are typically financially profitable, although questions are raised as to whether electricity tariffs fully reflect costs, including those associated with pollution and decommissioning of nuclear power plants. In the EU, electricity tariffs average 7 US cents per kWh for large industrial users and 15 US cents per kWh for households. These tariff rates include indirect taxes. The comparable tariffs in northern America are 4 US cents per kWh and 7 US cents per kWh respectively. In other words, industrial tariff rates are between 45 and 55 per cent of those for households in industrialised market economies.

Chart 3.6

Change in electricity consumption, 1989-94

In per cent



Sources: International Energy Agency and EBRD.

11 See International Energy Agency (1995).

12 See International Energy Agency (1996).



In gauging the appropriate level of tariffs in transition economies, differences in the costs of primary energy among transition economies, partially reflecting costs of transporting primary energy, must be taken into account. In Russia, Kazakhstan and Turkmenistan, fuel costs, which account for a significant proportion of power supply costs, are below those of both eastern Europe and the EU. This difference reflects in part the abundant supply of natural gas, the cost of which is likely to be below the export price (see Box 3.1). In addition, natural conditions allow the exploitation of hydroelectric power at relatively low cost in several CIS countries, such as Kyrgyzstan and Russia. Since the economic costs of fossil fuels and hydroelectricity are also relatively low in northern America, a comparison is drawn between the electricity tariffs there and those in the CIS. Also, as the economic costs of primary energy in eastern Europe and the Baltics are similar to those faced by EU utilities, tariff levels in these two regions are compared. In 1994, the average tariff level in the CIS was about one-half of the level in the United States. Similarly, the average level in eastern Europe and the Baltics was approximately 50 per cent of the average level in the EU.

The level and structure of electricity tariffs in transition economies also varies with progress in transition. Those countries at early and intermediate stages of transition (primarily CIS countries) still have tariff structures which are inverted, in the sense that charges to industrial users are above those for households. In addition, their tariff levels are low in relation to both those in the EU and the United States (see Chart 3.7). Those countries at advanced stages of transition (primarily in eastern Europe and the Baltics) have begun to rebalance their tariff structures between households and enterprises and to raise their levels.

### Box 3.1

#### Trade in natural gas

Some countries in the region produce substantial amounts of natural gas, including Kazakhstan, the Russian Federation and Turkmenistan, a significant proportion of which is exported to western Europe. In particular, 10 per cent of Russian gas production is exported, accounting for nearly 25 per cent of western Europe's gas consumption. The domestic price of natural gas, however, is likely to remain below central and west European levels not only because of the transport cost component, but also because of restrictions to the export of the very large volumes of gas potentially available. The volume of exports through the Russian pipeline system to western Europe, eastern Europe and the Baltics is limited by:

- the capacity constraints of existing pipelines and their strategic control by Russian interests;
- the desire of western European countries to limit supplies from Russia for reasons related to the security of supply; and
- the interest of the Russian Federation in restricting exports so as not to depress international prices.

As a result, the economic price of natural gas in Russia and other countries with large gas reserves in Central Asia is likely to remain below the net price of gas from European markets in the near and medium term.<sup>1</sup>

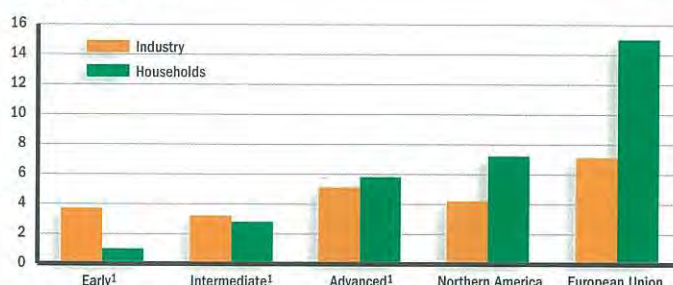
<sup>1</sup> See Gray (1996).

<sup>13</sup> See Freund and Wallich (1996).

Chart 3.7

#### Electricity tariffs by countries' stages of transition, 1994

In US cents per kWh



Sources: International Energy Agency.

<sup>1</sup> Average of countries for which data are available.

With low and inverted tariffs, reflecting in part past use of electricity as a mechanism for distributing benefits and resources under central planning, it is important to recognise that untargeted subsidisation of electricity can be a regressive measure. This adverse effect arises to the extent that higher-income households consume more electricity than do lower-income households, not only on a per capita basis but also as a proportion of income.<sup>13</sup> Thus, it can be more effective to support low-income households with targeted social security benefits.

Within the sector, the provision of a basic or life-line service for households at subsidised tariffs rates can also help to ease the impact of tariff increases on those who are unable to afford cost-reflective tariffs. One way to fund this subsidy is to charge progressively higher tariffs for those who consume greater amounts of electricity.

In contrast to district heating, water supply and waste-water disposal, the technical conditions to charge customers individually for the electricity they consume are available in most transition economies, since electricity meters are widely installed. However, not all electricity consumption in the region is actually metered, billed and paid for on time. "Non-technical" losses, largely theft by way of illegal connections and corruption among meter readers, are common in several countries. Some utilities have difficulty issuing bills on time for metered consumption, and often customers are unwilling or unable to pay for their consumption once a bill is received. Mechanisms for enforcing payments are also weak, with an unwillingness to disconnect users for non-payment. As a result, arrears to power utilities account for a significant share of total payment arrears in many transition economies, with state-owned enterprises and government organisations often incurring the largest liabilities. The discrepancy between effective electricity tariffs in the region and those in industrialised market economies is likely, therefore, to be even larger than is indicated in the above chart.

As a result of low effective tariffs, the demand for electric energy is higher in transition economies than it would be if tariffs reflected



costs.<sup>14</sup> Not only is this situation inconsistent with the goal of improving demand-side efficiency, the low tariff levels are also an obstacle to mobilising private finance for electricity investments (see Chapter 4). While increased tariffs and improved collection would initially represent additional expenditure for enterprises and households, these steps would make measures aimed at energy efficiency more attractive, easing the longer-term impact on real incomes.

The environment and nuclear safety

At the start of transition, the power sector contributed substantially to the poor air quality in a number of countries in the region. In 1990, sulphur dioxide emissions from power plants exceeded EU levels on a per capita basis by a factor of nine in Bulgaria, seven in Estonia and six in the area of what is now the Czech Republic (see Table 3.2 and Box 2.4). In these three countries local coal, or oil shale in the case of Estonia, is the primary energy source for power generation, and power generation accounts for the bulk of total sulphur dioxide emissions from all sources.

Since there are no consistent data available on the development of emissions, particularly of sulphur dioxide, since 1990, it is difficult to assess the change in air quality in the transition. Indications are, however, that any improvements to date are limited primarily to the effects of reduced thermal power generation. Strict environmental standards have so far tended to be enforced only for new power plant investments. However, where stricter environmental legislation applies also to existing plants, it is likely to be the driving force behind major power sector investments over the coming years, as for example in the Czech Republic and Poland.

The first generation of Soviet-designed RBMK (Chernobyl-type) and VVER 440/230 nuclear reactors are considered unsafe,

primarily because they do not have a secondary containment structure. Reactors of these types are presently in operation in Armenia, Bulgaria, Lithuania, Russia, the Slovak Republic and Ukraine. In Lithuania, two Chernobyl-type reactors account for about 80 per cent of total electricity generation, while in Bulgaria and the Slovak Republic the share of the VVER 440/230 reactors in electricity generation is around 20-25 per cent of the total.

Fossil-fuel power plants have higher variable costs per kWh of output than hydroelectric and nuclear plants, particularly since fuel costs have increased sharply to near international levels for importing countries since 1989. Where demand for electricity has fallen, utility companies have tended to reduce generation from fossil-fuel plants and to continue using hydroelectric and nuclear plants to the extent possible. As a result, the share of nuclear plants in electricity generation has increased in Bulgaria, Lithuania and Ukraine. Only in Russia has nuclear power generation declined, largely for technical reasons related to the availability and operation of the nuclear plants.

Summary

The main legacies in the power sector are high electricity intensities of output, existing overcapacities of supply facilities albeit needing maintenance and renewal, poor environmental performance and, in some countries, nuclear safety concerns. The inadequate level, structure and collection of tariffs hinders demand-side efficiency and makes private investments in more efficient equipment unattractive. Furthermore, as cash-strapped utility companies are often primarily concerned with the immediate need to purchase fuel to meet demand, they do not have sufficient funds to finance measures aimed at improving the environmental performance and, in some cases, nuclear safety.

3.4 Water and waste water

Although most countries in the region have adequate water resources, an intensive use of water in production and a neglect of the environment under central planning have seriously degraded the quality of this resource in some areas. Water usage by industry and agriculture pushed depletion beyond sustainable levels in parts of the region, while insufficient regard was paid to management of waste water. The provision of piped water and of waste-water facilities for households was free in the former Soviet Union, while tariffs for these services in eastern Europe were at a nominal level under central planning. Tariffs levels and structures for water continue to reflect this history, although those countries at more advanced stages of transition in eastern Europe have witnessed significant real increases in water tariffs in recent years.

Piped water

Available data on access to piped water point to significant variation across countries, both within eastern Europe and the former Soviet Union (see Chart 3.8), with two countries having relatively

Table 3.2  
Emissions of sulphur dioxide in selected countries, 1990

	SO <sub>2</sub> from power plants		Power plants as per cent of total SO <sub>2</sub> emissions
	1,000 tonnes	kg/capita	
Bulgaria	1,453	173	72
Czech Rep.	1,163	113	62
Estonia	217	141	79
Hungary	430	42	48
Lithuania	105	28	47
Poland	1,589	41	49
Romania	903	40	69
Slovak Rep.	243	46	45
Ukraine <sup>1</sup>	1,690	33	65
European Union	8,600	23	50

Sources: EU Commission and International Energy Agency (1996).

<sup>1</sup> Includes emissions from fuel refining and processing.

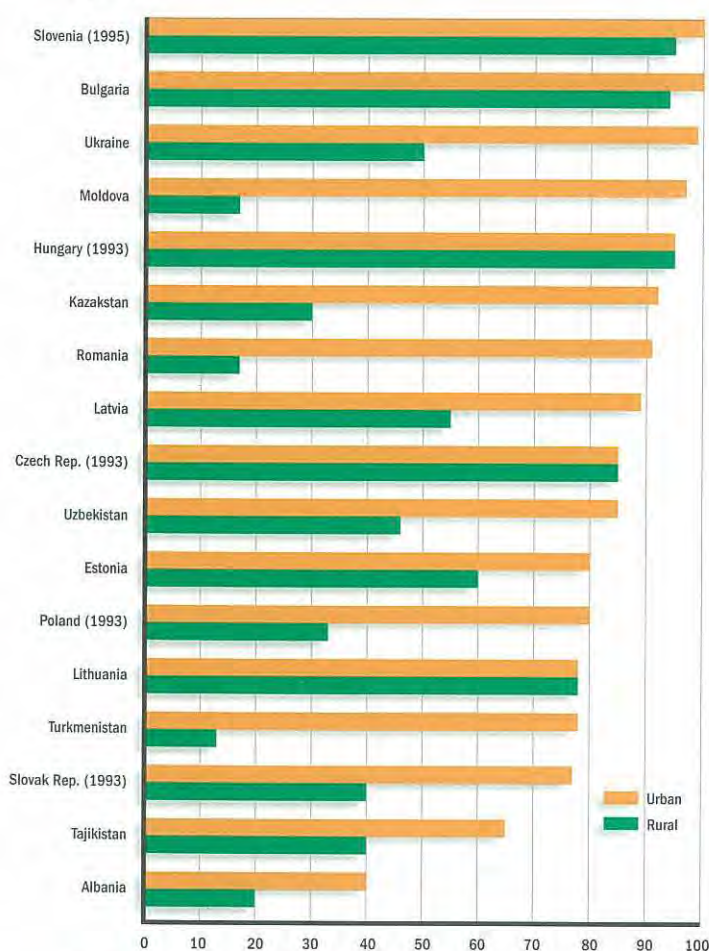
<sup>14</sup> The impact of the low tariffs on demand depends on the price elasticity of demand, which is smaller in the short term than in the long term, when power consumers can adjust the number and type of electrical appliances, production processes and even the location of electricity-intensive industries. Price elasticities within transition countries are difficult to estimate, as the price effects are particularly difficult to distinguish from structural changes in the demand pattern caused by other factors.



Chart 3.8

### Proportion of urban and rural population in households connected to piped water supply (1990)

In per cent



Sources: WHO (various years) and Nelson and Slijovic (1995).

low access to piped water: Albania and Tajikistan. Similarly, within countries, there is often wide variation between urban and rural households in terms of access to piped water. However, in rural areas with sparse populations a decentralised approach to water provision is often more efficient than piped water supply, and this indicator does not capture the extent to which there is access to clean water through wells. It is reported that Russia has relatively high access to piped water, with 75 per cent of the total population and 95 per cent of the urban population connected to piped water supplies.<sup>15</sup>

The extent of connections to piped water, however, is not necessarily equivalent to water delivery, with rationing occurring in some parts of the region. Service interruptions where they occur are due to three main factors: weaknesses in the physical infrastructure, such as leakages and equipment failures; ineffective

demand management; and poorly managed or inadequate water resources.

Ageing piped networks often result in leakages, and estimates of water losses for systems in the region where available range from 25 per cent (Lithuania) to 70 per cent (Albania). In comparison, estimated leakages from piped water supplies in industrialised market economies average about 20 per cent.<sup>16</sup> The second factor contributing to service shortages is the lack of effective demand management. The extent of metering varies widely across the region. In most countries of the region, industrial users are metered, but the extent of metering for apartment blocks and individual housing varies widely. Third, the push for growth under central planning was based not only on the accumulation of physical capital, but also on heavy use of available natural resources. The extensive use of water for irrigation in some countries, particularly in Central Asia, and for industrial processing has depleted water resources or damaged their quality.

The quality of water is also important. The most recent region-wide data on water quality are based on analyses conducted around 1990.<sup>17</sup> The analysis showed that water quality in the former Soviet Union measured according to national standards was poorest in parts of Central Asia and the Baltics and Azerbaijan, due primarily to chemical sources of contamination. The extent to which water quality failed to comply with national chemical standards arose largely from the intensive use of fertilisers and pesticides in agriculture, particularly for cotton production in Central Asia, of chemicals in industry, and to a lesser extent naturally occurring minerals in water resources.

Of the more than 3 million people living in areas adjacent to the Aral Sea, only 3 per cent have access to piped water supply, with the remainder supplied from wells providing extremely poor-quality water according to chemical and biological indicators.<sup>18</sup> In six countries – Belarus, Bulgaria, Hungary, Lithuania, Romania and the Slovak Republic – some water sources are highly contaminated with nitrates used in fertilisers.<sup>19</sup> Industry is an equally important contributor to water pollution. In the Ural region of Russia 33 per cent of non-ferrous smelters and 25 per cent of other metallurgical plants discharge directly into rivers without any form of treatment available.

### Water demand

Some countries in the region use large volumes of water. In the Baltics, Caucasus and Central Asia, in particular, annual water use of some countries is more than 2,000 cubic metres on a per capita basis (see Table 3.3). In comparison, northern America's per capita use of water is just under 2,000 cubic metres, while in the EU it is about one-third of the level in northern America. Some countries in the region thus use water intensively relative not only

<sup>15</sup> See MDIS (1993), an independent consultants report.

<sup>16</sup> See Foreign Investment Advisory Service (1996).

<sup>17</sup> See World Health Organisation (various years).

<sup>18</sup> High and increasing infant mortality rates, increased morbidity from tuberculosis, oesophageal cancer, cardiovascular and blood diseases, and diseases of the digestive organs have been linked to the poor quality of water supply in this area. See WHO (1995a), p.458.

<sup>19</sup> See WHO (1995a), p.187.



**Table 3.3****Annual per capita water use, 1989**

In cubic metres

	Households	Agricultural and industrial	Total
Armenia	149	996	1,145
Azerbaijan	90	2,158	2,248
Belarus	94	200	294
Bulgaria (1988)	43	1,501	1,544
Estonia	105	1,992	2,097
Georgia	156	586	742
Hungary (1991)	59	601	660
Kazakhstan	92	2,202	2,294
Kyrgyzstan	82	2,647	2,729
Latvia	110	152	262
Lithuania	83	1,107	1,190
Moldova	60	793	853
Poland (1991)	42	279	321
Romania (1994)	91	1,044	1,135
Russian Federation (1991)	134	656	790
Tajikistan	123	2,332	2,455
Turkmenistan	64	6,326	6,390
Ukraine	108	565	673
Uzbekistan	165	3,965	4,130
European Union <sup>1</sup>	79	454	583
Northern America <sup>1</sup>	266	1,470	1,736

Source: World Resource Institute (1996).

<sup>1</sup> Most recent year available.

to their population size, but also to the overall level of economic activity. The potential for more efficient use of water thus appears considerable in some countries.

### Water tariffs

Under central planning, water and waste-water sectors relied on governments for significant funding, particularly for capital investment. Charges were kept low to convey benefits to households and to encourage production by enterprises. In the transition, responsi-

bility for the provision of water and waste-water services has largely been devolved to municipalities (if not already done so under the old system), while the flow of central government funds has been sharply reduced in most countries. Many municipalities, however, have not raised tariffs sufficiently to cover operating and capital costs. These changes have led to substantial cut-backs in maintenance and investment.

National data on changes in water tariffs in real terms between 1990 and 1994 are available for a few countries in eastern Europe, although these figures in all likelihood conceal considerable variation within the countries (see Chart 3.9). One development reflected in these figures is that those countries in eastern Europe that are at more advanced stages of transition have tended to raise water rates in real terms for households by more than those at intermediate stages of transition.

As with other infrastructure sectors, the balance between household and industrial water tariffs also tends to fall more heavily on industry, despite the fact that households account for much of the peak loads for which the systems must be designed. Based on a small sample of water tariffs in the region, the ratio of industrial to household tariffs in 1995 was on average five to one, but ranged widely from one to 20. The relative burden on industry tended to be heavier in the CIS than in eastern Europe.

Effective tariff reform also requires extension of metering if more efficient water use is to be encouraged. This is beginning to occur in countries such as Hungary and Poland. In addition, non-payment for services remains a problem in some parts of the region, and there is often an unwillingness to disconnect enterprises and households for not paying. Lastly, it must be recognised that the pricing of water should reflect not only the costs of treatment and delivery, but also the scarcity value of this natural resource.

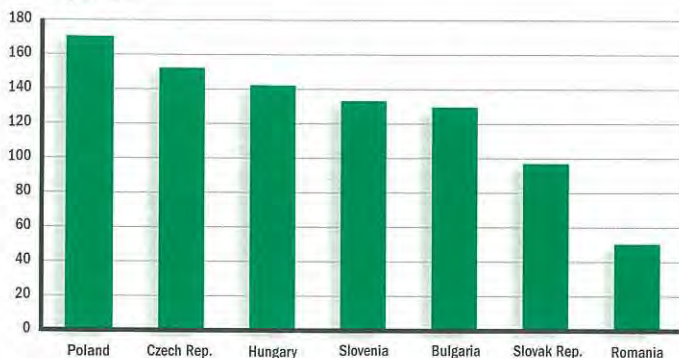
### Waste water and the environment

In eastern Europe, available data indicate that between one-half and three-quarters of households are connected to sewerage systems, with part of the variation reflecting the extent of rural populations. For many rural households, decentralised systems for collecting and treating waste water are often more efficient than centralised systems.<sup>20</sup> In Russia the sewerage connection rate is 60 per cent for the country as a whole, and 85 per cent in urban areas; similar rates are found in Ukraine.<sup>21</sup>

With respect to treatment facilities, a 1993 survey of five eastern European countries concluded that the level of waste-water treatment was poor.<sup>22</sup> Only 50 per cent of waste water at that time received secondary treatment, and the average efficiency of the treatment systems was 70 per cent relative to their performance potential. Many of the treatment plants were compromised by design flaws, outdated equipment and inadequate monitoring and control systems.

**Chart 3.9****Change in household water charges,<sup>1</sup> 1990-94**

In per cent



Source: UNICEF (1995).

<sup>1</sup> Adjusted for inflation.<sup>20</sup> See Somlyódy (1994) and Nelson and Sijivic (1995).<sup>21</sup> See MDIS (1993).<sup>22</sup> See Somlyódy (1994).



The effectiveness of water treatment throughout the remainder of the region is difficult to gauge directly. However, certain health indicators provide an indication of sanitation conditions. A deterioration in the biological quality of drinking water can be associated with the higher incidence of certain types of infectious diseases (cholera, typhoid fever, hepatitis A, gastrointestinal and several parasitic diseases). Data on the standardised death rate from infectious and parasitic diseases suggest that water quality may have fallen during the transition in some parts of the region.<sup>23</sup> While in eastern Europe this health indicator has remained constant or improved slightly during 1989-93, there was a significant deterioration in this indicator between 1992 and 1993 in the Baltics and the CIS.<sup>24</sup> While weaknesses in waste-water collection and treatment may well have been a contributing factor, the deterioration in this indicator may reflect a shortage of medical supplies and a deterioration in public health conditions.

Summary

The main challenges with respect to water and waste-water infrastructure are to maintain and improve existing piped systems and to upgrade the effectiveness of waste-water treatment facilities. Investment in waste-water collection and treatment facilities in industrialised market economies has averaged 1 per cent of GDP over the past 20 years, and the investment needs in the transition economies are substantially greater.<sup>25</sup> The level and structure of tariffs must also be adjusted to reflect more closely costs of service provision. Those countries at more advanced stages of transition have made greater progress in reform of water tariffs. With respect to the environment, water quality in the region has been damaged not only by inadequate waste-water treatment, but also by industrial and agricultural practices. In fact, a number of comprehensive water resource management programmes have been initiated during the past few years at regional level – for example, in the Danube River Basin, Baltic Sea and Black Sea.

3.5 Transportation

The evolution of transport networks in centrally planned economies, as in market economies, was influenced by country size and geography, settlement patterns and population density. These features differ substantially among the countries of eastern Europe, the Baltics and the CIS. However, central planning had a profound impact throughout the region on the composition and location of production and on the effective priority placed on personal mobility. In particular, the strong emphasis on heavy industry and the neglect of transport costs in location decisions led to very intensive use of rail freight services, especially in the former Soviet Union. Passenger services and personal transportation were limited in comparison. In both freight and passenger transport, central planning placed greater emphasis on the level of services than on their qualitative aspects, such as flexibility, logistics, reliability and safety. The environmental implications of transport policies and projects also received low priority. As a result, inherited transport networks in the region have several

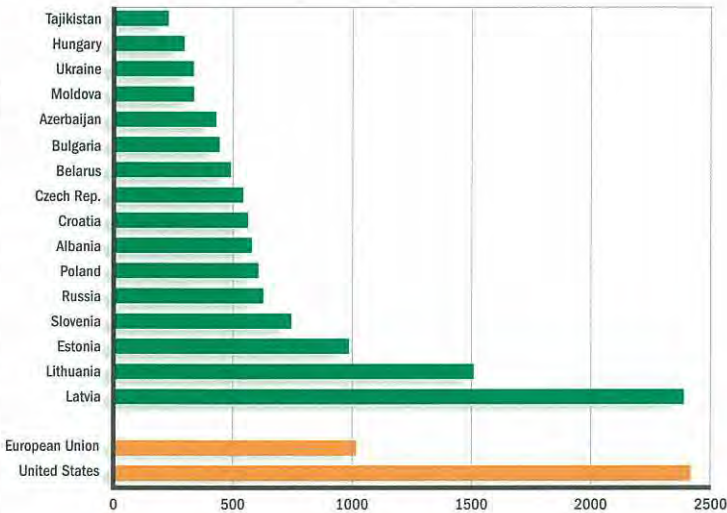
distinguishing features: a high share of railway services; low levels of motorised transport; low-quality services for both passengers and freight shippers; and safety and environmental problems. As with other infrastructure sectors, there are also significant price distortions in transportation.

Road and rail networks

Characteristics of transport networks in the region are relatively well-developed railways and limited road systems. The intensive use of railways reflected the central planning emphasis on primary and heavy industries, which created transport requirements for

Chart 3.10  
Rail network densities 1993

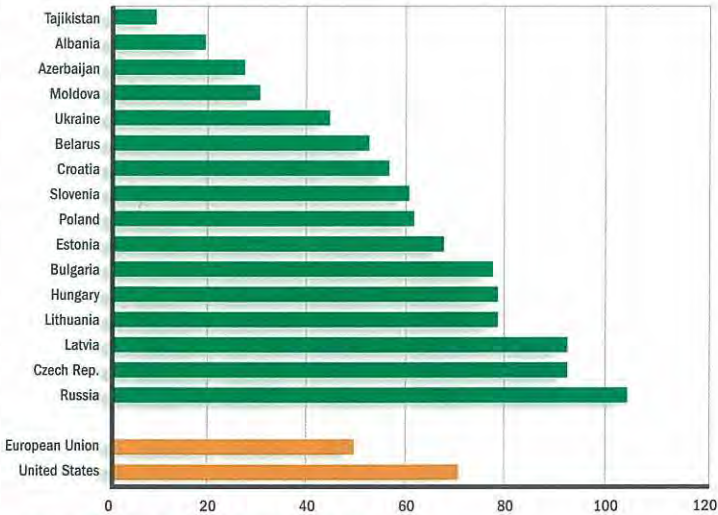
Kilometres of rails per 100,000 of population



Source: International Road Transport Union (1996).

Road network densities, 1993

Kilometres of roads per 100,000 of population



Source: International Road Transport Union (1996).

<sup>23</sup> World Health Organisation (1995b).

<sup>24</sup> Similarly divergent trends in a range of social indicators were reported in EBRD (1995) Chapter 2.

<sup>25</sup> See Somlyódy (1994).



bulk commodities. Moreover, industrial production and location decisions gave inadequate weight to transport costs, establishing overly centralised and vertically integrated production facilities and thereby generating an artificially high transport requirement. The capacity and cost advantages of railways over long distances and for bulk cargoes meant that this transport mode was well suited to the freight requirements of central planning. In most countries in the region, railways also provided a high share of passenger transport, not only for long-distance traffic but also for commuter and regional travel. Alternatives were in short supply. Low car ownership, limited bus services and poor roads all added to rail use.

The densities of transport networks are typically measured in relation to a country's population or to its land area. Chart 3.10 provides the densities of railways and roads in the region in relation to population. Two broad features stand out. First, the rail densities are high compared with those in the EU and United States. For example, the Russian rail network density in relation to population is about 50 per cent greater than that in the United States; although, if the densities were calculated in relation to land area, they would be broadly similar. Many countries in eastern Europe and the Baltics also have relatively high rail densities, and their land sizes are roughly comparable to those in the EU.

Second, the road densities in relation to population of most countries in the region are substantially less than those in the EU and the United States. Those countries in the region with high road densities are in the Baltics, which occupied a strategic location within the former Soviet Union.

The quality of the transport networks reflects a number of factors, including their initial design. For example, in the Baltics the major trunk roads run east to west rather than north to south. The trunk roads in the former Soviet Union were also designed for lower vehicle weights than in the EU. This is consistent, though, with the traffic tasks which they had to perform in the past. With respect to railways, design standards are less exacting than those in the EU. However, most rail lines have adequate speeds and are of a sufficient standard for the majority of rail freight services currently provided. Partly as a result of the greater use of rail for bulk freight, passenger speeds are generally lower than on main lines in the EU, offering less competition to emerging road coach and medium-distance airline services. Upgrading existing railway lines to provide higher passenger train speeds in order to compete with road services, however, would involve major investments in track realignment, resignalling, power supply, safety systems and rolling stock.

Another important dimension to the quality of infrastructure is maintenance and renewal. Here, piecemeal evidence points to considerable neglect. In Russia, the extent of rail track subject to speed restrictions, for example, has doubled since 1988 to stand at 20 per cent of the network,<sup>26</sup> while about 25 per cent of tracks in

eastern Europe are estimated to be in unsatisfactory technical condition.<sup>27</sup> The latter often serve as major trunk routes for new trading patterns. However, many secondary and branch rail lines with low traffic were probably maintained to excessively high economic standards in the past. With respect to trunk roads, an estimated 38 per cent of the system in Russia requires upgrading or reconstruction, and an additional 25 per cent is in need of resurfacing.<sup>28</sup>

### Changing demands

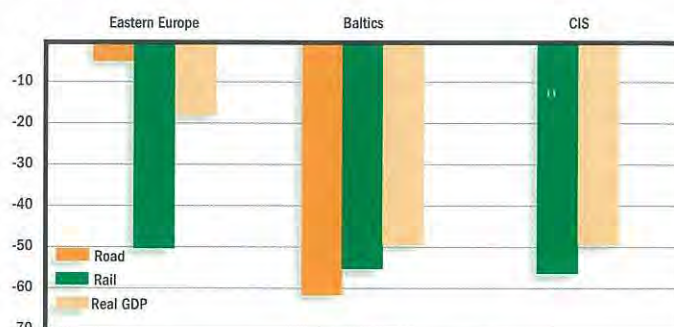
High volumes of freight transport in relation to output characterise transport activities inherited from central planning, with the sector being heavily dominated by rail. In 1988 freight intensity of output in the former Soviet Union (measured in terms of tonne-kilometres of domestic freight per dollar of GDP at purchasing power parity exchange rates) was nearly five times that in the United States.<sup>29</sup> Freight intensity in east European countries were similar to those in the United States, but well above those in the EU. The freight intensity of EU output is about one-third of that in the United States.

In the transition the demand for transport services has changed dramatically. There has been a sharp reduction in overall freight volumes, especially on the railways. Between 1989 and 1994 rail freight volumes declined about 50 per cent in eastern Europe, the Baltics and the CIS (see Chart 3.11). This decline is greater than the fall in real output in these economies, particularly in eastern Europe, pointing to a reduction in the freight intensity of output. However, the trends in road haulage in the region are more diverse. In eastern Europe road haulage fell by 5 per cent from 1989 to 1994, indicating that the proportion of freight carried by road transport has increased. However, in the Baltics road haulage has declined by more than rail. Only very limited data on road haulage in the CIS are available, and these figures point to substantial declines in the initial years of transition.

**Chart 3.11**

### Change in freight transport: 1989 vs. 1994

In per cent



Sources: World Bank Railway Database, ECMT (1996a) and EBRD.

<sup>26</sup> See EBRD (1993a).

<sup>27</sup> See Foreign Investment Advisory Service (1996).

<sup>28</sup> See EBRD (1993b).

<sup>29</sup> See EBRD (1993c).



It is instructive to compare this experience with EU railways, which have faced decades of increasing competition from road haulage and of declining heavy industries. Rail freight transport measured in tonne-kilometres in the EU has declined by about 22 per cent over the last 25 years, while the railways' share of the freight market share has halved to about 15 per cent.<sup>30</sup> The loss of rail freight traffic in eastern Europe, the Baltics and the CIS has had the effect, therefore, of compressing decades of gradual market-driven change in the EU into a few years. The organisation, management structures and operating methods of the railways in the region, however, are very similar to those in the EU 20 years ago. Railways in eastern Europe and the Baltics need to reform at a faster rate and more successfully than EU railways in order to secure an effective long-term role in freight transport.

Even if rail transport is successful in restructuring, road transport can be expected to carry an increasing share of total freight traffic for three main reasons. First, the shift in composition of output away from lower-value bulk commodities towards higher valued products and the location of new production facilities which takes account of transport costs will lead to a fall in the transport intensity of output. Second, with the shift towards higher-value products, road will become more competitive for freight transport in terms of cost and service compared with rail. Third, the road haulage sector will be operating in the private sector and will tend to be more responsive to customer demands. This outlook presents an infrastructure challenge both for road infrastructure providers and competing rail networks.

Changes in the scale and nature of demand for passenger travel also drive infrastructure needs. There has been a sharp increase in automobile registrations in the region, albeit from low levels. Personal mobility, measured by annual kilometres travelled per capita, was significantly lower in the centrally planned economies than in the EU. In eastern Europe and the Baltics the number of registered vehicles is now between 20 and 30 per cent above its pre-transition levels. Limited data from the CIS point to increases in registered vehicles ranging from 15 to 30 per cent.<sup>31</sup> These increases coincide with greater production within the region and liberalisation of imports from the EU, including second-hand vehicles. However, the rising cost of motoring, with fuel prices rising towards market levels, has had the effect of moderating the use of vehicles. Nevertheless, as living standards increase, it can be expected that car ownership will surge. In urban areas in particular this will create environmental pressures and tend to have a damaging effect on surface-based public transport unless policies are pursued to protect it.

## Airports and ports

In aviation infrastructure there is an adequate supply of airports, but runways are deteriorating, passenger terminals need upgrading, traffic control equipment needs replacing, and environmental measures need strengthening. Much of the infrastructure required for ancillary activities, such as customs and immigration,

air cargo, catering, baggage handling and connecting surface transportation, is lacking compared with market needs.

Similarly, ports are in need of modern, better managed facilities to serve traffic for which sea transport has a significant cost advantage over surface transport, such as dry and liquid bulk cargoes or containerised cargo. There is generally a need for upgrading of existing ports. However, given the right institutional and management change, much of the port infrastructure, such as at St Petersburg and Novorossisk, is capable of handling a substantial increase in traffic without major investment.

## Cost-reflective tariffs and prices

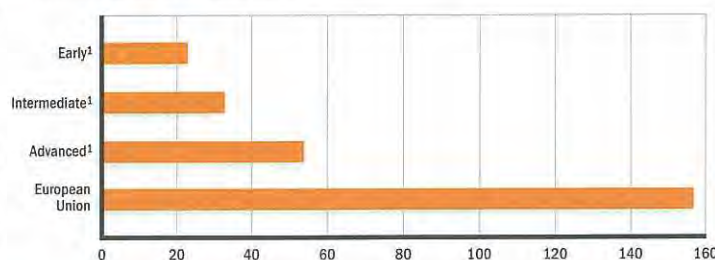
Historically, most railway systems in the region had higher rates of operating cost recovery than their counterpart public railways in the EU, mainly due to the much higher freight traffic intensities arising out of centrally planned production. Despite recent traffic reductions, rail freight still returns a margin above operating costs in many countries in the region, but there is increasing difficulty in earning sufficient revenue to fund renewal of infrastructure. This shortfall is partly due to higher costs, but also to governments requiring, or encouraging, freight services to support passenger services in an effort to cushion the impact of falling household incomes while not impacting on the government budget. The result is a significantly inverted structure of railway tariffs.

In the EU, passengers' fares are about 55 per cent higher than freight rates. In the advanced transition economies, this tariff structure is inverted, with passengers' fares about 55 per cent below those for freight in 1993.<sup>32</sup> The inversion in tariffs is even greater for those countries at intermediate and early stages of transition (see Chart 3.12). These cross-subsidies threaten to overprice freight and prompt its shift to road transport, thereby reducing the resources needed for railway renewal and improvement. Many railways in the region advocate EU policies, which prescribe that loss-making services should be operated under contractual arrangements, including financial compensation from the relevant authorities (municipalities for urban services, regional governments for rural services, and central governments for intercity services).

Chart 3.12

## Ratio of average passenger fares to average freight rates, by countries' stages of transition, 1993

(total passenger revenue/passenger km) to (total freight revenue/tonne-km) in per cent



Source: World Bank Railway Database.

<sup>1</sup> Averages for countries for which data are available.

<sup>30</sup> See Commission of the European Communities (1996).

<sup>31</sup> Information provided by DRI/McGraw-Hill from their database.

<sup>32</sup> See Thompson and Fraser (1996).



Road expenditure has been traditionally financed from earmarked taxes on road users, including taxes on fuels and lubricants. Chart 3.13 provides data on fuel prices in the transition economies, along with those in the EU and the United States. These figures indicate that gasoline prices in countries at advanced stages of transition have already risen above US levels. In countries at intermediate stages of transition, gasoline prices are also above US levels, but diesel prices are relatively low. Nevertheless, fuel prices in the region remain at less than one-half of those in the EU, where fuel taxes are much higher than in the United States.

### Safety and the environment

While there are safety challenges for all modes of transport in the region, the largest existing and potential problem, in terms of people at risk, relates to road use. The number of annual deaths in the transition economies due to traffic-related accidents compares unfavourably with that in the EU. In eastern Europe the number of deaths relative to the number of registered vehicles exceeded that in the EU by a factor of three in 1994.<sup>33</sup> A similar difference exists for the number of traffic-related deaths in relation to distances travelled. Fatality rates on Russian roads are between four and five times higher than those in western Europe and the United States.<sup>34</sup> With the increased registration of passenger cars and the projected expansion in road haulage, there is a need to improve safety in the design of both vehicles and roads as well as improve drivers' awareness of road safety.

As with safety, environmental problems beset all transport infrastructure providers. In the railway industry environmental regulations are being strengthened to try to tackle the specific problems of track contamination, the damage caused by lubricants and weedkillers, and the impact of new line construction. Ports and airports suffer from similar kinds of environmental problems as well as the impact of aircraft noise at airports and the effect of spillage on marine life in ports.

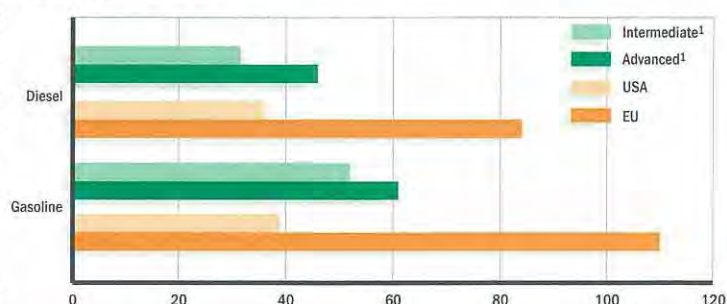
The rapid growth in the size and use of vehicles, the average age of vehicles, and the vehicle technology in use have focused attention on the environmental impact from road transport. Air pollution from motor vehicles is now a growing concern in some cities, such as Warsaw, Budapest and Prague. Authorities in a number of east European countries have set emission standards for new vehicles that comply with EU standards, but the main problem remains control of emissions from vehicles already in use, which form the majority of vehicle ownership. Engine retrofitting and the development of well-targeted vehicle inspection and maintenance programmes are cost-effective ways to address this problem.

In order to curb the impact of congestion and air pollution in cities, a balanced urban transport strategy is required. Many urban transport systems in the region have been squeezed by devolution of responsibility to local governments with weak revenue bases, a reduction in central government funding for their operation, and high levels of fare evasion. Many of the region's metro, tram and

Chart 3.13

### Diesel and gasoline prices by countries' stages of transition, 1995

In US cents per litre



Sources: GTZ, Energy Detente and World Bank.

<sup>1</sup> Averages of countries for which data are available.

trolleybus networks suffer a backlog in maintenance renewal, with no resources available for upgrading or system extension. The difficulty of establishing creditworthiness of city authorities has made it difficult for them to raise external funds for urban transport investment.

### Summary

The main legacies in the transport sector are a functional mismatch between the components and quality of the transport infrastructure and market demands. In the reorientation of transport services, there has been a sharp decline in demand for freight services, which in eastern Europe has fallen particularly heavily on the railways. Given the shift in composition of output toward higher value-added products and the increased demand for personal transport, there is likely to be a shift towards greater reliance on road services. Estimates of annual investment requirements in east European road and railway rehabilitation and development, including the EU's Trans-European Network initiative, range between 2 and 3 per cent of east European GDP over the next decade.<sup>35</sup> However, the current structure of railway tariffs and fuel taxes runs the risk of encouraging an excessive substitution of road for rail-based services, and this should be realigned. The increased reliance on roads also raises a number of safety and environmental concerns, including increased urban congestion and air pollution.

### 3.6 Concluding remarks

This survey of the inherited infrastructure capacities, market demands for services and environmental concerns associated with infrastructure point to several common themes. First, there are significant imbalances between supply and demand in most infrastructure sectors. Service provision is clearly inadequate, in terms of either quantity or quality, in the telecommunications and water and waste-water sectors, and is likely to become increasingly insufficient in road transportation. In contrast, the electric power and railway sectors are characterised by excess supply, at least in relation to notional capacities, with each sector having experienced sharp declines in the demand for services in the transition.

<sup>33</sup> See ECMT (1996b).

<sup>34</sup> See World Bank (1993).

<sup>35</sup> See Gaspard (1996). This EU initiative aims to facilitate integration of key European infrastructure networks.



As with many industries in transition economies, infrastructure requires substantial restructuring. This overhaul requires much greater efficiency in the use of existing infrastructure assets. In those sectors where there are significant new demands, investment in additional capacity is also needed. However, in those sectors where inherited infrastructure capacity is adequate, any investments must aim carefully to meet market demands, such as for improvements in service quality and environmental concerns, rather than past central planning priorities. Chapter 4 examines the potential for a more commercial approach to infrastructure to promote this needed restructuring.

The reform and effective collection of tariffs are crucial in both balancing the supply and demand for infrastructure services and achieving the financial viability and accountability of infrastructure service providers. The overall level of tariffs tends to be below that which allows for cost recovery, particularly in the electric power and water and waste-water sectors and, to a lesser extent, in telecommunications. Moreover, the structure of tariffs weighs more heavily on enterprises than on households in all sectors. This reflects the role of infrastructure in allocating benefits and resources under central planning and strong public resistance to rebalancing tariff structures. There is also a significant problem with non-payment for services by both enterprises and households in a number of countries. Tariff reform is an important challenge for government policy, and this issue is considered in Chapters 4 and 5.

Lastly, infrastructure has a strong impact on the environment. Coal, lignite and oil-shale fired electric power plants are a major source of air pollution in the region, and the effectiveness of waste-water treatment is often inadequate. Nuclear safety is also a significant issue in several countries. At the same time, the increased reliance on road transportation in the transition is raising concern about urban congestion and air pollution in some cities. Managing the environmental legacies from central planning and the environmental consequences of the market are important regulatory challenges. Again, these issues are taken up in Chapter 5.

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# Commercial infrastructure: pressures and potential

# 4

The public provision of infrastructure services has been widespread in all economies. This approach is commonly followed because infrastructure consists of, or is at least perceived to consist of, natural monopolies and because unregulated private provision can lead to monopoly pricing or failure to benefit from economies of scale. Infrastructure activities are also seen to be strategic in the sense that they are crucial to the functioning of all economic activity and to everyday lives. Thus, governments have recognised a responsibility for infrastructure and, in many cases, it was assumed that this responsibility implied public ownership and provision. Lastly, infrastructure can have significant spillover effects on the environment, which some have argued can be taken into account only in a system of public ownership.

It is now increasingly recognised, however, that these considerations do not automatically imply that public ownership and provision are the right answer. There is a great deal that can be done through private participation in infrastructure, particularly where there is scope for competition among, or effective regulation of, service providers. Where private participation is not considered possible, governments are taking an increasingly commercial approach to publicly provided services.

This chapter analyses the development of a more commercial approach to infrastructure in transition economies, where there is a pervasive legacy of using infrastructure to distribute benefits and resources under central planning. It examines the main elements of this approach (commercialisation of public utilities, selective private entry and privatisation), how their application varies across infrastructure sectors and stages of transition, and the extent to which this approach is supported by private finance. Chapter 5 considers how governments can support a commercial approach to infrastructure by defining boundaries between competition and regulation in infrastructure and by establishing effective regulation where competition is not possible.

While weaknesses in publicly provided infrastructure in market economies have spurred a search for private alternatives in these countries, infrastructure in transition economies is particularly distorted by decades of central planning.<sup>1</sup> There is a significant mismatch between what remains largely an inherited supply of infrastructure services and new market demands and concern for the environment. Achieving a balance between supply and costs, on the one hand, and market demands and environmental concerns, on the other, will require substantial restructuring, including new investment, more effective management and greater efficiency. Tariff levels and structures also diverge significantly from those that reflect efficiency considerations and fiscal constraints. Tariffs that reflect costs are necessary to guide both

market demands for infrastructure services and investment decisions throughout the whole economy.

This chapter examines the potential for commercial infrastructure to help overcome the legacies from central planning in infrastructure and the weaknesses of public provision. It argues that this approach can be instrumental in two ways. The first is to provide some insulation from political influences. The sheltering of infrastructure from excessive political intervention is necessary both to achieve cost-reflective tariffs and to unlock access to private finance for needed investments. Due to severe fiscal strains associated with transition, few governments in the region are in a position to expand public finance for infrastructure, and, in fact, many governments have sharply reduced public investment in the transition. The second is to promote restructuring by selecting the most capable service providers and strengthening their incentives. The selection of managers for infrastructure enterprises under central planning was influenced not only by the distorted priorities of the old system, but also by the way in which bureaucracies operate.

This chapter also examines the relationship between the environment for private investment and the extent of private participation in infrastructure. Development of this environment is measured using the EBRD's transition indicators. This analysis finds a strong relationship between progress in transition and private participation in infrastructure. Lastly, the sources of, and challenges in, private finance for infrastructure in transition economies are examined. Impediments to private finance are identified in part by considering the EBRD's role in financing private infrastructure projects.

Section 4.1 of this chapter considers the strengths and weakness of public and private provision by drawing on available evidence from market economies and by analysing the specific circumstances of infrastructure in transition economies. The second section examines experiences with commercialisation of public enterprises in transition economies and progress in expanding private participation in infrastructure. Section 4.3 analyses the relationship between progress in transition and private participation in infrastructure. The fourth section assesses the potential for, and impediments to, private finance of infrastructure in transition economies. Section 4.5 provides conclusions.

## 4.1 Public provision and private participation

The strengths and weaknesses of public and private provision of infrastructure services vary across market or regulatory structures and infrastructure sectors. This section brings together available evidence on experiences in industrialised and developing market

<sup>1</sup> See Chapter 3.



economies with these two forms of provision. Infrastructure in transition economies is then examined in view of this evidence.

### Considerations and evidence

While competition or effective regulation in infrastructure can exert a strong discipline on firms through strengthened incentives and market selection of service providers, be they publicly or privately controlled, there remain several potential differences between public provision and private participation. These differences arise in two basic ways. The first set of differences arises through the objectives pursued by public and private firms and the constraints they face in their operations. The second set emerges from the potential for public and private firms to influence the market or regulatory structures in which they operate.

The objectives and constraints of public and private firms can differ in a number of ways. Public ownership can divert the objectives of infrastructure enterprises away from commercial principles and well-specified policy objectives towards meeting, in a sometimes haphazard manner, a wide range of political pressures which governments face. For example, public investment in infrastructure is often misdirected, reflecting political rather than economic priorities. The tendency of governments to favour new projects at the expense of maintaining existing infrastructure is one example. Public ownership can also impose constraints which undermine the efficiency of operating and investment decisions. Examples of public enterprises in market economies with over-staffing and weak internal incentives due to limitations on dismissals and pay are legion. Fiscal constraints on public investment can also lead to foregone investment.

Private ownership of firms too can fail to deliver a strong commercial orientation. This weakness often arises in the absence of effective corporate governance or in the presence of monopoly.

The potential for public and private firms to influence market or regulatory structures differs as well. For example, a public firm operating in a competitive market with free entry and exit against a number of private competitors (facing hard budget constraints and similar cost structures) would in principle be unable to survive unless it pursued only the objective of profit maximisation and shed any political or social constraints that impeded its operational efficiency. However, would a government allow a public firm to exit from the industry or would it seek to sustain its operations by softening its budget constraint? The answer depends on the government's objectives and the pressure it faces. A public firm with a soft budget constraint can readily use this advantage to restrict competition.

Another example is government regulation of a private monopoly. In this case, a regulatory institution must stand in the place of the impersonal arbiter of the market in balancing the interests of the private producer against those of consumers. The potential

for regulatory institutions to be captured by a private monopoly with substantial resources is considerable, where capture refers to the regulator's loss of impartiality between consumers and producers. As a result, the ability of such institutions to reconcile effectively these pressures and to maintain their impartiality and legitimacy is often questioned.

Evidence from industrialised and developing market countries shows some of the interactions that may occur in practice between ownership, efficiency and market structures. In a competitive market a high-cost producer can in principle remain in the industry only if it can ignore the threat of exit or take-over. Evidence from around the world consistently shows that in competitive markets the relative profitability and operating efficiency of private firms is greater than that of state-owned firms operating in the same markets.<sup>2</sup> These results mean that governments are often willing to tolerate below-market returns on their invested capital in public enterprises or to subsidise their operating costs. These foregone returns or subsidies are mirrored by organisational slack within these enterprises, and it is often the case that public enterprises are run for the benefit of managers and employees and not for that of customers or government.

The evidence on public versus private ownership of firms operating in monopolistic market structures is more difficult to evaluate in terms of cost efficiency, investment, pricing and profitability. To make such judgements, it is necessary to measure carefully the impact of alternative ownership structures not only on producers but also on consumers and governments. A recent set of 12 case studies of privatisation, including a number of firms operating in non-competitive markets, found that in all but one case privatisation yielded overall welfare gains.<sup>3</sup> These benefits came primarily from improved productivity and increased investment following privatisation. They occurred in both non-competitive and competitive markets, in part because the regulatory framework for these particular monopolies were effective both in allowing private firms to operate efficiently and in protecting consumers.

While available evidence points to potential efficiency gains from private as opposed to public ownership, particularly in competitive markets, the effectiveness of governments in regulating private monopolies has a chequered track record.<sup>4</sup> One prevailing view is that small, well-organised groups (frequently producers) tend to benefit more from regulation than large, diffuse groups (frequently consumers). The failure of regulation to achieve the goal of social efficiency contrasts sharply with the benefits from infrastructure deregulation in the United States, particularly in the transportation sector where there is significant scope for competition between modes of transport. Estimates of the benefits from deregulation amount to between 7 and 9 per cent of the output of the formerly regulated sectors.<sup>5</sup>

<sup>2</sup> See Vickers and Yarrow (1988) and Vining and Boardman (1992).

<sup>3</sup> Galal, Jones, Tandon and Vogelsang (1994) examine the impact of 12 major privatisations in Chile, Malaysia, Mexico and the United Kingdom.

<sup>4</sup> See Klein and Roger (1994). Chapter 5 discusses specific regulatory issues related to infrastructure in the transition economies.

<sup>5</sup> See Winston (1993).



There are also examples of regulatory failures in the transition economies, where experience with such institutions is largely absent. For example, the initial institutions responsible for regulating natural monopolies in the Russian Federation (Department of Prices in the Ministry of Economy and the Federal Energy Commission) appear to have been dominated by the interests of producers, such as Gazprom (natural gas) and various elements within the government.<sup>6</sup> In other countries in the region, however, consumers of infrastructure services, such as electricity, appear particularly effective in preserving subsidised services.

The evidence from industrialised and developing market economies thus points to the conclusion that private ownership contributes to greater operational efficiency and investment provided that firms face market competition or effective regulation. These benefits arise largely from the strong commercial focus and hard budget constraints achieved under private ownership. However, where competition in infrastructure is not possible, the design of robust regulatory institutions is important to achieving benefits from private participation. This consideration takes on particular significance in infrastructure in the transition economies, where there is no recent history with such institutions.<sup>7</sup>

### Infrastructure in the transition economies

While available evidence points to potential benefits from private participation, it is important to identify key factors when deciding on whether to expand private involvement in infrastructure in transition economies. The evidence presented in Chapter 3 shows that infrastructure capacities in transition economies diverge widely from market demands and concern for the environment. As a result, infrastructure must be substantially restructured, requiring new investment, more effective management and greater efficiency. Tariff structures also continue to be heavily influenced by the use of infrastructure as a way of distributing resources under central planning, which encourages inefficient use of services, distorts investment decisions and impairs financial viability of infrastructure enterprises. An important challenge for commercialisation and private participation in infrastructure in transition economies is whether they can help to overcome these key problems.

There are strong arguments for tariff levels and structures that reflect both the economic costs of providing services, including external benefits or costs (e.g., new land use opportunities or pollution) and the financial constraints of governments. Efficiency in the use of infrastructure services is an important social objective, and the main way to achieve it is through tariffs that reflect the incremental economic costs of providing services. Private participation in infrastructure can promote more socially efficient tariffs, by creating a constituency for their implementation.<sup>8</sup>

A more commercial approach to infrastructure, in turn, can help to unlock private sources of finance for investment through greater

financial viability. A major constraint on infrastructure investment in transition economies is the lack of access to finance. This impediment arises both from the strains on public finances in the transition and from the continued reliance on infrastructure as a means of distributing benefits and resources to households and enterprises.

Infrastructure in transition economies also requires greater operational efficiency on the part of infrastructure enterprises themselves. This issue is largely the same as with state-owned enterprises in market economies, with the difference that past priorities and the neglect of certain infrastructure sectors under central planning extended not only to investment but also to the allocation of labour skills, in particular technical experts and skilled managers. The selection of enterprise managers was also strongly influenced by bureaucratic and political considerations. As a result, there are considerable variations in the organisational efficiency of existing infrastructure enterprises both across and within sectors. Private participation and market selection can thus play an important role in improving efficiency.

### *Tariff reform and political influence*

Evidence of distorted tariff levels and structures for infrastructure services and effectiveness of tariff collection presented in Chapter 3 reveals an important aspect of an uncommercial approach to infrastructure in the region. It is not easy for governments to overturn the legacy of using infrastructure to control the distribution of resources and of allowing soft budget constraints for enterprises. A new approach involves upsetting consumers with higher tariffs and more determined collection.

Such changes can be facilitated, however, by complementary policies, such as carefully targeted social safety nets. These expenditures, of course, must be funded with taxes which should be designed to create as few distortions as possible. It is likely to be much more efficient to focus policies for the distribution of resources on households rather than on producers. In particular, the efficiency losses associated with raising revenues through value-added and income taxes and targeting social benefits are likely to be much less than those associated with distorted consumption and investment due to the continued transfer of resources through infrastructure. In those countries at more advanced stages of transition such complementary tax and social expenditure reforms are under way.<sup>9</sup>

Within the infrastructure sectors themselves, it is also possible to ensure access to basic services to those most in need. This support can take the form of basic minimum or lifeline services at subsidised rates for those households that cannot afford to pay tariffs that reflect the costs of services.

Even with the implementation of such complementary reforms, overcoming public resistance to cost-reflective tariffs can remain a

<sup>6</sup> See Capelik and Wilson (1995).

<sup>7</sup> See Chapter 5.

<sup>8</sup> This point is similar to the political economy arguments made for privatisation in transition economies. See Frydman and Rapaczynski (1994), Chapter 6, and Boycko, Shleifer and Vishny (1995).

<sup>9</sup> See World Bank (1996a), Chapter 4.



challenge. Pressure from both households and enterprises is likely to be particularly strong in the electricity, water and rail transport sectors, where the delivery of services in the past was adequate and the tariffs were low. There is also a history of customers being lax in making payments and of a lack of effort in tariff collection and enforcement.

In telecommunications, however, surveys indicate a high willingness to pay for service access, particularly among business users. Households and enterprises were extensively rationed in their access to telecommunications services under central planning, and popular resistance to cost-reflective tariffs appears to be less than in other infrastructure sectors.

Initial steps towards mitigating political pressure can involve the commercialisation of infrastructure enterprises. Commercialisation refers to reforms in the oversight of, and incentives within, state-owned enterprises in order to simulate the practices of private firms. These changes include legal incorporation and exposure of state enterprises to commercial laws and bankruptcy; selection of an agent with clear responsibilities and accountability for representing the state as the owner of government enterprises; transparent procedures for selecting enterprise managers; and managerial incentive contracts based on performance measures. However, the government still retains considerable discretionary control over state enterprises even with such reforms.

A further instrument for reducing political pressures is to introduce private participation, thereby adding a clear and consistent voice for cost recovery and efficiency in tariffs.<sup>10</sup> Where competition is possible, private participation reinforces and sustains the market's efficiency in setting prices by helping to ensure that all producers face hard budget constraints. Even under effective regulation by government, a private firm is relatively insulated from political influences compared with a public enterprise. This insulation arises from the fact that in order to attract private finance for (generally irreversible) investments in infrastructure assets, governments must first put into place institutions to protect private property rights, including those for credible regulation.

While effective regulation can constrain private enterprises to pursue carefully specified social objectives, their ownership status serves to insulate them from political pressures beyond the contractual terms of the regulations. When government is both the owner of the service provider and regulator, it retains more scope for involvement in directing the activities of infrastructure enterprises. It is, therefore, the respect of private property and contracts that serves to insulate private, albeit publicly regulated, infrastructure enterprises from excessive political influence.

### Limited public finances and investment

Fiscal revenues have fallen sharply in the transition, placing a tight constraint on government capital expenditures.<sup>11</sup> Under central planning, the enterprise sector provided the bulk of revenues through a mixture of turnover, profits and payroll taxes. In transition, however, the enterprise sector experienced steep falls in revenues and large losses with abrupt shifts in relative prices, increased competition and sharp output declines. Wages and interest rates were also liberalised, further impairing enterprise profitability. The tax base withered, tax arrears spread and revenues dried up. To provide buoyancy to revenues, tax reforms have been implemented and tax administration improved, although it remains weak with coverage of the emerging private sector a major challenge. As a result of these measures, government revenues as a share of GDP have appeared to stabilise in many transition economies, albeit at significantly lower ratios compared with the pre-transition period.

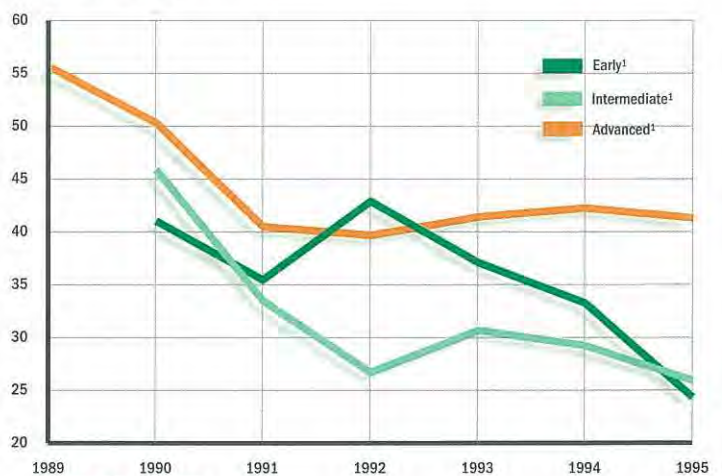
Chart 4.1 shows the government revenue performance of countries grouped by their stages of transition as measured by the EBRD's transition indicators.<sup>12</sup> The countries that have experienced the smallest decline in government revenues relative to GDP are those at advanced stages of transition, followed by the countries that have been the most hesitant reformers and that remain at the early stages of transition. The largest declines have been experienced by those at the intermediate stages of transition. This group includes Kazakhstan and the Russian Federation, where reversing the continued deterioration in revenues remains an urgent priority.

When faced with extreme fiscal pressures, governments often defer capital expenditures, and those in transition countries have proved no exception. However, interpreting trends in government capital

Chart 4.1

### Government revenues by countries' stages of transition

In per cent of GDP



Sources: IMF and EBRD

<sup>1</sup> Averages of countries grouped by stages of transition for which data are available.

<sup>10</sup> See Willig (1994) and Newbery (1994).

<sup>11</sup> See also EBRD (1994), Chapter 6, IMF (1996) and World Bank (1996).

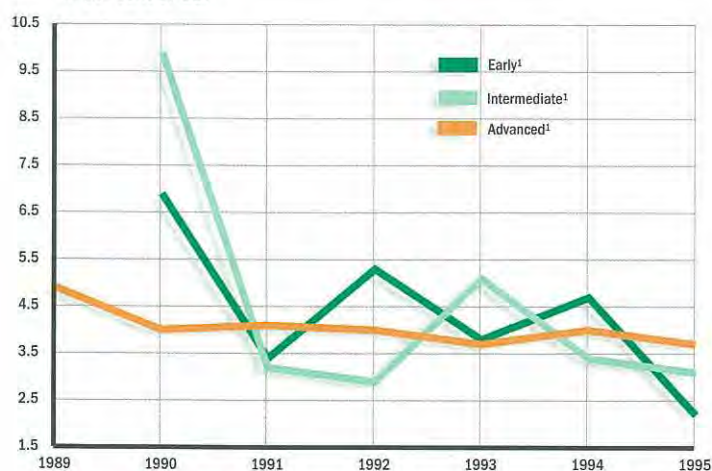
<sup>12</sup> See Chapter 2 for a discussion of measuring stages of transition and the classification of countries. Those countries at advanced stages of transition are Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia. Those at intermediate stages of transition are Albania, Armenia, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Georgia, Kazakhstan, Kyrgyzstan, Romania, the Russian Federation, Ukraine and Uzbekistan. Those at early stages of transition are Azerbaijan, Belarus, Tajikistan and Turkmenistan.



Chart 4.2

### Government capital expenditures by countries' stages of transition

In per cent of GDP



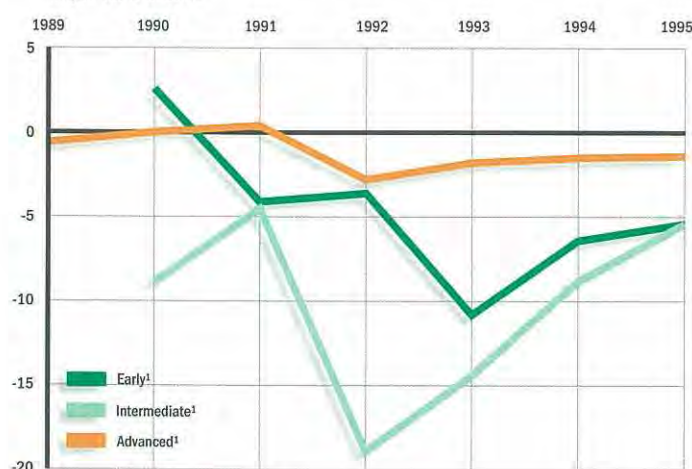
Sources: IMF and EBRD

<sup>1</sup> Averages of countries grouped by stages of transition for which data are available.

Chart 4.3

### Government fiscal balances by countries' stages of transition

In per cent of GDP



Sources: IMF and EBRD

<sup>1</sup> Averages of countries grouped by stages of transition for which data are available.

expenditures requires a careful understanding of the starting point. Under central planning, the government budget provided much of the funding for investment in both infrastructure and in fixed assets by enterprises, either through budgetary outlays or capital transfers.<sup>13</sup> Even allowing for variations in starting points, capital expenditure by governments continues to fall even in the most recent years (see Chart 4.2). While this decline in government capital expenditure appears less pronounced in countries at more advanced stages of transition, significant falls are still being experienced by countries at earlier and intermediate stages of transition. In most of these countries government capital expenditures in 1995 were between 2 and 3 per cent of GDP.

With sharp cut-backs in government investment, as well as compression of current expenditures, most countries in the region have made some, if not significant, progress toward fiscal stabilisation. Fiscal deficits in countries at advanced stages of transition have fallen to levels below those prevailing in many industrialised market countries, and the levels in countries at intermediate and early stages of transition are only modestly higher (see Chart 4.3). However, expenditure pressures associated with the transition, in particular health care and pensions, and the need to maintain educational standards, will continue to pose challenges for fiscal stabilisation over the medium term. The scope for significant increases in capital expenditures by governments to meet investment needs in infrastructure would appear to be limited without recourse to tax increases (which could deter other types of investment) or to larger fiscal deficits (which could weaken confidence in macroeconomic stabilisation).

#### Market selection and operational efficiency

Under central planning, certain infrastructure sectors were given higher priority than others and achieved a greater share of the distribution of physical capital among the various sectors. This also applied in the allocation of labour skills, in particular technical experts and skilled managers. For example, the power sector commanded relatively high wages because of the overall priority placed on the sector and attracted many well-trained engineers. In contrast, the telecommunications sector was saddled with relatively low wages and obsolete technology, which tended to discourage skilled personnel from entering this sector. Other sectors that received relatively low priority were waste water (and pollution control more generally), motorways and road haulage.<sup>14</sup> The old system also advanced those who were skilled at manipulating a bureaucracy rather than serving customers.

The opening of infrastructure to commercialisation and private participation would allow for more market-based selection of service providers. This selection process does not mean abandonment of existing infrastructure assets, but rather the introduction of competition to operate and to improve these assets. This competition can take the form of replacing managers of public enterprises through competitive selection or of bidding for concessions to operate existing assets or for licences to provide new services. The privatisation of existing service providers through cash sales can also perform this role. However, voucher and insider privatisations do not lead to market selection, at least in the first instance, though a market for corporate control can emerge in principle for these privatised enterprises.

Lastly, under central planning, infrastructure enterprises were operated in ways which distribute resources not only to end-users but also to workers, particularly through the over-staffing of such enterprises. In the transition, those infrastructure enterprises that face the strongest pressures to rationalise their workforces are those which face declining demands for services, such as in electric power and the railways. As with tariff reform, this

<sup>13</sup> Countries in the region differed in the extent to which central planning was reformed prior to 1989 (or 1991 in the Baltics and CIS) by allowing enterprises greater control over investment decisions and use of retentions as a source of finance.

<sup>14</sup> See Chapter 3.



rationalisation can be facilitated with complementary policies, such as worker retraining and support for business spin-offs from infrastructure enterprises which are down-sizing.

*In summary*, the main priorities in infrastructure in transition economies are:

- to move towards more cost-reflective tariff levels and structures to encourage more efficient use of infrastructure services, to guide appropriately investment decisions throughout the economy, and to strengthen the financial viability and accountability of infrastructure enterprises;
- to expand access to private finance through improve financial performance given the fiscal constraints on public investment associated with transition; and
- to promote the restructuring of infrastructure by allow increased market selection of service providers and to promote greater operational efficiency.

A more commercial approach to infrastructure, including greater private participation, is a key instrument for achieving each of these priorities. In particular, private participation in infrastructure can promote more socially efficient tariffs by creating a constituency for their implementation, which can also help to unlock access to private finance.

## 4.2 Approaches to commercial infrastructure

The commercialisation of public infrastructure enterprises in the transition economies refers to reforms that simulate the business approach of private enterprises while retaining public ownership. These measures aim to promote greater efficiency and improved services from public enterprises. The commercialisation of public enterprises is now proceeding throughout much of the region, and a number of general issues raised by the experiences so far are highlighted below.

Private participation in infrastructure in transition economies is arising in one of two ways. First, selective private entry is made possible through the licensing of new service providers and the awarding of concessions to operate new or existing public infrastructure assets. Second, existing government enterprises can be privatised. Over two-thirds of the 26 countries in the region have allowed selective private entry in at least one infrastructure sector, while seven countries have privatised at least one major infrastructure enterprise.

The pattern of private participation across infrastructure sectors is similar to world-wide trends, indicating the importance of sector characteristics and their ability to support private involvement. However, the telecommunications sector in transition economies has a higher proportion of private sector projects compared with other regions, reflecting the backward state of development of this sector under central planning.

## Commercialisation

Successful firms typically have three basic characteristics. They have clear goals which are focused on cost-effective delivery of goods and services to consumers; their managements are autonomous, and both managers and workers are accountable for performance; and they are financially independent. These are inherent characteristics of private firms in a market economy, but they are often absent from enterprises that operate under the control of governments, which must balance a range of economic, political and social objectives.

Governments in many transition economies have used a number of instruments to promote commercial qualities in their infrastructure enterprises, and these measures have been extensively surveyed in a recent study.<sup>15</sup> The most fundamental step is corporatisation, the legal separation of public utilities from government through incorporation. This change serves to establish clear boundaries between a public utility and government, thereby separating ownership from management of the enterprises. In transition economies these two roles were often blurred under the structures inherited from the old regime, preventing the establishment of clear responsibilities and systems for accountability for both managers and those within government who performed an ownership role. Corporatisation can also involve subjecting state enterprises to the disciplines of commercial law and bankruptcy, although this is not always the case in transition economies.

With separation of ownership from management in state enterprises, governments must select an agent to represent it as the owner of these enterprises. This responsibility can reside with particular government ministries, or a separate agency can be established to perform the task. In transition economies, leaving the ownership role with the branch ministries that formerly operated infrastructure enterprises runs the risk of leaving unchanged long-established relationships between ministries and the state enterprises which they formerly operated. Several transition economies – including Hungary, Poland and Russia – have established a separate government agency or ministry to represent the state as the owner of enterprises. However, branch ministries in the transition economies have often maintained considerable influence over the state enterprises that they formerly operated.

Improving the management of infrastructure enterprises typically requires selection of capable managers and introduction of managerial incentive contracts based on performance measures. Under central planning, the selection of enterprise managers was neither competitive nor transparent, and a number of governments in the region have recently begun to adopt more open procedures. However, incumbent managers in some cases have been able to use their inside knowledge and personal connections to maintain their positions. Where selection of managers is made on the basis of fair competition, available evidence suggests that significant gains in performance can be realised.<sup>16</sup> Until recently, performance evaluation and incentives were largely absent in

<sup>15</sup> See Pannier (1996).

<sup>16</sup> See McMillan (1996).



transition economies. Their effective implementation requires the development of quantitative and qualitative measures of managerial performance and setting of targets that are sufficiently demanding. There is not yet a sufficient track record to gauge their effectiveness in the region.

Available evidence from developing countries on performance-related contracts for public-sector managers, however, reveals that they are often ineffective. A comprehensive survey of government enterprises in developing countries found that implementation of reforms based on performance contracts with public-sector managers had little impact on enterprise performance, including profitability, labour productivity and total factor productivity.<sup>17</sup> Factors behind these disappointing results are the inability of governments to overcome the information advantage of inside managers in negotiating performance contracts, the weakness of rewards and the absence of penalties for poor performance, and the frequent breach of contract terms by governments, including the regulation of infrastructure tariffs according to fair and consistent rules. This latter finding is particularly significant for infrastructure in transition economies, where attainment of socially efficient tariff structures is a priority.

Selective private entry

Selective private entry into infrastructure can take the form either of new operators serving market niches where competitive provision is possible or of concessions to operate public infrastructure assets. The latter approach allows for competition for the right to serve a market where competition in that market is not possible. There are several advantages to expanding private participation in infrastructure in these ways. While these approaches usually require supportive measures to reduce the scope of public utility monopolies, they typically do not require the creation of regulatory institutions or the break-up of dominant utilities; yet they allow for increased competition. The regulatory conditions that are required are usually written into the licence agreements or concession contracts. The use of contracts and the courts, at least as a transitory arrangement, allows for more rapid implementation compared with comprehensive regulatory reform.

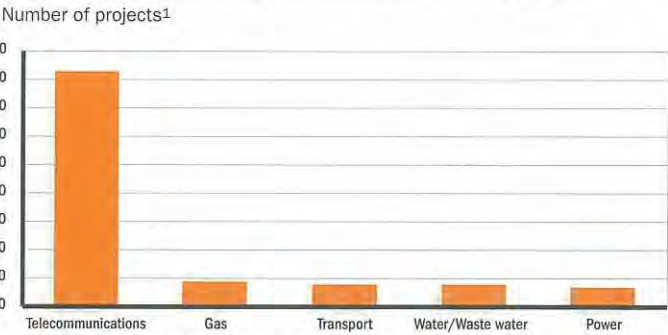
Scope for competition in the market is created by limiting the extent of the monopoly granted to integrated utilities to those parts that are truly natural monopolies and by allowing competition elsewhere (common examples of the latter are cellular telephony and independent power generation). While those services that are provided competitively do not necessarily require price regulation, they are usually delivered to consumers through existing infrastructure networks; and determining the terms and conditions for accessing these networks can be a difficult issue to resolve. Two basic requirements are that competing service providers have access to the networks on equivalent terms and that consumers are free to choose among competitors.

Competition for the market is created through bidding for concessions to operate infrastructure assets for a fixed period. This

bidding can help to reveal information about the potential efficiency of alternative private contractors and operators. However, this approach to competition can encounter at least three types of problems. First, the terms of concession are limited to those events that can be reasonably foreseen, and unexpected circumstances can lead to the renegotiation of the concession. Second, the private concession holder may not have an incentive to maintain infrastructure assets, particularly near the end of the concession period. Third, some types of concessions (e.g., operating concessions or leases) do not obligate the concession holder to make investments, thereby limiting some of the benefits from private participation.

In transition economies, selective private entry into infrastructure has been most prevalent in the telecommunications sector (see Chart 4.4). These projects have focused on cellular telephony, specialised networks for data transmission and other business services, and, to a lesser extent, long-distance and international services. In power there are relatively fewer projects involving selective private entry, in part because existing capacity in many of the countries was already large.

Chart 4.4  
Selective private entry in infrastructure sectors



Sources: EBRD and World Bank Private Infrastructure Database

± Projects with awarded contracts or in operation.

Privatisation

Privatisation of infrastructure enterprises can extend the benefits from private participation beyond selective areas of infrastructure to include much of the sector. However, successful privatisation can require two types of institutional change, which may take considerable time to implement. First, infrastructure enterprises themselves may require restructuring to create scope for competition or to enhance their commercial viability. Second, where monopolies are being privatised, effective regulatory institutions must be developed. Private investors must be assured that the approach to setting infrastructure tariffs is transparent and that the institutions responsible for regulation are robust enough to balance fairly the inevitable pressures from governments, consumers and producers.

Some attempts to sell dominant infrastructure enterprises in Hungary and Russia to strategic investors have failed in part because investors lacked confidence in nascent regulatory arrangements. In Kazakstan, sales in electricity have been quickly achieved, but at low prices. Building the necessary regulatory insti-

<sup>17</sup> See World Bank (1996b), Chapter 2.



tutions takes time and there can be beneficial interchanges between potential private investors and government over their design.<sup>18</sup>

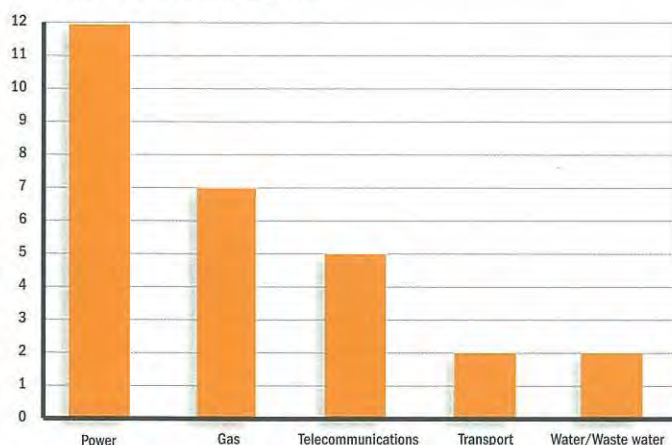
One form of infrastructure privatisation which has also proceeded quickly is privatisation through vouchers in the Czech Republic and Russia. These countries have distributed minority stakes in major telephone, electric power and gas utilities as part of their mass privatisation programmes. In the Czech Republic, however, this initial distribution has been followed by the cash sale of additional shares in the dominant telephone provider to strategic investors.

The complete privatisation of infrastructure enterprises through vouchers could well compromise potential benefits from private participation, however. Due to resulting weaknesses in corporate governance, it may fail to deliver deep restructuring, investment and access to private finance (see Box 4.1). Voucher privatisation of infrastructure enterprises in the absence of effective regulation also risks creating a constituency in favour of monopoly provision and may require the government to compensate shareholders for interference with property rights acquired through voucher schemes.

**Chart 4.5**

### Cash privatisations in infrastructure sectors

Number of privatised enterprises



Sources: EBRD and World Bank Private Infrastructure Database

The cash privatisation of infrastructure enterprises, including sales of minority stakes, in transition economies has been most prevalent in the telecommunications, power and gas sectors (see Chart 4.5). Estonia, Hungary, Kazakhstan and Latvia have sold at least minority stakes in dominant telecommunications enterprises to strategic investors. The Czech Republic has also sold a minority stake in its dominant telecommunications operator to a group of strategic investors, following the partial voucher privatisation. Hungary, Kazakhstan and Poland have privatised major electricity or gas enterprises, with Hungary separating electricity generators, transmission grid and regional distributors prior to their cash sale.

Total cash investments by strategic investors in major infrastructure privatisations in the region amount to US\$ 6 billion. This represents 20 per cent of cumulative foreign direct investment in transition economies from 1990 to 1995.

<sup>18</sup> See Chapter 5.

### Box 4.1

#### Privatisation and deep restructuring

While continued public provision imposes a significant financial constraint on infrastructure investment, private participation does not necessarily ensure restructuring, investment and access to private finance. For these, the form of private ownership and the effectiveness of corporate governance are important determinants in the transition economies. The various approaches to privatisation in the region have led to a range of ownership structures for private firms. Under some approaches to privatisation, such as the voucher privatisation programme in Russia and privatisation “by liquidation” in Poland, workers and managers become the controlling owners of their enterprises. In this case, the objectives of firms are not necessarily focused on profit maximisation, and there can be strong pressures to maintain employment or to raise wages.

Other approaches, such as the voucher privatisation programme in the Czech Republic, can lead to dispersed outside ownership when mechanisms for corporate governance are new and untested. Weak corporate governance effectively allows insiders to control firm operations. In the transition economies, concentrated outside ownership may be required to induce a strong focus on maximising profits, at least in the period before any market for corporate control develops. Some strength of corporate governance, together with a focus on profits, are required both for undertaking long-term investments and for generating the confidence of potential creditors and other outside investors.

Available evidence presented in Chapter 8 of the 1995 *Transition Report* suggested that in transition economies effective corporate governance in the form of concentrated outside ownership is necessary to deliver significant investment.<sup>1</sup> Drawing upon enterprise surveys, the analysis considered the relationship between ownership structures (state, insider, and dispersed outside and concentrated outside ownership) and various measures of enterprise performance. The indicators included those related to defensive restructuring driven by hard budget constraints, such as changes in real wages, employment and labour productivity as well as those indicating deeper restructuring, such as investment in new plant and equipment.

The main findings on the basis of this evidence were that, while indications of defensive restructuring through reductions in employment and real wages were found across many forms of ownership (the state, insiders, dispersed outsiders and concentrate outsiders), only those enterprises with concentrated outside ownership undertook significant investment. However, on the basis of this finding, it is not possible to say whether the lack of investment by firms subject to what are judged to be less effective ownership structures (in the context of transition) is due to the absence of effective incentives or the lack of access to finance. The two, of course, can be related. It is also important to recognise that ownership structures are not static and that there are strong incentives for a market for corporate control following some forms of privatisation.<sup>2</sup>

<sup>1</sup> EBRD (1995), Chapter 8.

<sup>2</sup> See Chapter 4 of the 1994 *Transition Report*.

#### Sectoral composition of private participation

The sectoral composition of private participation in infrastructure in transition economies parallels that in other regions (see Chart 4.6). Much of this participation occurs in the telecommunications and electric power sectors, measured in terms of number of projects, largely because in these sectors there is some scope for competition in the markets for these services and there are reason-



ably well developed regulatory arrangements to support this competition.<sup>19</sup> However, the balance between the number of projects in these two sectors is reversed in the transition economies, reflecting the relatively greater investment needs in telecommunications than in electric power.

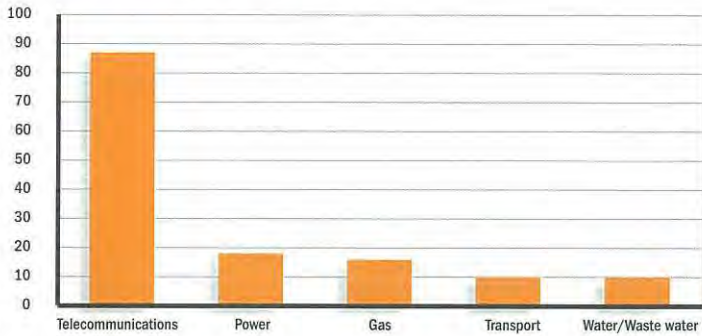
One sector in which the region appears to be lagging is transportation, where there have been a substantial number of projects world-wide involving concessions for the construction (or upgrading) and operation of airports, motorways and ports. However, there appears at this point limited scope for a completely commercial approach to toll motorways in transition economies, because their financial viability has yet to be established. However, the external benefits from new roads (e.g., new land use opportunities) provide an economic justification for government subsidies that can enhance their commercial viability. In the rail sector, privatisation of infrastructure is also made difficult, as it is in EU countries, by the limited ability of train operations on many lines to pay full track costs: only one country in Europe, Great Britain, has privatised its rail network. However, there are medium-term prospects for privatising freight and passenger train operations, but this first requires industry restructuring.

4.3 Private participation and progress in transition

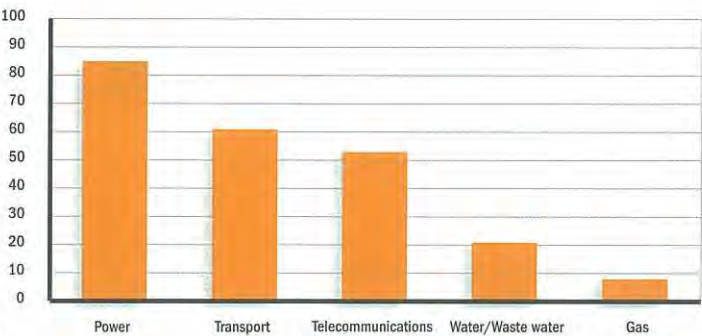
Like other forms of private investment, private participation in infrastructure requires a supportive environment. The relevant features of this environment go beyond issues of competition and effective regulation. In transition economies, the development of this environment is measured in part by indicators of progress in transition. Investors in privatisations of infrastructure enterprises, as well as those in infrastructure projects involving selective private entry, will typically require a sound legal framework for private transactions and share ownership, access to finance and material inputs, a stable macroeconomic environment, and a credible regulatory framework and reliable tax regime which will allow an assessment and limitation of risks and a market return on the investment. Satisfaction of these requirements requires progress in transition.

The EBRD’s transition indicators embody many of the key factors determining the extent to which an effective environment for the private sector has been established.<sup>20</sup> In the early stages of transition, when major structural reforms have yet to be undertaken, or even in the intermediate stages when many of the consequences of reforms have yet to become apparent, commercial risks are often high. Relative prices can remain volatile and the creditworthiness of business suppliers and customers can be difficult to ascertain. Those countries at more advanced stages of transition tend to have a much more stable environment for investment, as well as greater progress in macroeconomic stabilisation.<sup>21</sup> In fact, survey evidence shows that foreign

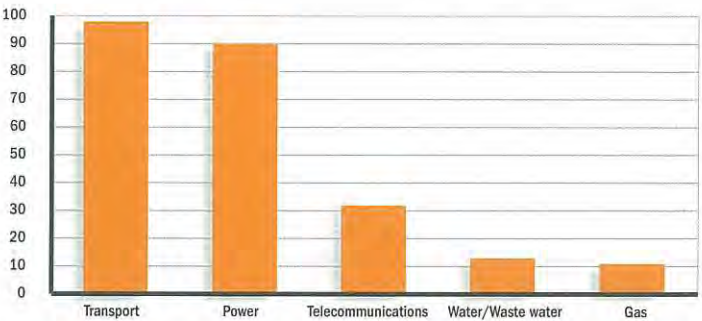
Chart 4.6  
Sectoral composition of private participation in infrastructure by region  
Number of projects with completed contracts or in operation plus number of privatised enterprises  
Eastern Europe, the Baltics and CIS



East Asia



Latin America



Source: EBRD and World Bank Private Infrastructure Database

investors’ perceptions of investment risks tend to decline with progress in transition.<sup>22</sup>

In transition economies, private participation in infrastructure exhibits a strongly positive relationship with progress in transition (see Chart 4.7). This correlation holds for both cash privatisation of infrastructure enterprises and for selective private entry. The positive correlation exists for potential projects as well as those

<sup>19</sup> See Chapter 5.

<sup>20</sup> See Chapter 2.

<sup>21</sup> World Bank (1996a), Chapter 2, argues that progress in transition is necessary for control of fiscal and quasi-fiscal deficits and macroeconomic stabilisation.

<sup>22</sup> See Lankes and Venables (1996).

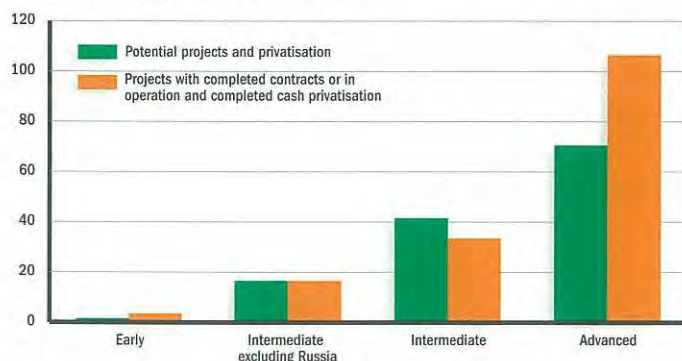


that are already operational, reinforcing the point that progress in transition contributes to and facilitates private participation in infrastructure. The strength of the relationship also highlights the particular importance of a stable environment for private investment to infrastructure where many investments are large and irreversible.

Chart 4.7

### Private participation in infrastructure by countries' stages of transition

Number of projects and privatisations



Source: EBRD and World Bank Private Infrastructure Database

#### Box 4.2

### Project finance, incentives and risk management

Private infrastructure projects require from sponsors strong commitments to their successful implementation and operation. A sponsor is an investor with a long-term strategic interest in the project, which is reflected in a significant, if not majority, stake in the project company. This equity stake must be long-lived and not clawed back through contracts and fees. Such an enduring commitment is necessary to generate the confidence of creditors and outside equity investors. However, sponsors seek to achieve a balance between creating this confidence and sharing risks with creditors and outside equity investors.

Private infrastructure exposes sponsors and investors to a number of risks that require careful management. The keys to their effective management are clear assessments, careful allocation of risks among the parties involved according to their ability to manage the risks and strong incentives for their mitigation by these parties. The nature of these risks can vary considerably over the project cycle, from initial development, construction and start-up to full-scale operation, calling for carefully designed and often complex project structures.

During the development phase of a project, two main risks are the rejection of the project proposal by government or affected public

groups and the failure of the sponsor to obtain sufficient financing for the project. By establishing transparent selection procedures for project concessions with public participation, a government can reduce uncertainty in project development. This requires clearly designed concessions and evaluation criteria and their consistent implementation.

The construction and start-up phase is typically the riskiest of the project cycle. Since lenders rarely assume completion risk, this is usually allocated to the project's sponsors, contractors and equipment suppliers and insurers. The risks of cost over-runs, completion delays and failure to complete to required specifications can be managed by using fixed-price, fixed-date, turnkey construction contracts, with specified penalties for performance failures and bonuses for over-performance. However, for projects with significant uncontrollable risks, there can be some sharing of them among the parties involved. Risks can also be hedged by obtaining commercial insurance or state guarantees against events beyond the control of the project sponsor or contractor, by including cost contingencies and by building in some excess capacity.

Once a project has passed the start-up phase, there are a number of operational and market risks that will affect the financial performance of the project. Those specific to the project include: availability and cost of inputs; technical performance of the project itself; non-payment risks (which are particularly high

## 4.4 Mobilising private finance

While commercial infrastructure can serve to expand access to private finance for needed infrastructure investment in the transition economies, the extent of private infrastructure finance in the region has lagged behind that in other parts of the world. Innovations in international capital markets have helped to foster the recent world-wide expansion in private financing of infrastructure, particularly the rapid development since the late 1980s of project finance and of international capital flows through securities markets. However, the impact of these innovations has only recently been felt in transition economies.

Project finance allows a sponsor to raise funds secured primarily by the cash flows and assets of a particular entity, which often takes the form of a newly established company.<sup>23</sup> In infrastructure, this technique is often used to support the selective entry of private service providers, such as those with licences to provide new services or concessions to operate public infrastructure assets. Because these entities typically have little or no financial track record, this financing technique relies on the clear definition and allocation of project risks to ensure that incentives are strongly linked to performance and that risks are clearly allocated and well managed. Project finance thus serves an important purpose beyond

in transition economies due to the history of soft budget constraints and low prices); foreign exchange risk arising from the mismatch between local currency revenues and foreign financing; and environmental and regulatory risks associated with the tariff adjustments and licensing. Some of these risks can be managed through long-term supply contracts for inputs, guarantees on operational performance from the contractor and local currency financing.

There are also a number of economic and political risks to which projects are exposed. The EBRD and other multilateral development banks (MDBs), based upon their unique standing with governments, are typically well placed to bear and to mitigate these risks, including the risks of foreign exchange inconvertibility and of expropriation, and those from changes to regulatory policies, such as the failure to adjust politically sensitive tariffs in line with agreed schedules and the arbitrary revocation of licences. Indeed, regulatory risks are of overwhelming importance to sponsors and investors in private infrastructure projects. Since the risks that MDBs have an advantage in mitigating are well-specified events, guarantees against these particular risks are a valuable instrument through which MDBs can participate in private infrastructure projects. The EBRD has used specific-risk guarantees in combination with standard project finance (debt and equity) in supporting a number of private infrastructure projects.

<sup>23</sup> World Bank (1994), Chapter 5, and Nevitt and Fabozzi (1995) provide detailed discussions of project finance, including its purpose, structures and instruments.



Table 4.1

**International bank loans to private infrastructure projects by region, 1990-95**

	1990		1991		1992		1993		1994		1995	
	US\$m	No. of companies	US\$m	No. of companies	US\$m	No. of companies	US\$m	No. of companies	US\$m	No. of companies	US\$m	No. of companies
Africa	0	0	428	1	13	1	142	2	172	3	41	3
Asia	1,062	12	1,105	12	1,890	23	6,409	34	5,825	53	10,280	105
Eastern Europe, the Baltics and CIS	0	0	7	1	177	2	442	13	649	14	1,821	19
Latin America	467	7	1,061	14	490	10	1,448	19	2,391	34	3,622	37
<b>Total infrastructure</b>	<b>1,529</b>	<b>19</b>	<b>2,601</b>	<b>28</b>	<b>2,570</b>	<b>36</b>	<b>8,441</b>	<b>68</b>	<b>9,037</b>	<b>104</b>	<b>15,764</b>	<b>164</b>

Sources Euromoney Loanware and IFC

simply providing funds. The process of raising project finance imposes considerable discipline on the project's structure. It thus performs a role similar to effective corporate governance in privatisations, establishing incentives and monitoring performance. Box 4.2 describes some basic techniques of project finance.

Traditional sources of debt financing for private infrastructure projects are the major international banks and export credit agencies, which have developed considerable expertise in project finance. The major international banks have substantially increased their financing of private infrastructure projects in developing countries over the past several years, and in 1994-95 this expansion spread to eastern Europe, the Baltics and the CIS (see Table 4.1). Much of this financing has been concentrated in the telecommunications sector and, to a lesser extent, gas pipelines. While the major international banks are very active in project finance, they face several constraints. The first is their exposure limits, making complicated loan syndications necessary for large infrastructure projects. Banks are also limited by the maturity of their deposits and the long economic lives of infrastructure projects. The longest international bank loans are typically 7-12 years, while many infrastructure projects require financing well beyond 12 years to avoid refinancing risks.

In terms of investment time horizons, institutional investors, such as pension funds and insurance companies, can provide a better match for infrastructure financing than that provided by commercial banks. However, these institutions tend to be averse to risks and require the careful structuring of projects. A number of institutional investors have begun to finance private infrastructure projects through investment funds that specialise in private infrastructure in developing countries. These funds can offer a mix of financial instruments, including secured and subordinated debt, equity and bridge financing to cover the riskiest phase of the project cycle (construction and start-up). While at least 16 such funds have been established on a global basis with the potential to invest over US\$ 10 billion, only two have been set up to invest in private infrastructure in eastern Europe, the Baltics and the CIS, both with backing of either the EBRD or International Finance Corporation. The potential investment capacity of these two funds is US\$ 150 million.

One way to gauge the nature of financial impediments to private infrastructure in the transition economies is to consider the types of financing provided by the EBRD for such projects. A fundamental operating principle of the EBRD is to provide financing only when alternative sources of funds are not available elsewhere on reasonable terms and conditions.<sup>24</sup> In other words, the EBRD is restricted to providing finance for viable projects only when the market and other sources of funds are unable or unwilling to provide the necessary capital. The EBRD's ability to fund such projects while observing sound banking principles arises in part from the segmentation of international capital markets (with respect to certain sectors and countries) and the capabilities and unique standing of the Bank itself. The inherent weaknesses of the domestic capital markets in the transition economies also create a potential role for the EBRD in mobilising local currency finance for private infrastructure projects.

The aggregate capital structure for all of the EBRD's private infrastructure projects reveals that overall the projects are financed with 43 per cent in debt and 57 per cent in equity (see Table 4.2). Within the capital structure of EBRD-supported projects, it is noteworthy that the Bank's share of financing is significantly greater for debt than for equity. Direct lending by the EBRD accounts for 38 per cent of total foreign debt, while its loan syndications among international banks account for a further 27 per cent. The EBRD thus either directly provided or helped to mobilise 65 per cent of all foreign debt financing for the private infrastructure projects it supports.

With respect to local currency debt, the EBRD has helped to mobilise financing through the use of guarantees to support domestic bond issues. There has been relatively little domestic bank financing of private infrastructure in Bank-supported projects, reflecting the dominance of short-term lending by local banks in most transition economies. Developing domestic sources of debt financing for infrastructure projects remains a priority, particularly since most infrastructure services are non-tradable and should be financed in local currency from a risk-management perspective. The emergence of life insurance and, to a lesser extent, private pension funds in the transition economies represents an important potential source of local

<sup>24</sup> Agreement Establishing the European Bank for Reconstruction and Development, Article 13 (vii).



Table 4.2  
Capital structure of EBRD-supported private infrastructure projects

	ECU billion	% of instrument	% of total
Total financing	4.8		100.0
Debt	2.1	100.0	43.2
Foreign			
Foreign commercial banks	1.0	45.7	
Of which: EBRD syndications	0.6	27.3	
EBRD	0.8	38.3	
Other	0.2	8.7	
Local	0.1	7.3	
Equity	2.7	100.0	56.8
Foreign			
Private foreign sponsors	1.4	52.4	
EBRD equity	0.2	8.3	
Other	0.0	1.1	
Local	0.2	5.6	
Retained earnings	0.9	32.5	

Source: EBRD

currency finance for infrastructure projects, which has yet to be tapped in a substantial way.<sup>25</sup>

The EBRD has also taken an important role in mobilising equity finance, being the only significant source of portfolio equity for the projects. While strategic investors must contribute the bulk of the equity in private infrastructure projects from the viewpoint of incentives and project management, outside equity can also form an important component of capital structures. There are so far relatively few institutional sources for portfolio equity investments in private infrastructure projects in the region.

While an examination of projects that have been initiated reveals some information about financing constraints, it is also important to consider experiences from EBRD projects that have lapsed. Two points can be drawn from this experience.

First, in the EBRD's experience, a number of projects have failed to advance because of the perceived high costs of both the interest margins and the time required to negotiate and document often complex projects. As a result, several of those proposed for private participation have been abandoned or undertaken on a sovereign basis. However, the view that private financing is more expensive than sovereign-guaranteed loans requires careful consideration. Simple comparisons of borrowing costs between private finance and sovereign loans reveal wide spreads in interest rates. However, the cheaper cost of sovereign loans must be weighed against the risks of project failure to which governments are exposed and the inefficiencies that can arise from the inadequate management of these risks. In particular, sovereign loans typically submerge the difficult risk management and incentives issues that

are the intense focus of highly structured private finance. The assumption of project risks by the government typically leads to a weakening of incentives to manage these risks effectively, which is reflected in the relatively poor performance of public versus private infrastructure projects. The incentive and efficiency benefits of private markets apply just as strongly, and perhaps more strongly, to capital markets as to other areas of economic activity.

Second, it must be recognised that private finance of a project does not preclude a role for public support in the same project. There are some types of infrastructure projects where it is difficult to achieve financial viability on a strictly commercial basis, but where the economic returns to the projects may be high. Such a divergence between financial and economic returns can arise, for example, in the case of some transport sector projects, for which there are often external benefits. In such cases, the challenge is to find ways of blending public subsidies with the benefits of private finance. A key to progress in this area will be to develop financial structures that are simpler and less costly, but that do not compromise their important disciplining role.

4.5 Concluding remarks

In transition economies, infrastructure must be substantially restructured to meet market demand and concern for the environment. Tariff levels and structures are also heavily distorted by the use of infrastructure under central planning as a way of distributing benefits and resources to households and enterprises. The main challenges for commercial infrastructure are thus:

- to move towards more cost-reflective tariff levels and structures to encourage more efficient use of infrastructure services, to guide appropriately investment decisions throughout the economy, and to strengthen the financial viability and accountability of infrastructure enterprises;
- to expand access to private finance through improved financial performance given the fiscal constraints on public investment associated with transition; and
- to allow increased market selection of service providers and to promote greater operational efficiency.

This chapter argues that commercial infrastructure can help to meet these challenges in two ways. First, it can help to insulate infrastructure from excessive political influence and create a constituency for tariff reform. Second, this approach can serve to improve the selection of service providers and to strengthen incentives within infrastructure enterprises. Available evidence from industrialised and developing market economies suggests that the move towards private participation where there is competition or effective regulation, in particular, can yield significant gains in terms of operating efficiency and investment.

Much of the private participation in infrastructure has occurred through selective entry into areas where competition is possible

<sup>25</sup> Chapter 7 examines the development of local life insurance and private pension funds in the region.



and regulatory arrangements to support this participation are reasonably well developed. Privatisation of existing infrastructure enterprises has proceeded more slowly. This form of private participation can require two types of institutional change: the restructuring of enterprises before their privatisation and the creation of effective regulatory institutions.

The infrastructure sector with the most extensive private participation is telecommunications. This concentration of activities is consistent with both the specific challenges in the transition economies and with the world-wide pattern of private participation in infrastructure.

This chapter also examined the relationship between the environment for private investment, as measured by the EBRD's transition indicators, and private participation in infrastructure, since a key challenge in infrastructure is investment. This analysis finds a strong relationship between progress in transition and private participation in infrastructure.

Lastly, the sources of and impediments to private finance in support of commercial infrastructure in the transition economies were examined, in part, by considering the role of the EBRD in financing private infrastructure projects in the region. This analysis points to a shortage of long-term debt, both from international capital markets and domestic financial systems in the region, and of portfolio equity.

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# Regulation and competition in infrastructure

# 5

As with many industries in transition economies, infrastructure requires substantial restructuring. Chapter 4 points out that a commercial approach to infrastructure can promote its restructuring. Commercial infrastructure provides some insulation against the excessive political influence over unreformed state enterprises and creates a constituency for tariff reform. Strengthened financial performance and accountability and greater access to private finance for infrastructure investment are important aspects of restructuring. Commercial infrastructure can also improve selection of service providers, strengthen incentives and boost operational performance. This approach to infrastructure involves commercialisation of state enterprises, private entry into selective areas of infrastructure, or privatisation. In each case, however, commercial infrastructure must be accompanied by effective regulation or competition.

A fundamental task in the regulation of infrastructure is to determine where the boundaries between regulation and competition are to lie. In the last decade or so there has been a fundamental change in the thinking of policy-makers in industrialised and developing market economies.<sup>1</sup> Whereas infrastructure used to be considered a natural monopoly virtually in its entirety, there is now seen to be scope for competition to play a significant part in infrastructure provision.<sup>2</sup> This development owes something to changing technologies, such as gas turbine generation allowing electricity to be produced efficiently at a lower scale, or cellular telephony, which has already demonstrated the potential for competitive provision in 11 transition economies. However, this change of approach is due principally to the realisation that it is possible to restructure the industries concerned so that there is at least functional separation and even separation of ownership between activities, according to their potential for allowing competition. Thus, electricity generation (which is potentially competitive) can be separated from high-voltage transmission (which is a natural monopoly). This in turn can be separated from local distribution, where there are elements of natural monopoly alongside the potential for limited competition.

The introduction of competition where possible is desirable because it avoids the high costs imposed by regulation. These costs arise in at least two ways. First, and most simply, regulation requires considerable economic and sectoral expertise, which is scarce in any society, and particularly so in those emerging from the era of central planning. Skilled and experienced personnel are hard to recruit and retain,<sup>3</sup> and effective regulation needs to make efficient use of this scarce resource as well as the substantial resources sometimes spent by firms in dealing with regulatory

matters. Second, and more fundamentally, regulation is costly in another way. By continuing to allow the state discretion to intervene in the outcome of economic processes, an additional dimension of uncertainty is added to the calculations of private investors whose confidence in the future will be critical to providing the capital requirements of transition.<sup>4</sup> For both of these reasons, competition where possible is preferable to unnecessary regulation.

Competition in infrastructure can also promote better operational and financial performance by service providers. For example, competitive pricing combined with the threat of bankruptcy for loss-making firms eliminates much of the scope for inefficiency within both publicly and privately owned firms. Competitive market entry and exit also perform an important role in selecting which firms provide the services demanded by consumers. Thus, if an incumbent (public) enterprise is not among the most efficient potential producers, opening the sector to competition can serve to change the composition of the industry. Finally, competition can reveal information about the comparative performance of firms operating in the same sector, particularly where there are private firms and performance measures are available from published accounts or share prices. This information can be used to improve incentives within both public and private firms.

The scope of competition and that of necessary regulation, however, depends on the state of technology and the provision of alternative services, both of which are constantly changing, particularly in the transition economies. For example, the falling cost of radio transmission is likely to make access to local telecommunications potentially competitive in the near future. The rapid expansion in road haulage and personal transportation are posing greater competitive challenges to the dominance of railways in transportation. These examples underline the difficulties in foreseeing the potential problems for a system of regulation and the need for any regulatory system to have the flexibility to respond to unforeseen developments. However, flexibility also has a cost. Investors need reassurance that the profitability of their investments will not be compromised by future regulatory decisions that might lower prices or increase standards to court political popularity, exploiting the fact that capital investments, once “sunk”, cannot move elsewhere. Typically, investment in infrastructure is extremely capital intensive, has a long lead time and subsequent operating life, and once made cannot change either its function or its location. The “sunk” nature of investment in infrastructure makes it particularly vulnerable to fears about adverse regulatory decisions in the future.

<sup>1</sup> An analytical framework for understanding these changes, and evidence for the UK economy, are given in Armstrong et al. (1994).

<sup>2</sup> See World Bank, 1994.

<sup>3</sup> See Fingleton et al., 1996, for evidence on the experience of competition agencies in central Europe.

<sup>4</sup> See Chapter 4.



Given the need for flexibility, the most challenging task for regulation, therefore, is not that of deciding what to do at any moment, but of determining who should have what powers at some time in the future to decide what should be done. This choice may consist either of allocating powers to some party or parties or of determining a procedure whereby existing rules may be changed. It is in an important sense a task of constitution-making rather than merely policy-making. Sometimes the constitution-making task is extremely difficult even if it is easy to see what policies are needed. For example, it is clear in most transition economies that tariffs for electricity should be raised to levels that reflect some appropriate measure of costs. It is far from clear, however, which regulatory arrangements are the best for convincing potential investors in electricity-producing assets, or in assets using electricity, that tariffs will continue to reflect costs over the lifetime of the assets concerned. The credibility of chosen policies is as important as their intrinsic merit, and credibility is in large part a constitutional matter. The fact that credibility may be threatened by political uncertainty is of particular importance in transition economies, precisely because these countries have seen major changes in political regimes and have not had time to develop the relative stability and institutions that investors require.

Section 5.1 examines issues in the design of regulatory institutions, given the absence of such institutions in the region up to now. Section 5.2 examines in detail the scope for competition and the requirements for effective regulation in each of the main infrastructure sectors covered by this Report: telecommunications, electric power, water and waste water, and transportation. Section 5.3 summarises the main issues concerning regulation and competition in infrastructure.

### 5.1 Design of regulatory institutions

The experience of regulation in market economies has cast light on a number of crucial questions that need to be faced in regulatory design. First, what should be the relationship of regulatory institutions to other branches of government, particularly when providers of services are state-owned? Second, how geographically and politically decentralised should regulation be in a particular sector? Third, how should regulatory tasks be allocated between different institutions? Lastly, what powers and instruments should regulatory bodies have?

There are a number of reasons why it is desirable – especially in transition economies – for regulatory functions in infrastructure to be institutionally separated from other functions of government. They all arise from the fact that effective regulation may conflict with other pressures upon government. It is only where regulatory functions can be exercised with reasonable independence and transparency that it is possible to be confident that they will be exercised well. Independence does not mean lack of political accountability, but it does imply that such accountability is best exercised periodically and according to reasonably clear terms of reference for the institutions concerned. Moreover, credible regulation often requires the use of powers of investigation and

punishment that may be politically acceptable only where there is visible accountability exercised over the use of these powers. Establishing accountability may be an essential prerequisite, therefore, to granting these institutions the powers that they need to function effectively.<sup>5</sup>

Two particular reasons for institutional separation stand out. First, government is subject to constant pressures to satisfy particular interests, while coherent policies for infrastructure require an especially long-term perspective. When government ministries are both the service provider and tariff-setting authority, they tend to keep tariffs low, and adjust them erratically according to the ebb and flow of pressure from users of services. This tendency is particularly strong given the history of the transition economies, where infrastructure under central planning served as a means of directing resources to, and influencing the decisions of, households and enterprises. Clear rules for tariff-setting and independent regulatory institutions that exercise the discretion which is required in implementing these rules are much more likely to result in a coherent and effective outcome. Second, only the establishment of regulatory institutions that are separate from the interests of the service provider can put credible pressure on the latter to improve performance, particularly where the entrenched interests of workers and incumbent managers contribute to inefficiency, corruption or low-quality provision.

While effective regulation requires institutional separation, at which level of government (local, regional, national or even supra-national) should regulatory power lie? Where natural monopolies exist at the local or regional level rather than the national level, decentralisation of regulation becomes possible, as with the local provision of water and waste-water services in some countries. Different levels of regulation have a comparative advantage in addressing different kinds of problems. Decentralised regulation has the major advantage that regulators can adapt their policies more closely to the circumstances and needs of the particular locality or region, and they will tend to be more accountable to the political process in that area.

Local regulatory institutions, however, can be more vulnerable to corruption or more generally to “capture” by special interest groups. In particular, decentralisation can weaken the effectiveness of regulatory institutions where there is a significant shortage of specialist expertise, as in the transition economies. Sometimes decentralisation can also cause fiscal problems for local jurisdictions, either because it weakens the ability of poorer jurisdictions to receive transfers from richer ones, or because there may have been decentralisation of responsibilities without decentralisation of revenue-raising powers. The latter problem has been particularly acute in the Russian Federation in recent years.

Decentralisation can also cause problems where it is important to coordinate the policies of different jurisdictions because policies adopted in one jurisdiction have a significant impact on conditions in another. In such circumstances centralised regulation is often

<sup>5</sup> See Neven et al. (1993), Chapter 5, for a review of some of these arguments.



more appropriate. Centralisation is particularly important where there are major environmental impacts or network connections between regions – as when a river flows between them, or transport infrastructure in one affects the costs of external trade originating in the other. Thus, while certain regulatory objectives in a sector may be better pursued through decentralisation (tariff-setting in water), others may be better served through a centralised approach (environmental protection). The need for some centralisation or coordination in infrastructure regulation poses a particular challenge where a previously existing federation has broken up, as in the case of the former Soviet Union.

On the division of powers between different regulatory institutions, one question is whether there should be separate regulators for each sector. Another is whether different regulatory objectives – the management of environmental considerations, the policing of anti-competitive behaviour, the setting of tariffs – should be managed by different institutions. Given the scarcity of specialist expertise, pooling resources where there are common problems makes sense. In some areas, such as energy or transport, there may be an important interaction between regulatory policies which means that it is important to determine them together: rail tariffs need to be set jointly with policies on pricing and taxation of road transport; and electricity pricing both influences and is influenced by the costs of alternative forms of power and of fuel. However, transparency and accountability may require separation of functions so that responsibilities are not confused – for example, to avoid the achievement of politically expedient goals, such as low pricing, at the expense of equally important ones, such as control of pollution.

Finally, the instruments used by regulators can have an important bearing on the design of regulatory institutions. One approach to price regulation is to allow service providers to charge prices that covers costs, including a market rate of return on invested capital. This approach, widely used in the United States, is often referred to as rate-of-return regulation. An alternative approach is to set a price ceiling for services, allowing the service provider to earn a higher profit by improving performance and controlling costs. This approach, first applied in the United Kingdom, is often referred to as price-cap regulation. Viewed over time, though, the distinction between the two becomes less sharp, as price caps are periodically adjusted with a view to the profits earned by service providers. Nevertheless, one advantage of price caps, which is important in transition economies, is to economise on resources required to monitor regulated industries, because they encourage service providers to reveal potential cost savings. It is noteworthy that US regulatory agencies typically have much larger specialist workforces than their price-cap counterparts.

The credibility of price caps can be difficult to sustain, however, since the earning of profits from productivity gains and cost savings can generate pressures for tighter price caps. This problem is potentially significant in transition economies, where

there is no recent history of regulatory institutions. To encourage investment, price caps must be at a level that allows a market return on invested capital and must not be subject to overturning by political whim. Rate-of-return regulation can thus have an advantage in reassuring investors.<sup>6</sup> However, the benefits from this increased credibility must be weighed against the additional information costs incurred in supporting rate-of-return regulation.

## 5.2 Tailoring reforms to sectors and challenges

The needs and circumstances of the infrastructure sectors vary widely, between countries, between sectors and even between different activities in the same sector. This means that the fundamental issues highlighted here – the balance between competition and regulation, the trade-off between regulatory intervention and credibility, the degree of independence, the appropriate levels of decentralisation and specialisation of regulation and the choice of regulatory instruments – have to be resolved in varying ways. The sector-by-sector analysis outlined below draws lessons from Chapters 3 and 4 on what challenges the infrastructure sectors currently face and on approaches towards commercial infrastructure, and goes on to examine the ways in which competition and regulation are beginning to respond to the developments.

Even across the wide diversity of country and sectoral experiences it is possible to discern some common priorities, even if these vary in urgency and the degree to which they are already being addressed. First, distortions need to be removed in both the level and the structure of tariffs in order to encourage efficiency in resource use and to attract private-sector investment in expansion and modernisation of the infrastructure stock.<sup>7</sup> Second, there needs to be an opening of service provision to competition in those areas where it is appropriate and feasible to do so. This liberalisation can and should proceed relatively rapidly. For it to be credible, private participation, or at least commercialisation of public utilities, may be needed to remove the tendency for state-owned enterprises to use the public purse to underwrite anti-competitive behaviour. Third, regulatory institutions that are transparent, independent and accountable need to be established in areas where competition is impossible or seriously imperfect. In practice, this means as a first step the institutional separation of regulation from service provision, a reform that has yet to be undertaken in most infrastructure sectors in most transition economies. The building of effective regulatory institutions requires considerable time. They do not need to be large, but they do have to be of high quality and subject to effective leadership. The initial steps toward their creation should not be delayed.

## Telecommunications

### Challenges

The evidence in Chapter 3 indicates that the overwhelming priority in telecommunications is investment in new capacity and improvement of the quality of existing capacity. Given fiscal constraints, the bulk of this investment must come from the private sector, and much of the private finance of infrastructure in the transition

<sup>6</sup> See Ordoover, Pittman and Clyde (1994).

<sup>7</sup> See Chapter 4.



economies has so far flowed into this sector. There is ample evidence that the willingness of users to pay for new telecommunications capacity will continue to exceed the costs of providing this capacity for the foreseeable future. However, there is at present a significant imbalance between the low tariffs for local calls and the high tariffs for trunk and international calls, which creates a danger that new investment may be distorted towards long-distance traffic at the expense of local networks.

The challenge for regulation in this sector centres, therefore, on investment. Most importantly, a framework must be established in which investors are confident that they will recoup the costs of the

sizeable investments required, together with enough of a reward to compensate for the risks involved. Here, there is an important trade-off: the more secure and credible the regulatory framework, the lower the risk premium investors will require, so that paradoxically a framework which guards against the danger of excessively tight restrictions on prices may be able to elicit higher investment and consequently lower prices in the long run. To ensure that this investment is directed to those parts of the network where returns are genuinely high, existing distortions in tariff structures must also be removed. Finally, telecommunications operators need to be given incentives to respond to these investment opportunities and to use profits to finance future investment.

Table 5.1	
Telecommunications sector	
Services legally open to private entry (number of private entrants)	
Cellular telephony:	Albania (1), Belarus (1), Bulgaria (2), Croatia (2), Czech Republic (3), Estonia (3), FYR Macedonia (1), Hungary (3), Kazakstan (1), Latvia (2), Lithuania (3), Poland (3), Romania (1), Russian Federation (9), Slovak Republic (1), Slovenia (2), Ukraine (2) and Uzbekistan (1)
International long-distance services:	Ukraine (1)
Domestic long-distance services:	Poland, Russian Federation and Ukraine (1)
Local services:	Hungary (16), <sup>1</sup> Kyrgyzstan, Poland (14), Russian Federation and Ukraine
Privatisation of dominant operator (share of private ownership)	
	Czech Republic (49 per cent), Estonia (49 per cent), Hungary (67 per cent), Kazakstan (49 per cent), Latvia (49 per cent) and Russian Federation (49 per cent)
Regulatory institutions	
Separate telecoms department within ministry:	Czech Republic <sup>2</sup> and Slovak Republic <sup>3</sup>
Separate telecoms authority:	Hungary and Latvia (for tariffs) <sup>4</sup>
Anti-monopoly office:	Poland <sup>5</sup>

Sources: EBRD and World Bank.

<sup>1</sup> Of the 54 local telephone companies, concessions to operate 16 of these companies have been awarded to consortia that do not include the dominant Hungarian telephone operator, MATAV.

<sup>2</sup> Ministry of Communications retains authority for licensing new service providers. Authority for resolving disputes over the terms of inter-connection with the fixed network remains unclear.

<sup>3</sup> Telecommunications office within the Ministry of Transportation, Posts and Telecommunications is responsible for monitoring service quality, while the Ministry itself is the licensing authority. The Ministry of Finance sets tariffs.

<sup>4</sup> Telecommunications office within the Ministry of Economy proposes tariffs and issues licences for private networks and services, but final decision on tariffs rests with the Ministry of Finance.

<sup>5</sup> The Telecommunications Law established an independent Tariff Council to set tariffs, while the Ministry of Transport and Communications is responsible for overall telecommunications policy, radio frequency management, mobile licensing and relations with international telecommunications organisations.

In facing these challenges, a number of crucial policy issues for the sector need to be resolved. First, in which parts of the sector is competition desirable? Second, in those parts in which competition is desirable, should there simply be free entry, or should the authorities regulate a given number of competing operators? Third, what is the appropriate pace of market liberalisation? Should it take place as fast as possible so that the benefits of competition are quickly achieved? Or is there a case for a more gradual approach, so that the lure of monopoly profits in the short term acts as a spur to investment? Finally, where there remains a degree of monopoly power, what is the appropriate structure of regulation?

*Scope for competition*

In market economies there has been increasing competition in many parts of the telecommunications sector. The manufacture of equipment is a potentially competitive activity like any other, and in the transition economies this activity has long been separated from the telecommunications operators. The provision of enhanced services and cellular telephony to the final customer can be undertaken by rival operators, provided access can be assured on appropriate terms to the physical transmission network. Competition in cellular telephony has already been introduced in 11 transition economies (see Table 5.1). Although the fixed network has long been considered a natural monopoly, even this structure is changing, for a number of reasons. First, local radio links (which are not subject to significant scale economies) may soon be sufficiently low-priced to replace fixed links. Second, the falling cost of fibre-optic transmission, as well as the fact that telecommunications services can be bundled with other services, such as cable television or electricity distribution, means that the cost disadvantages of duplicating parts of the main network may be small compared to the overall value of the services provided and to the potential benefits from competition.

Competition in the core telecommunications services (local, domestic long-distance and international services) remains limited. In the great majority of countries, there is still a monopoly telecommunications operator, usually a government enterprise that is both owned and regulated by a government department or ministry. Partial privatisation of the state operator has taken place in five countries (the Czech Republic, Estonia, Kazakstan, Latvia and the Russian Federation) and majority private ownership has been achieved in only one (Hungary). However, this privatisation has only in some cases been accompanied by general liberalisation,



although this is sometimes promised for the future. The move towards liberalisation is most extensive in local services, where in Poland, Hungary, Kyrgyzstan, the Russian Federation and Ukraine local authorities have legally opened local networks to competition. Poland, the Russian Federation and Ukraine have also legally opened long-distance telephony to competition, but only Ukraine has allowed private entry in long-distance and international services through an operating concession.

It is ironic that there should be fewer countries with competition in international and long-distance than in local services, since local access is one part of the sector where the natural monopoly argument remains the strongest. However, the openness to competition in local services is less marked in practice than it looks on paper, for it is here that sizeable investments are required to raise the level of access to the network. The inversion of the tariff structure also makes local services less profitable to the incumbent operator and new entrants compared with domestic long-distance and international services. In Poland, for example, over 70 licences have been awarded for private entrants into local services, but only 14 have initiated operations. Those that have done so are also obliged to create new local infrastructure networks rather than build on the existing network of the dominant operator – a system which is good for maintaining competitive pressure on the dominant operator, but at the cost of considerable duplication.

While it is undoubtedly easier to introduce competition in areas of new technology, such as cellular telephony, where there are fewer entrenched interests at stake, in the rest of the sector difficult questions arise about the appropriate pace at which competition should be introduced. There are at least two reasons why phased competition is desirable. It allows both for an initial period of monopoly profit as an incentive to investors and for a period of learning and adaptation to new conditions. In Hungary, for example, under the terms of the sale of the 30 per cent stake in MATAV (the state operator) to a Deutsche Telekom/Ameritech consortium in 1993, MATAV will enjoy a monopoly position for eight years. Similarly, in Estonia the partially privatised operator, Esti Telefon, was given an eight-year exclusive right to provide long-distance services. By contrast, the partial privatisation of the Latvian operator Lattelekom in January 1994 involved a monopoly right for a period of 20 years (subject to some limited rights of competition in enhanced services and the establishment of private networks). The comparison with Estonia and Hungary suggests that such a lengthy period may be an unnecessarily long time to wait for the benefits of liberalisation. With only a distant prospect of competition, there may be limited incentive to invest now in new capacity and service improvements.

The gradual introduction of competition may refer not only to the period of time but also to the extent of competition envisaged. For example, in mobile telecommunications an initial duopoly may provide a better incentive than complete liberalisation for rapid extension of network coverage in the initial phase of investment. Complete liberalisation might encourage all competitors to concentrate their network coverage only on major population centres. However, at least limited competition in cellular tele-

phony should be introduced where possible to help spur investment and to keep some check on profits, as the experience with Centertel in Poland illustrates (see Box 5.1).

International evidence on the value of phased competition for fixed-link telephony is difficult to assess conclusively, but it seems reasonable to suggest that it is most appropriate where the requirement for network investments is high, as in most transition economies. However, even where phased competition in the market is appropriate, it is desirable to ensure that there is competition for the market – for example, through the award of licences by competitive tender. The main difficulty with phased competition, however, lies in ensuring that the timetable for liberalisation is credible. Granting monopoly or duopoly rights creates interest groups with a powerful incentive to resist further liberalisation.

### *Effective regulation*

For those activities that remain monopolies, the structure of regulation is of great importance. Only in Hungary, Latvia and Poland has there been the establishment of independent regulatory powers. In the great majority of transition economies, regulation of prices is still carried out by a government ministry, sometimes the same ministry that continues to have responsibility for ownership and management of the sector's assets. The fact that such a ministry is also subject to considerable political pressure has contributed to maintaining tariffs for local services below cost-recovery levels.

### **Box 5.1**

#### **Cellular telephony in Poland**

In 1991 a joint venture between Poland's state-owned telecommunications operator, Telekomunikacja Polska SA (TPSA), with 51 per cent of the equity, and Ameritech and France Telecom, with 24.5 per cent each, established Centertel, the country's first provider of cellular telephone services. The EBRD provided debt financing for the venture. Centertel was granted a licence to develop and operate a country-wide, analog cellular network for 25 years. The participation of TPSA was in part intended to facilitate fair conditions for interconnection charges, while the licence granted Centertel the freedom to set tariffs. It was anticipated that competition would emerge from the licensing of two digital cellular operators. However, their start up was expected to be delayed until 1996 pending withdrawal of the Russian army, which occupied the radio frequencies. By the beginning of 1996 Centertel had 82,000 subscribers and reported a net profit of US\$ 62 million on turnover of US\$ 174 million. At the insistence of the majority shareholder, Centertel paid out nearly US\$ 60 million in dividends, despite a provision in the EBRD loan agreement that the profits be funnelled back into investment. The EBRD subsequently called the loan. Also, in early 1996 the Polish government awarded the licences to operate two digital cellular systems to rival consortia, although Centertel had been promised one of these.

The case illustrates two important issues. First, when liberalisation is delayed (even though unavoidably in this case), monopoly provision of cellular telephone services can be very profitable in the context of widespread shortages of fixed-link access to telephone services. There would appear to be scope for two if not more cellular service providers in these markets. Second, if a monopoly is granted, it should be limited in time and supported with a requirement in the licence that the profits are funnelled back into investment.



In the Russian Federation the effectiveness of regulation is further hampered by the fragmented organisation of the telecommunications system and its control. There are 85 regional operators, which are owned by the republics concerned and a monopoly operating long-distance (between the republics) and international services. The Ministry of Posts and Telecommunications has overall responsibility for the industry, but the regional republics have considerable effective control over the publicly owned operators in their regions. The unsuccessful attempt by the Russian government to sell a share of a newly formed holding company of all the regional operators to foreign investors in 1995 points to the potential problems that regulatory uncertainty can create in attracting private participation. Similarly, the slow progress made by a joint venture between Deutsche Telekom, France Telecom and Rostelekom, the Russian domestic long-distance and international operator, to build a fibre-optic trunk network linking major cities may have been due in part to the uncertain legal and investment climate in the country.<sup>8</sup>

Poland has adopted a different policy, with responsibility for price regulation in the hands of the Anti-Monopoly Office (AMO). This approach has avoided, to some extent, the difficulties seen elsewhere of excessive protection of state-owned firms. Indeed, the AMO has ruled against the state-owned operator on several occasions. However, in its implementation a number of issues emerge. First, the Ministry of Communications issues permits for new service providers, but remains the owner of the dominant operator. Second, the legal framework for the terms of access to the fixed network remains unclear. Third, despite the AMO's efforts, the tariff structure still discourages investors from entering the market for local services, where licensing is more liberal. There are also more general issues raised by relying on AMOs to regulate telecommunications tariffs. While it is undoubtedly beneficial to have regulation carried out separately from a Ministry of Communications, assigning the responsibility to a general competition authority tends to confuse the tasks of creating competition and regulating prices in its absence. Many transition economies need to establish clearly the principle that competition policy is not merely price control in disguise, and allowing competition authorities to retain price control powers makes establishment of that principle more difficult. Also, there is no good argument for the pooling of expertise, since the nature of the training and skill required to regulate telecommunications is very different from that of more general anti-trust policy.

The main challenge of providing a credible assurance to investors is one with which all countries in the region are still grappling. Uncertainty over political developments and the consequent credibility of any proposed regulatory arrangements for the sector has proved very costly in some countries (such as the Russian Federation). In Hungary some attempt has been made to overcome regulatory uncertainty by making use of the provisions of contract law. The concession granted to MATAV in 1993 offers an eight-year monopoly in the supply of long-distance and international services, and in 29 of the country's 54 local districts. This

monopoly is conditional on performance targets with respect to the rate of growth of installed exchange lines. It is also conditional on a price-cap formula that allows retail prices to rise by 7.5 per cent per annum in real terms, and this is reviewed every four years (by the Minister for Transport, Telecommunications and Water Management). Although the terms of this review are clearly potentially politically charged, the fact that it must take place only after four years represents a constructive attempt to use the greater certainty of the contract law to mitigate the vagaries of regulatory politics in the interests of creating greater certainty for investment. In some transition economies contract law is as uncertain as regulatory politics, but the solution seems well-adapted to the Hungarian circumstances. As shown in Chapter 6 of the 1995 *Transition Report* and Chapter 2 of this Report, Hungary along with Bulgaria, Croatia, the Czech Republic, Estonia and Poland have relatively effective legal frameworks for investment, including contracts.

### Summary

The priorities in telecommunications can be summarised as follows. First, the regulation of prices, the granting of licences and the determination of conditions of access to fixed networks need to be placed in the hands of a regulatory body that is separate from the ownership and management of any state assets in the sector, and preferably insulated from day-to-day political pressures while remaining periodically accountable. Second, distortions in tariff structures need to be removed to create incentives for private investment. Privatisation provides a valuable way to increase the state's commitment in this process, particularly in local networks to increase access to telecommunications services. Third, a credible timetable needs to be established for liberalisation in the sector in international, domestic long-distance and local services. The precise pace of such liberalisation may vary with local circumstances, but long delays in introducing competition should be avoided. Enhanced services and cellular telephony should be quickly liberalised where this opening has not already taken place.

### Electricity

#### Challenges

The immediate challenge is to provide electricity tariffs that reflect costs and to enforce payment by electricity users. This measure would lead to a long-term decline in the electricity intensity of the transition economies from the current high levels documented in Chapter 3. It would be wrong to conclude, however, that the region's power generation capacity is likely to meet power needs adequately in the medium term, particularly where there is a strong recovery in economic output.

Much of the current capacity is in very poor condition due to years of inadequate maintenance. In addition, the capacity has such low levels of energy efficiency that it is uneconomic at world fuel prices or it is highly polluting. Many generating units will have to be closed, and many more upgraded or retro-actively fitted with pollution control mechanisms. In some respects, therefore, the

<sup>8</sup> See Armstrong & Vickers (1996).



need to encourage new investment raises similar issues in electricity as in telecommunications. However, there is also the serious additional constraint that tariffs have historically been held very low and may be politically much more difficult to raise. Nevertheless, establishing tariffs that reflect costs remains an immediate priority. Users of electricity must make current investment decisions in the knowledge that they will face tariffs reflecting the true cost of electricity production to the economy.

Since the prices of tradable forms of energy, such as oil and natural gas, have already been raised to international levels throughout much of the region, enterprises and households may tend to substitute subsidised electricity for the more expensive alternatives over time. Tariff reform is thus necessary to ensure that adequate incentives are in place for investments that use the most appropriate form of energy and that save energy altogether. Furthermore, credible environmental regulation of electricity needs to be in place, and tariffs must reflect the costs of regulated environmental standards. Regulation must also ensure that risks of power system failure or of incidents at nuclear power stations are adequately controlled. Finally, there is major scope for improved efficiency in the management of existing assets in the sector. The significance of private sector participation involves, therefore, both the provision of improved management of inefficient plant and the supply of new investment.

### *Tariff reform*

Firms are the electricity users that have the greatest medium-term potential for investment in energy-saving techniques, and the establishment of cost-reflective tariffs for them is therefore urgent. However, in most countries the discrepancy between prices and costs is greatest for households, with their low average income limiting the scope for closing this gap quickly. Some progress has been made in raising tariffs in recent years (usually because of fiscal pressures), although there remains a considerable way to go, particularly in the countries at early and intermediate stages of transition.<sup>9</sup> Households are responsible for much of the peak energy demand (which is supplied from generation units with the highest marginal costs and often with the most polluting plant). It is uncertain how sensitive household demand is to prices, but there may be substantial efficiency gains to be made from better management of demand from households. Given the legacy of low tariffs in transition economies, as well as the potential importance of electricity in household budgets, the challenge is to find ways of structuring tariffs so that they are perceived as fair as well as efficient.

In some parts of the region the payment record of both households and firms is poor (Albania and Ukraine, for example) and there are sometimes significant system losses due to theft. Unfortunately, these problems may make raising tariffs more difficult, since higher real prices may encourage greater non-payment. However, provided that the legal powers exist to enforce payment (notably by denying access to persistent non-payers), and provided that the basic tariff structures are perceived as fair, rising real tariffs

provide improved incentives for distribution companies to devote resources to ensuring collection.

The perceptions of fairness are important, however. First, raising household electricity tariffs to cover costs fully would have a significant impact on the real incomes of households (unlike with telecommunications charges). While there is evidence that this impact is not regressive on average, some poor households would be severely affected. It is important, therefore, to ensure that other tax-and-benefit policies are implemented to minimise the impact on poor households. High inflation sometimes makes it difficult to maintain steady real values of pensions and other welfare payments, and in these circumstances there is a good case for various kinds of "lifeline" tariff, with low charges for consumption up to a certain level and substantially higher charges thereafter. Such systems have the advantage that they can be targeted and therefore can have a limited overall budgetary impact. They can also be implemented by the service providers themselves, so they are less prone to become a vehicle for politically induced fluctuations of the kind that can play havoc with long-term investment decisions.

Second, factors other than the overall income distribution may affect the perceived legitimacy of electricity charges, and therefore the willingness of customers to pay. For example, in Albania the high levels of non-payment (up to 70 per cent) owe something to previous government policies that encouraged households to switch towards electrical appliances when real prices for electricity were low. Similarly, if large and well-connected state-owned enterprises fail to pay their bills and are not cut off (as has happened in a number of countries, including the Russian Federation and Ukraine), there will be severe resentment if smaller enterprises or households are penalised for non-payment. This suggests that policies to improve payment need to be introduced broadly and systematically so that burdens are perceived as being fairly shared.

There is in addition significant scope for energy savings in transition economies to help offset the impact of real tariff increases on consumer bills, as households and enterprises switch to less costly energy sources or invest in energy-saving technology. One approach to energy saving is through energy service companies, which develop small and medium-sized energy efficiency investments. These constitute the bulk of investments related to energy conservation on the demand side. Energy service companies are typically paid through contractual arrangements that convert customers' savings from reduced energy costs into a revenue stream. Such companies have become well-established in northern America and western Europe over the past decade and the concept is now being developed in transition economies with the support of the EBRD.

Privatisation in the electricity supply industry has a particularly important role in providing an incentive for, and a test of, the credible establishment of economic tariffs.<sup>10</sup> Hungary provides a good example of such a process at work, in that the government's efforts

<sup>9</sup> See Chapter 3.

<sup>10</sup> As has been argued by Newbery (1996a).



to privatise electricity distribution companies in 1992-93 failed to meet its expectations of sales values because investors lacked confidence in the future regulation of tariffs. These problems were addressed by establishing a more credible tariff policy, and eight electricity companies successfully privatised in early 1996 (see Box 5.2). By contrast, the inclusion of 30 per cent of the main vertically integrated company in the Czech voucher privatisation scheme and of 49 per cent of the Russian companies in similar schemes has involved no such pressure for improved regulation.

This does not mean that privatisation is impossible prior to the establishment of cost-based tariffs. The sale of an integrated regional monopoly and a large power station to foreign investors has been reported in Kazakhstan, albeit at low prices that reflect the high risks involved in taking on loss-making enterprises in an uncertain business environment. However, this approach avoids addressing regulatory issues that will become important in the future and can involve the loss of valuable public revenue.

Elsewhere in the region there has been some private sector involvement in the construction and upgrading of generation capacity subject to power purchase agreements with municipali-

ties or other power users. This approach points to the possibility of introducing competition in a sector which is still overwhelmingly loss-making, and where state ownership is likely to remain the norm for some time to come.

### *Scope for competition*

There has been significant restructuring in the sector even without privatisation, with considerable separation of distribution companies both from each other and from the grid, and some separation of generation as well (see Table 5.2). In some countries, such as the Russian Federation, this restructuring involves basically the creation of regional monopolies (distribution, regional transmission and generation are vertically integrated, and the national grid provides the means for trade between these monopolies; the grid also has large shareholdings in the regional companies). Since the distribution companies may be able to pass on their costs of generation to the customer, the presence of the grid provides no real incentive to generate electricity efficiently. Elsewhere, there is potentially a more competitive structure in which generation, transmission and distribution are fully separated in order to break up both generation and distribution into separate operating companies. Armenia has five generating companies, Hungary eight, Poland 35 and Ukraine six. It can be argued that at least the larger countries (the Czech Republic, Hungary, Poland, Romania, the Russian Federation and Ukraine) should eventually be able to privatise a sufficient number of separate generation companies to ensure reasonable competition (a minimum of five companies is a reasonable rule of thumb).<sup>11</sup> However, the short-term prospect for competition in the market for power generation is limited by the lack of financial viability of the sector with current tariff levels and structures.

In the meantime, the unbundling of the electricity sector provides scope for competition in the right to supply the market through bidding for long-term contracts, provided access by private suppliers to the grid can be ensured on non-discriminatory terms.<sup>12</sup> This approach relies on long-term “take-or-pay” contracts with independent power producers, which ensure vigorous competition for contracts, but which provide weaker incentives for efficiency improvements after contracts have been signed. Although distribution cannot be a competitive activity, except for supply of retail services to certain large customers, separation of distribution companies from each other at least provides for accounting transparency and consequently makes it easier for price regulation to be based on comparative cost or “benchmark” information.

### *Effective price regulation*

As with telecommunications, an important early task is to separate regulation from the state’s responsibilities of owning and managing assets in the sector. There has been a variety of approaches adopted by transition economies, as Table 5.2 indicates. In some countries, prices are regulated by a branch of government that is separate from the energy ministries, although in such circumstances it is important to ensure that issues of safety and quality of service are

#### **Box 5.2**

### **Privatisation of electric power in Hungary**

In January 1992 the Hungarian power sector was reorganised under a holding company, Magyar Villamos Művek Rt. (MVM), with 15 subsidiaries: eight for power generation, six for distribution and one as the national grid. Through the State Holding Company, the government owned virtually all the shares in MVM, while MVM in turn owned 50 per cent of the subsidiaries, with the State Property Agency (SPA) holding most of the remainder. The role of the State Holding Company was to retain in government control those enterprises in which the government had a strategic interest, while the mandate of the SPA was to sell its holdings as quickly as possible. The SPA attempted to sell through trade sales 15 per cent of each of the six electricity distribution companies in November 1993. However, the government considered that the tender offers were too low, and then consolidated the ownership structure of the sector by transferring the holdings of the SPA to the State Holding Company.

The regulatory framework for electric power was finalised only after the failed privatisation attempt in a law passed in April 1994, under which the Hungarian Energy Office was created. The Office was given the authority to issue licences where there was a natural monopoly and to propose maximum tariffs, while the Minister of Trade and Industry retained responsibility for setting tariffs. In July 1995 after a series of negotiations between the Energy Office and the government, a decree was issued containing a series of price increases up to 1997 and a medium-term framework for setting tariffs. This framework for tariffs is designed to allow an 8 per cent return on capital.

The six regional power distribution companies and two generators were partially privatised in December 1995, with up to 49 per cent of the shares in each of the companies sold to foreign strategic investors in a public tender. In March 1996 retail tariffs were increased in line with the decreed formula. However, the government has postponed announcing any further increases from 1 October 1996 to 1 January 1997.

<sup>11</sup> See Newbery (1996a).

<sup>12</sup> See Bacon (1995) and Besant-Jones (1996).



not neglected. In Hungary and the Russian Federation a separate regulatory authority for energy as a whole has been established. It is too early to tell how effectively these agencies will be able to function, since it is unclear whether they will be able to operate with real autonomy. For example, the Federal Energy Commission in the Russian Federation is the successor to an earlier body that was widely criticised for having few powers and no real independence, since it was composed mainly of industry representatives. It has now been restructured to have consumer representation and has been granted enhanced powers to gather information, but the effectiveness of these changes has yet to be tested.

Table 5.2  
Electricity sector

Comprehensive unbundling  
(number of enterprises)

Generation:	Armenia (5), Hungary (8), Poland (35), Ukraine (6)
Distribution:	Armenia (53), Belarus (6), Czech Republic (8), Hungary (6), Poland (33), Russian Federation (72), Slovak Republic (3), Ukraine (27)

Independent power generators  
(number of projects) Hungary (3), Czech Republic (1)

Privatisations<sup>1</sup>  
(number of privatised enterprises)

Integrated utilities: <sup>2</sup>	Czech Republic (1), <sup>3</sup> Kazakstan (1), <sup>4</sup> Russian Federation (1) <sup>5</sup>
Generators:	Hungary (3), Kazakstan (1), Poland (1)
Distributors:	Czech Republic (8), <sup>6</sup> Hungary (6), Russian Federation (72) <sup>7</sup>

Regulatory institutions

Separate department within ministry:	Armenia, <sup>8</sup> Belarus, Bulgaria, <sup>9</sup> Georgia, Lithuania, <sup>10</sup> Ukraine <sup>11</sup>
Separate energy authority:	Hungary, Russian Federation
Anti-monopoly office:	Kazakstan, Kyrgyzstan

Sources: EBRD and World Bank.

<sup>1</sup> Including partial divestiture.

<sup>2</sup> Including regional integrated utilities.

<sup>3</sup> CEZ (Czech Power Company) (high-voltage transmission and some generation) partially privatised using vouchers.

<sup>4</sup> Regional integrated utility, Almaty.

<sup>5</sup> RAO EES Rossii (Russian Joint Stock Company for Electric Power and Electrification) (high-voltage transmission and some generation) partially privatised using vouchers and through direct sales to insiders.

<sup>6</sup> Partially privatised using vouchers.

<sup>7</sup> Partially privatised to insiders, with the remaining shares owned by the integrated utility, RAO EES Rossii (high-voltage transmission and some generation).

<sup>8</sup> State Committee on Prices deals with tariff issues; an independent regulatory authority is to be established.

<sup>9</sup> Committee on Energy, which reports to Council of Ministers.

<sup>10</sup> Establishing an Independent Regulatory Agency. As an interim step the government has established an Energy Pricing Council, which submits proposals to the Cabinet.

<sup>11</sup> An independent regulatory authority is to be created as part of the 1995 reorganisation of the Ministry of Power.

There is also the issue of whether the energy sector should be regulated as a whole rather than through separate regulators for electricity, gas and other energy forms. The case for an integrated approach may be strongest in those parts of the former Soviet Union where natural gas is in plentiful supply, but where international trade in gas is limited by security concerns in importing countries and the inadequacy of pipeline facilities. This means that domestic prices for natural gas should diverge from export prices for some time to come, contrary to the standard economic considerations for internationally tradable commodities. It is important, therefore, that the choice of techniques and the location of plant in electricity generation is made on the basis of coherent long-term decisions about the prices not only of electricity but also of different kinds of fuel. This task could be made easier by an integrated approach to regulation for the sector as a whole. However, a single regulatory agency could be particularly vulnerable to capture by special interests, especially in resource-rich countries.

The environment and nuclear safety

Different issues arise with respect to environmental and safety regulation. Electricity generation is a major source of airborne pollution, especially sulphur dioxide, nitrogen dioxide and carbon dioxide. The first two of these have both local and cross-border impact, and carbon dioxide emissions are a matter of global concern. It is clearly important that electricity generation should be carried out in a manner that takes account of the environment, and that users should face the additional costs that concern for the environment will entail. The issue, therefore, is to decide which form of regulation is most likely to ensure that this happens.

Regulation by an energy ministry which continues to own the assets of the industry or to be closely identified with the industry's interests is certainly undesirable. Environmental regulation is often expensive and will tend to be resisted within the industry itself. The alternatives are regulation by either a general environmental agency or by whichever agency is charged with regulating other aspects of electricity. The advantage of the former is that it enables an integrated and coherent approach to be adopted to overall environmental regulation. It also ensures that the political difficulties faced by the industry in raising tariffs do not provide an incentive for lax enforcement of environmental standards. An associated risk, however, is that regulation becomes excessively strict because of the agency's wish to justify itself and to enlarge its own budget. For transition economies where there are high levels of pollution in the power sectors, this risk is probably smaller.

Given the shortage of resources which might attract investment in the region, it is essential that reductions in polluting emissions are achieved efficiently. The experience of environmental regulation in market economies has shown that traditional command-and-control methods can sometimes be very inefficient.<sup>13</sup> More innovative regulatory instruments, such as tradable emissions permits, which ensure a given level of emissions reduction by those plants which can do so at the lowest cost, are potentially of

<sup>13</sup> See Newbery (1990).



particular value in transition. They can be much simpler to operate than command-and-control methods because they require less detailed information on the part of the regulatory authorities.

Regulation of nuclear safety poses particularly difficult problems since it is often the most dangerous plants that provide cheap base-load power and which national authorities are most reluctant to close down. As the accident at Chernobyl indicated, nuclear safety has important cross-border implications. The effectiveness of this regulation is therefore an entirely proper matter for international negotiation and concern.

At their 1992 Summit, the G-7 countries offered those countries in transition a multilateral programme to improve safety in their nuclear power plants. This initiative was to comprise immediate measures in operational safety, short-term technical improvements based on safety assessments, and enhancement in regulatory regimes. It was also to create the basis for longer-term safety improvements by considering the scope for replacing less safe plants by developing energy sources and by improving energy efficiency. The G-7 also advocated setting up a multilateral mechanism to help implement this initiative, and in 1993 it proposed that the EBRD establish a Nuclear Safety Account (NSA) to receive contributions from bilateral donors to be used for nuclear safety projects in the region. The EBRD administers the NSA, which has several projects under implementation in the region.

### *Summary*

The overall priorities in the power sector are therefore threefold. First, tariffs reflecting costs need to be established for both households and firms. Second, complementary policies need to be put in place to improve collection rates, to promote investments in energy conservation and to ease the adverse impact on the poor. Third, strong and independent institutions need to be established to regulate tariffs, environmental pollution and nuclear safety. Only when progress is made in these three areas is there likely to be significant private investment in improving existing capacity in the sector.

## **Water and waste water**

### *Challenges*

The available evidence on the condition of water and waste-water infrastructure in the region presented in Chapter 3 points to significant investment requirements to improve the condition of the existing piped water networks (particularly to reduce leakage) and to upgrade sewerage and waste-water treatment facilities. The important policy issues that arise in water and waste water are fourfold. First, how can competition be introduced into this sector? Second, to what extent should tariffs be raised, and how does this depend on progress in the introduction of metering? Third, what policy reforms in other sectors are required to reduce organic and inorganic pollution of water resources? Lastly, what is the appropriate structure of price and quality regulation in the water sector, and how can the efficient management of assets in this sector best be encouraged?

### *Scope for competition*

Of all the infrastructure sectors, water and waste water are the areas in which there is least scope for competition in the traditional sense. The costs of the transmission network are inevitably a large proportion of the overall value of the resource, and there are significant scale economies and economies of density in building pipelines (as in the construction of other forms of water storage and transmission, such as reservoirs and canals). There may be other processes in the technology of water management that are less characterised by scale economies (parts of the sewage treatment process, for example). However, there are important benefits to which these processes give rise, and in the absence of some mechanism whereby private suppliers could appropriate these benefits, conventional competition is unlikely to work. Sewage plants could not compete to offer a cleaner environment to the final consumer, but this does not mean that there is no role for competition. However, it must be competition for the right to supply the market under a concession contract from the government (often termed franchise bidding in the water and waste-water sector) rather than competition in that market. Some of the terms of such concessions (service prices or quality standards, for example) must be determined by regulation rather than by the suppliers themselves, but competition to meet these terms is still essential. For example, water companies may compete to supply services of a given quality at the lowest service price, or a given quality at a given price at the lowest subsidy.

Implementation of this approach to competition for the market, however, raises a number of difficult issues. First, evaluating bids for complex services such as these requires a degree of experience often lacking at the local government level, even if consultants are hired specially for the purpose. Given the relative strength of engineering skills in the region, engineering criteria tend to dominate economic and financial considerations. Second, franchise bidding for an existing water or waste-water network is more problematic than a bidding for a build-operate-transfer project involving, for example, a new treatment plant. Uncertainty over the existing condition of the buried assets leads to high risk premiums in the bids, and the greater likelihood of future contingencies adds instability to the contract. Third, it is not an easy matter to put all non-price factors on an equal basis so that price alone can be the determining criterion in the evaluation. Negotiations will usually play an important role after the selection of one or more preferred tenderers. Fourth, frequent rebidding is the best way to maintain market pressure. However, this is not easy to accomplish in the case of water and waste-water infrastructure because of the existence of long-term assets and the problems involved in their valuation at hand-over. There is also a strong incumbent advantage that greatly reduces competition.

This is not to say that franchise bidding is not a valuable approach for the provision of water and waste-water infrastructure. The advantages it offers over a system of perpetual licences and regulation by permanent commission are considerable. However, careful consideration must be given to the supporting



administrative, legal and regulatory framework to ensure that concession contracts will be enforced by a competent court system. Hungary has already enjoyed some success in attracting the participation of private sector (including foreign) companies in this way (see Table 5.3).

Table 5.3

Water and waste-water sector

Municipal water and waste-water enterprises

Operating concessions or leases: (number of projects)	Czech Republic (2), Hungary (1), Lithuania (1) and Poland (1)
Concessions to operate: (number of projects)	Hungary (3)

Sources: EBRD and World Bank.

In circumstances where private sector management expertise would be valuable for the sector, but where regulatory uncertainty is a significant disincentive to private investment, the granting of operating concessions or leases (which differ from concessions in that they require no capital investment) can provide a fruitful form of public-private partnership. This approach has been followed in four transition economies (the Czech Republic, Hungary, Lithuania and Poland). One advantage of such arrangements is that competition may be increased. Without the need to amortise long-term assets, it becomes possible to rebid the contract on a more frequent basis, perhaps as often as every five years. A major disadvantage, of course, is that the need for private sector financing is usually one of the major objectives of local governments in the first place. The absence of capital commitment by the private sector also requires closer and more detailed monitoring than would be necessary under a concession contract, especially to make sure that adequate maintenance is carried out on the assets of the sector. However, high-powered incentives can still be created for management to achieve efficiency improvements, by linking rewards explicitly to the cost savings achieved.

Effective price regulation

A distinguishing feature in this sector is the trade-off between centralisation and decentralisation in regulation, which influences the selection of regulatory approaches and institutions. The local nature of services argues strongly in favour of placing primary responsibility for them at the local government level (with an exception being made for certain environmental and water-resource aspects) so that service providers will be accountable to local groups, and services will reflect local needs. However, there will be a need for regulators to scrutinise the costs of service providers and consequently for a considerable degree of financial, economic and administrative expertise, which is often lacking at the local level. In addition, the level of regulation that is needed to inspire investor confidence requires both great expertise and independence of opinion.

One of the major challenges in transition economies is to work out the details of regulatory mechanisms and institutions for water and waste water, taking into consideration the political and administrative culture of each country. The special difficulty during the transition is that, given the legacy of a command economy and strong centralisation, it is all too easy for central government regulation to become overly bureaucratic and insensitive to local conditions. For this reason, solutions may be favoured that involve contracts combined with supervision by independent, non-governmental groups. Their efforts, however, could be supported by central governments in information gathering and analysis. Because of the relatively large number of separate service systems in each country that can be used as a means of comparison, benchmark pricing has considerable potential in this sector, although it will take some time to develop robust methodologies.

It is important to emphasise the need to attain clarity in the regulatory framework, since the assurance of a credible and remunerative tariff structure over the medium term is as important in ensuring private sector participation as it is in the case of electricity. The establishment of cost-based tariffs has another important virtue. Not all users are metered (especially in the household and small business sector). Cost-based tariffs can encourage the voluntary adoption of metering by users who wish to economise on the use of this scarce resource. This is a matter of particular urgency in industry and agriculture, where the intensity of water use is frequently well above levels in market economies. Raising tariffs may help, therefore, to establish the principle that water is no different from any other goods, as well as making metering appear the friend of the user rather than the imposition of the state. The same principle operates here as in the case of electricity: linking tariff increases to conservation measures makes both the increases and the conservation appear more reasonable and more legitimate than if either is undertaken separately.

The environment

The Aral Sea problem illustrates one of the most significant predicaments in water resource management, namely the extent to which water quantity and quality depend on the management of other sectors of the economy, notably industry and agriculture. Excessive diversion of river water for agricultural use was responsible for a decline of 40 per cent in the surface area of the Aral Sea and a fall in its volume by 65 per cent between 1960 and 1989.<sup>14</sup>

Both industrial and agricultural production can make large claims on water resources (and usually pay well below the costs of these resources). Both can also involve processes with high levels of pollution that damage the quality of the water for the rest of the population. More than in any other infrastructure sector, therefore, the quality of services is affected by regulatory decisions taken in other sectors. For example, agricultural policies encourage intensive farming which results in an increase in the nitrate content of water that runs through arable soil; typically price support for agricultural output is not matched by measures to raise the price of

<sup>14</sup> See Gleick (1993), Table F.20.



chemical inputs. The poorly regulated discharge of industrial effluent damages water quality to such a degree that any subsequent intervention in the provision of water services is unable to reverse the damage. It is often far more cost-effective to use regulation to prevent water pollution occurring in the first place than it is to intervene to clean it up after it has occurred.

These considerations suggest that there is a strong case for regulation of environmental issues affecting the water sector and that this should be carried out by a separate body concerned with overall environmental policy. Given the way in which pollution of water sources can cross regional and municipal boundaries, this suggests that environmental regulation needs to be carried out at a national level, although regulation of the service delivery can be and often is the responsibility of lower levels of government. Many transition economies have made water service the responsibility of municipal government. However, the means by which municipalities can be given incentives to take into account the cross-border impact of their policies remain to be fully developed, though several regional water resource initiatives are under way, including in the Danube River Basin, Baltic Sea and Black Sea.

### Summary

Overall, the policy priorities for the water and waste-water sector are threefold. The first is to encourage private sector involvement in management and service delivery through competition for the market. Second, tariffs that reflect costs must be established, not only to strengthen the financial viability of service providers but also to encourage metering and other investments in water conservation, especially by agricultural and industrial users. The third priority is to ensure that these costs take account of the effect that water use – by industry and agriculture, for example – has on the availability and quality of water for other users. In particular, polluters of water must pay the full cost of the damage they inflict. These priorities will be best assured by the establishment of independent and transparent regulatory institutions, although their structure and composition may differ from that in telecommunications and electricity given the local nature of the natural monopoly.

### Transport

In transport, considerations of overall system capacity, which are extremely important in telecommunications, are less significant than the geographical and functional mismatch between the components and quality of transport infrastructure and likely future demand. As trade patterns in transition economies reorient towards existing market economies, there is a need for new and expanded westward links, by road, rail, sea and air. Rail use (relative to GDP) is still very high in comparison with industrialised market economies, but has declined sharply in the transition. The changing market share in favour of road transport reflects the more diversified composition of production in the transition. In addition, transport networks are often in poor condition and not as effectively managed as they could be. Major investments are required in maintenance and in upgrading the quality of existing infrastructure in line with market demands, and more effective management is required.

To find the right balance between competition and regulation in the transport sector, two interrelated questions need to be addressed. First, what is the scope for competition in transport? Second, what quantity and type of regulation is needed, and more generally, what role should governments play?

The scope for competition in transport depends largely on the specific characteristics of individual modes of transport and on the existence of alternative modes which can provide competitive services in the same markets. The distinction between competition *within* the market and competition *for* the market is particularly important in this sector. Competition in the market can take place between firms in the same mode of transport – intra-modal competition – or between firms in different modes (road or rail, for example) competing in the market for the same service, namely transport between two points. Competition for the market takes place when different firms compete for the right to provide a service for a given period of time (urban bus franchise) or to build and operate infrastructure under a concession agreement (toll motorway concession). Transport modes differ regarding the potential scope for each type of competition, and the extent of institutional and financial restructuring that first needs to be undertaken.

Government strategic planning and regulation have important roles in transport infrastructure investment. These roles reflect the influence of transportation on many aspects of economic activity and social life and its impact on land use and the environment. These considerations mean that uncoordinated and unregulated private investment cannot be expected to respond adequately to the needs of the economy and society as a whole.

### Competition within the market

Competition within the market is usually more feasible and desirable for the supply of transport services than that of transport infrastructure. Certain services, such as road haulage, inter-city coach services and air transport, can be opened up fairly fully to competition, and experience in market economies provides valuable lessons. In transition economies there has been extensive privatisation and liberalisation of road haulage, often as part of a process of divesting of services by large vertically integrated enterprises. Hungary and Poland, for example, liberalised and privatised their road haulage services from existing local public enterprises and own-account fleets. Because of the large number of these privatised service enterprises, as well as the lack of significant economies of scale in such activities, this has resulted in *de facto* liberalisation of haulage markets. However, obstacles to entry remain significant in some countries. These include difficulties in obtaining operating licences, or preferential contracting policies by state authorities. There has been less progress in liberalisation of inter-city bus transport.

Although deregulation of road haulage, inter-city bus services and air transport in market economies has not been free of problems, existing evidence strongly suggests that general restrictions on entry into these markets serve no useful purpose, and that the



amount of institutional restructuring required prior to open competition is minimal.<sup>15</sup>

Introducing competition among train-operating companies is more complex. It can require a large amount of enterprise restructuring, regulatory frameworks for gaining fair access to tracks, mechanisms for allocating capacity, and new contractual frameworks between infrastructure owners and operators to ensure safe and reliable services. There are basically three ways in which railways can be restructured, and each creates different potentials for competition. The first is to put the railway infrastructure under the direct management responsibility of the main passenger or freight operator which uses it and to charge other operators which might also use it for access. The second is to establish infrastructure as a separate internal business within an integrated railway and then to create an internal market with the freight and passenger division. The third approach is to establish the infrastructure business as a separate corporation, so that commercial relationships with the freight and passenger operating companies are formalised in legal contracts. Each of these approaches aims to create scope for competition by unbundling vertically integrated railways, and each has advantages and disadvantages which vary with the particular circumstances of the railway. EU directives require the second approach, and they may be strengthened in due course to require the third. However, EU countries, with the exception of Great Britain, have not embraced the notion of competition among railway operators.

Most countries in transition have recognised the need to adapt their railways to the market economy. Some are in the planning stages of reform, and a few have begun the process of vertical unbundling. The latter countries include Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Russian Federation, and Slovenia (see Table 5.4). In comparison with railway restructuring in western Europe and other industrialised countries, the envisaged pace of change is very rapid, given the extensive use of railways under central planning and the sharp decline in demands

for their services in the transition. These plans must recognise the impact of strong competition from other modes of transport, but there remains the need to continually reappraise productivity targets, equipment utilisation and unit cost levels.

The fact that vertical unbundling of infrastructure and service operations can create scope for competition within the market applies to other modes of transport as well. For example, the joint operation and management of airport and airline services in transition economies is a practice inherited from the integrated structures of the past, and is a system which hampers competition. There are no financial or operating reasons to maintain airports and airline operations together. If anything, this may provide opportunities for cross-subsidy, which should be avoided. Moreover, there is ample scope for introducing competition in airline services and to a lesser extent in airport management. After the US experience with deregulation, the scope for introducing viable competition in the provision of commercial aviation services is no longer in doubt. Recent developments show that regional airlines can successfully compete with nationally established airlines. There are useful lessons in these developments for countries such as the Russian Federation and the Central Asian republics, where airline services are vital for long-distance travel. Airports represent a case where ownership of infrastructure can be successfully separated from the running of airport services, such as runway maintenance or baggage handling, with the possible exception of air traffic control.

Competition for the market

Competition for the market can provide for private participation and efficiency gains in many areas of transport infrastructure provision and management, such as road and rail track maintenance, the construction and operation of toll motorways, airport terminals and port berths. Through competitive bidding for the right to provide and/or manage a given infrastructure facility or support service for a period of time, or to undertake a particular investment, it is possible to achieve significant cost reductions and service quality improvements. In the Russian Federation, for example, competitive bidding for road maintenance works was introduced in 1994, leading to increased competition in the selection of contractors and to a reduction in costs per unit of lane-kilometre of road upgrading work being contracted.<sup>16</sup> Likewise, open tendering for major road works is becoming common practice in Romania as part of the restructuring of the road sector, including the construction industry and the Ministry of Transport.

Concessions to build and operate parts of the transport infrastructure can also attract private participation and new investment into the sector. Toll motorway concessions have been granted in Hungary and are at the bidding stage in Poland and Romania (see Table 5.4). In principle, the use of tolls means that such concessions can involve 100 per cent private finance. However, traffic flows in most road corridors in the region are not yet sufficient to bear the full cost of upgrading to high-standard, dual-carriageway,

Table 5.4

Transport sector

Functional separation of state railways: <sup>1</sup>	Bulgaria, Czech Republic, Hungary, Poland, Romania, Russian Federation <sup>2</sup> and Slovenia
Concessions for ports and airports: (number of projects)	Hungary (1), Kazakstan (1) and Turkmenistan (2)
Motorway concessions: (number of projects)	Hungary (2), Poland (bidding stage) and Romania (bidding stage)
Regulatory institutions: (separate motorways authority)	Hungary, Poland, Romania

Sources: EBRD and World Bank.

<sup>1</sup> The functional separation of railways involves establishing separate operating units within the state railway along functional lines, typically, freight haulage, passenger services and infrastructure (tracks, signalling, stations).

<sup>2</sup> Commitment under the 1995 Statement of Modernisation Strategy and Commercialisation Principles for Russian Railways.

<sup>15</sup> See, for example, Morrison and Winston (1986), McGowan and Seabright (1989), and Thompson and Whitfield (1995).

<sup>16</sup> see Bousquet and Queiroz (1996).



segregated highways. Nevertheless, motorways typically have social rates of return well in excess of their private rates of return because of their contribution to reducing congestion and accidents and creating new land use opportunities, although in some circumstances they may impose significant environmental costs of their own. Where private rates of return are inadequate to make the project independently viable, this suggests that public-private partnerships, in which the state contributes a subsidy in recognition of the social benefits thereby created, may make an important contribution to mobilising investment finance in this sector.

Concessions for other elements of the transport infrastructure (airports and ports) can work in similar ways to those discussed above for the water sector. Four such concessions are in operation in three transition economies (see Table 5.4).

### *Regulation*

The nature of necessary regulation depends very much on the nature of prevailing and potential competition. When inter-modal competition is strong and there are no artificial barriers to entry into the market, there appears to be little reason for price regulation. While the safety aspects of road and air transport usually need specialised regulatory expertise, evidence from market economies suggests that, provided the conditions for granting licences to operators are reasonably clear and non-discriminatory, and that an appropriate safety regime is properly enforced, regulation of the general process of competition in the provision of these services can be left to competition agencies.

Even in the presence of strong inter-modal competition, however, the relationship between modes of transport is complex and will require some coordination as well as competition. For example, the development of airports requires consideration of road and rail links; the scope for seaports to handle container traffic depends on the quality of rail links as well as on the presence of container terminals inland. For these reasons, decisions about the location of infrastructure investment requires regulatory supervision by local and/or national planning authorities. However, since these decisions usually have significant consequences for the profitability of existing service operators, such authorities can come under strong pressure to favour established operators against new entrants. A strong presumption in favour of competition and rights of new entrants is therefore appropriate.

When there is competition for the market, some amount of regulation is necessary to monitor compliance with the concession agreements signed between the public authorities and the private concessionaires. In addition, it is necessary to have an arbitration authority, which does not need to be a specialised one, to resolve disputes that may arise between the parties in cases of non-compliance. It is essential to ensure the independence of these regulatory bodies as well as to limit their proliferation. In Hungary, Poland and Romania independent authorities have been established to oversee the toll motorway concession (see Table 5.4).

Government credibility and consistency is vital to encourage private participation in transport infrastructure investment. The cancellation of toll road projects after the private sector has committed significant resources to the projects has occurred in some countries in the region, and such reversals will undoubtedly make it difficult to attract investment in similar projects in future.

In some transport sub-sectors, government will continue to play an active role due to inherent obstacles to efficient resource allocation posed by the fact that prices faced by alternative competing modes do not reflect true social costs. This is the case in urban transport, where basic economic principles suggest that pricing may require government subsidies to operators to support public transport, which is needed to reduce urban congestion and pollution levels. The degree of subsidy required will also depend on the complementary policies adopted with respect to taxation of private transport. For example, if congestion pricing could be adopted for roads, private car transport would become significantly more expensive, and public transport could compete without the need for large subsidies. Although market economies have been slow to consider the adoption of congestion pricing for roads, this is no reason for transition economies not to learn from earlier experiences.

### *Summary*

The policy priorities for the transport sector are fourfold. First, the infrastructure needs to adapt to a likely long-term shift from rail to road, both by providing appropriate road infrastructure and by restructuring the railways to benefit from their comparative advantage and to reduce their dependence on state aid. Second, competition needs to be introduced or extended in areas where it is feasible, such as road haulage, air transport and inter-city bus services. Third, competition for the market needs to be implemented to ensure a more commercial approach and greater responsiveness to customer demand in areas as diverse as urban bus transport and the management of airports, where competition in the market cannot work directly. Fourth, effective regulation of environmental impact (including congestion and accident risk) needs to be undertaken to ensure that the growth in demand for transport services does not reduce the productivity of urban centres and the quality of city life.

## **5.3 Concluding remarks**

Although the particular problems and priorities in infrastructure vary from sector to sector, a number of common themes emerge. Three in particular deserve to be highlighted here. First, competition for the right to supply the market is possible and important throughout the infrastructure sectors – in particular where competition in the market is either impossible or likely to be achieved only in the medium to long term. Competition in the market can be quickly achieved in some activities, as illustrated by the cases of cellular telephony and road haulage, although the scope for competitive provision in telecommunications extends well beyond cellular services. But elsewhere there are many services, such as electricity generation, water and waste water, airports, ports and



toll motorways, where competition for the market has the potential to increase efficiency and encourage private investment in infrastructure in transition economies and thus to promote its restructuring.

Second, establishment of tariff levels and structures that reflect both costs and fiscal constraints is necessary to encourage efficiency in the use of infrastructure services, to direct appropriately investment throughout the whole economy and to unlock finance for much needed investments in infrastructure. The use of infrastructure as a mechanism for distributing benefits and resources to households and enterprises has no coherent rationale. However, public resistance to tariff reform is often strong. Use of complementary policies, such as those that encourage energy efficiency or water conservation and that target subsidised services to the poor, however, can ease the impact of tariff reform and facilitate its implementation.

Third, independent yet accountable regulatory institutions are needed to oversee competition for the market, to guard against the abuse of monopoly power and to take into account the environmental impacts of infrastructure, such as pollution and urban congestion. There is no recent history with independent regulatory institutions in transition economies, and only limited progress has so far been achieved in the establishment of regulatory institutions that are separate from the government ministries which oversee infrastructure sectors. Given the time required to establish effective institutions, the initial steps towards their creation should not be delayed. Key considerations in the design of regulatory institutions, including boundaries between competition and regulation allocation of regulatory responsibilities, are provided in the summaries for each of the four infrastructure sectors discussed above.

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