



## Infrastructure to 2030

**Why is infrastructure key to economic and social development?**

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### Introduction

Infrastructure systems – transport, electricity, telecommunications, water, etc. – play a vital role in economic and social development. Increasingly interdependent, they are a means towards ensuring the delivery of goods and services that promote economic prosperity and growth, and contribute to quality of life.

Demand for infrastructure is set to continue to expand significantly in the decades ahead, driven by major factors of change such as global economic growth, technological progress, climate change, urbanisation and growing congestion. However, challenges abound: many parts of infrastructure systems in OECD countries are ageing rapidly, public finances are becoming increasingly tight, and infrastructure financing is becoming much more complex.

As a result, a gap is opening up in OECD countries between the infrastructure investments required for the future, and the capacity of the public sector to meet those requirements from traditional sources. Bridging the looming “infrastructure gap” will demand innovative approaches, both to finding additional finance and to using infrastructures more efficiently and more intelligently through new technologies, demand management strategies, regulatory changes and improved planning.

Where will new sources of finance come from and what role will the private sector play? How can infrastructures be managed more effectively and more efficiently? Will the business models currently in place for financing, organising, regulating and delivering infrastructures and infrastructure services be able to respond adequately to the complex challenges they face, and will they be sustainable over the longer term?

This *Policy Brief* looks at the forces shaping investment needs in infrastructure over the next 25 years. Drawing on examples and experience from across OECD countries, it offers a set of policy proposals for governments to explore in their efforts to bridge the infrastructure gap and enhance infrastructure’s contribution to economic and social development in the years to come. ■

**Why is infrastructure key to economic and social development?**

Infrastructure is not an end in itself. Rather, it is a means for ensuring the delivery of goods and services that promote prosperity and growth and contribute to quality of life, including the social well-being, health and safety of citizens, and the quality of their environments. In the past, infrastructure has provided significant social and economic benefits. Looking to the future, it will continue to play a vital role in economic and social development, not least because the networked economy is becoming increasingly important, and society ever more dependent on the smooth running of a growing range of infrastructure services.

Moreover, the various infrastructure systems themselves are interacting ever more closely with one another, engendering interdependencies and complementarities, as well as heightened vulnerability, and thereby posing new policy challenges.

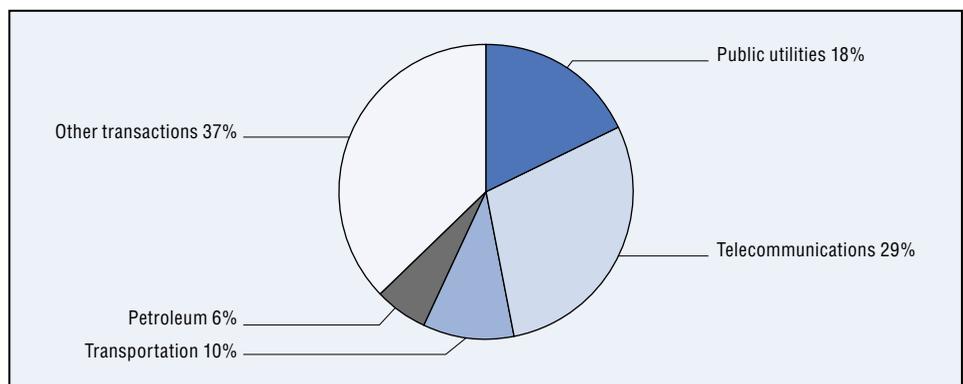
The fast pace of world economic growth will put increasing pressure on infrastructure. The infrastructure requirements of OECD countries and the larger non-OECD countries such as China, India and Brazil, are growing. The world economy is expected to grow on average at close to 3% per year to 2030, with developing countries' performance outstripping that of the developed countries by a wide margin (4% per year compared with 2.4%).

So the two-way street along which economic growth encourages demand for infrastructure, and infrastructure generates economic growth is set to get much busier in the years to come. Moreover, globalisation and the emergence of new markets and new players are helping lengthen supply chains and exacerbate congestion around key ports, airports and transit corridors.

Infrastructure needs will also be shaped by an array of other factors, including:

- Demographic developments – ageing populations, urbanisation and population movements to rural and coastal areas.

**Figure 1.**  
**VALUE OF PRIVATISATION INFRASTRUCTURE TRANSACTIONS**  
 (as a percentage of the total value of privatisation transactions), 1990-2006



Source: OECD (2002), *Financial Market Trends*, No. 82, June, and *The Privatization Barometer*, [www.privatizationbarometer.net](http://www.privatizationbarometer.net).

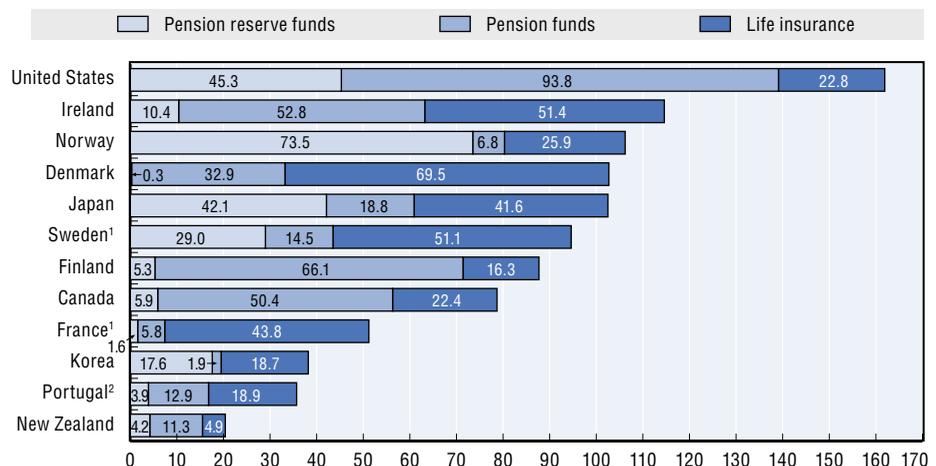
- Increasing constraints on public finances due to ageing populations, security concerns, etc.
- Environmental factors, such as climate change and rising quality standards.
- Technological progress especially in information and communication technology.
- Trends towards decentralisation, and growing local public involvement.
- The expanding role of the private sector.
- The growing importance of maintenance, upgrading and rehabilitation of existing infrastructures. ■

**How fast will it need to grow?**

At present, governments are not well placed to meet these growing, increasingly complex infrastructure needs. Government budgets, the traditional source of infrastructure finance, will come under significant pressure over the coming decades in most OECD countries – due to ageing populations, growing demands for social expenditures, security, etc. General and local taxation, which finance government budgets, will also come under pressure as voters become increasingly reluctant to pay higher taxes. Moreover, looking across the full range of economic, social and environmental forces affecting key infrastructure sectors, nowhere does the current public policy, regulatory and planning framework appear adequate to tackle the multiple challenges facing infrastructure development over the next 25 years.

Failure to make significant progress towards bridging this infrastructure gap could prove costly in terms of congestion, unreliable supply lines, blunted competitiveness, and growing environmental problems, with clear implications for living standards and quality of life.

**Figure 2.**  
**CONSOLIDATED PENSION AND LIFE INSURANCE ASSETS IN SELECTED OECD COUNTRIES, 2005 (% of GDP)**



1. Pension reserve fund data are 2004 data.

2. Life insurance data are 2003 data.

Note: Unallocated pension insurance contracts are excluded from pension funds' assets.

Source: OECD (2006), "Pensions Markets in Focus", Issue 3, October. Data drawn from OECD, Global Pension Statistics, Insurance Statistics and other administrative sources.

But how much infrastructure investment is likely to be needed through to 2030? Rough estimates from the OECD suggest that annual investment requirements for telecommunications, road, rail, electricity and water taken together are likely to total around an average of 2.5% of world gross domestic product (GDP). If electricity generation and other energy-related infrastructure investments in oil, gas and coal are included the annual share of GDP rises to around 3.5%. Clearly, the figure would be even higher if one were to include other infrastructure such as ports, airports and storage facilities.

How are these investments likely to be allocated? Globally, a large share will be used for new additional infrastructure, but much will also be accounted for by maintenance, replacement and upgrading of existing transport, water and telecommunication systems. The shares vary across regions. In OECD countries, infrastructure networks and systems are, broadly speaking, in place, and the scope for adding new infrastructure is limited. Consequently, a larger effort will need to be directed towards maintenance and upgrading of existing infrastructures and to getting infrastructures to work more efficiently. Ways of making the system more efficient include investment in new technologies, and demand management strategies to better control traffic flows through road, rail, electricity and water systems. In the BRICs (Brazil, Russia, India and China) and most developing countries, by contrast, the lion's share of investment is likely to go on new construction as governments strive to expand inadequate networks. ■

### How will we pay for it?

Looking across the globe, a not insignificant part of infrastructure is already in private hands – this is especially true of telecommunications and, to a lesser degree, of power generation and railways – and it is to be expected that private money will continue to flow to these activities. More problematic is the area of publicly owned and operated infrastructures, because it is here that pressures on budgets and tax-raising capacity are already starting to be felt.

#### Box 1.

##### THE PRINCIPAL POLICY RECOMMENDATIONS

#### 1. Innovative Approaches to Finance

1. Encourage public private partnerships (PPPs) to raise additional financing.
2. Encourage investment by pension funds and other large institutional investors.
3. Make greater use of user charges for funding infrastructure.
4. Diversify and expand traditional revenue-raising sources.
5. Explore the funding possibilities offered by land value capture.

#### 2. Improving the Regulatory and Institutional Framework Conditions

6. Examine the legal and regulatory framework conditions with a view to encouraging the emergence of fresh sources of capital and new business models for infrastructure.
7. Encourage the emergence of new players and new business models.
8. Place greater emphasis on the reliability of infrastructure functioning.
9. Strengthen the framework for standards.
10. Explore new institutional arrangements that may provide more effective and efficient financing and/or delivery of infrastructure.

Evidence suggests that in the advanced countries, public capital investment has accounted for a steadily declining proportion of total government expenditure. For the OECD area as a whole, government spending on gross fixed capital formation (investment in material assets such as roads, water pipes or fibre-optic cable installation) as a share of total general government outlays fell from 9.5% in 1990 to approximately 7% in 2005.

At the same time, social expenditure has noticeably increased its share of the total. Between 1980 and 2003, social expenditure rose on average from about 16% of GDP to 21% of GDP. Experiences differ across OECD countries, but on average public spending-to-GDP ratios increased most significantly in the early 1980s, and then again in the beginning of the millennium, with average ratios rising by 1% of GDP between 2000 and 2003.

The two key drivers of increased social spending have been health and the retired population. Both are expected to expand considerably in the coming decades, outpacing the growth of government budgets and that of GDP by a substantial margin. Projections suggest that for the OECD area as a whole, spending on public health and long-term care could increase from the current level of 6.7% of GDP to between 10.1% and 12.8% by 2050, while pensions could rise on average by around 3 to 4 percentage points of GDP over the same period.

These mounting pressures will probably only be offset in small part by lower spending on education and on child or family benefits. Moreover, scarcer labour is expected to put pressure on governments to increase investment in all forms of education, including lifelong learning. Accordingly, the scope for public investment in infrastructure within government budgets will be increasingly constrained.

What are the options for the public sector to bridge the infrastructure gap? Despite growing pressures on public budgets, general and local taxes will continue to provide the single most important source of financing in many

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#### Box 1. (cont.)

#### THE PRINCIPAL POLICY RECOMMENDATIONS

#### 3. Strengthening Governance and Strategic Planning

11. Support the development of long-term, co-ordinated approaches to infrastructure development.
12. Reduce the vulnerability of long-term infrastructure planning to short-term thinking.
13. Ensure the involvement of a broader range of stakeholders in the infrastructure process.
14. Step up efforts to reduce the length and complexity of the planning-to-implementation process.
15. Strengthen international co-operation for transborder infrastructure.

#### 4. Developing and Integrating Technology

16. Support technologies to improve efficiency and to enhance demand management.

#### 5. Expanding and Improving the Toolkit

17. Strengthen public capacity to address infrastructure issues.

cases. However, in most OECD countries and some BRICs, ageing populations are likely to lead to shrinking wage bills, thereby reducing tax receipts. To some extent, the severity of the effect will depend on such factors as the evolution of labour market participation rates, immigration, productivity, and the balance between consumption-based and income-based tax revenues. Some compensation may be forthcoming in the guise of increased tax receipts from accumulated pension assets, but the effect is likely to be limited to generally no more than one percentage point of GDP. ■

### How can the private sector help?

In other words, public budgets fed by taxes will not suffice to bridge the infrastructure gap. What is required is greater recourse to private sector finance, together with greater diversification of public sector revenue sources.

Private sector finance has traditionally had a strong presence in some infrastructure sectors in some countries. In recent years, as the share of government investment in infrastructure has declined, that of the private sector has increased. Privatisations (*i.e.* the sale of state-owned assets) have been an important driver. Since the 1980s more than USD 1 trillion of assets have been privatised in OECD countries. Infrastructure has consistently been on centre stage. Averaged out over the 1990-2006 period, almost two-thirds of all privatisations in the OECD area have concerned utilities, transport, telecommunications and oil facilities.

Elsewhere, too, privatisation activity has been vigorous. Over roughly the same period, some USD 400 billion of state-owned assets were sold in non-OECD countries, of which about half were accounted for by infrastructure.

New business models with private sector participation, notably variants of public/private partnership models (PPPs) that are being increasingly used particularly in OECD countries, offer further scope for unlocking private sector capital and expertise. So too do the huge pools of private sector capital managed by pension funds and insurance companies. Infrastructures, with their low-risk and steady-return profile, are of considerable potential interest to such funds. In the OECD area alone, pension funds today amount to some USD 18 trillion, up from USD 13 trillion in 2001. ■

### How much government support will be needed?

Diversifying the sources of public sector finance includes making more and better use of user fees, creating mechanisms for securing long-term financing for infrastructure (*e.g.* long-term infrastructure funds), exploring the possibilities offered by land value capture – enabling governments to make use of the value of the land they hold – and promoting innovative variations on traditional financing mechanisms.

Expanding access to additional private and public sector sources of finance will make a significant contribution to bridging the infrastructure gap. However, it will not suffice on its own. The challenges facing governments are simply too diverse and complex. In the coming years, policy makers will in addition need to:

- Improve efficiency in the construction and operation of infrastructures.

- Increase efficiency levels in the use of infrastructures through better management of demand.
- Ensure infrastructures are reliable and resilient.
- Enhance the design and capacity of infrastructures to meet future environmental and security challenges.
- Strengthen life-cycle management of infrastructure assets as the focus of investment turns increasingly to maintenance, upgrading and refurbishment of existing facilities and networks.
- Raise the effectiveness of infrastructure development both in meeting multiple objectives – economic, social, environmental, etc. – and in allocating resources to create maximum value.

In rising to meet these challenges, governments will need to complement the search for fresh sources of capital with a wide array of other measures. These must include: regulatory changes to encourage the emergence of new business models and the development and integration of new technologies; the promotion of more competition in procurement and operation; legal and administrative changes to speed up planning, procurement and implementation; application of new technologies and new schemes to enhance efficient use of infrastructures and better manage demand; closer international co-operation; improved security; and the underpinning of infrastructure design, financing and funding with long-term strategic planning.

Finally, the planning, financing and management of infrastructure will need to be supported by better basic tools. Information, data collection, research and analysis need strengthening. Accounting for improved asset management should be used more widely, as should rigorous evaluation methods for stronger evidence-based policy making. Greater use can be made of on-line tools for communication and dialogue. And there is ample scope in education and training institutions for greater efforts to develop the interdisciplinary skills and knowledge that will be required to tackle the opportunities and problems raised by infrastructure in the years ahead. ■

### For further information

For more information on the OECD's work on infrastructure needs to 2030, please contact:

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at the OECD International Futures Programme.



### For further reading

OECD (2006), **Infrastructure to 2030: Telecom, Land Transport, Water and Electricity**, ISBN 92-64-02398-4, € 45, 355 pages.

OECD (2007), **Infrastructure to 2030, Volume 2: Mapping Policy for Electricity, Water and Transport**, ISBN 978-92-64-03131-9, € 50, 505 pages.

Or visit: [www.oecd.org/futures/infrastructure](http://www.oecd.org/futures/infrastructure).

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