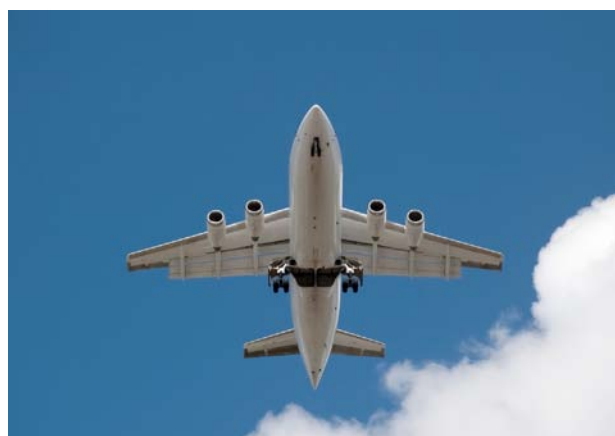


# Strategic Transport Infrastructure Needs to 2030



## MAIN FINDINGS



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International Futures Programme

## **Strategic Transport Infrastructure Needs to 2030**

### **Main Findings**

OECD Futures Project on  
Transcontinental Infrastructure Needs to 2030/50



## FOREWORD

Major international gateway and corridor infrastructures such as ports, airports and key rail routes are crucially important to the exports and imports of all the products and resources of modern-day economies. These infrastructures will become even more important in the future.

Following a brief recovery in economic growth rates at OECD and world level, global activity has slowed again and the near-term economic outlook is for quite weak growth. However, over the longer term to 2030, modest but sustained growth is expected in developed countries, and significantly higher growth in the major developing countries. International passenger and trade demand are likely to see strong long-term growth as well.

As a result, rapidly increasing volumes can be expected, particularly along major trade and transport corridors between the largest regions, *i.e.* Asia (China, India), Europe and North America. Aviation and maritime services will carry most of the long distance traffic, with ground handling likely to remain heavily concentrated at the major international gateway airports and ports.

*Strategic Transport Infrastructure Needs to 2030* looks in particular at whether gateway ports, hubs, and their inland transport connections are up to the demanding tasks ahead. Case studies explore the opportunities and challenges and help identify the pertinent key issues. Much of this infrastructure will require improved capacity to handle volumes two or three times current levels, not to mention the largest passenger aircraft and container vessels in use by 2030. Improved funding and financing arrangements will be needed in many countries, given their current deficit and debt levels and other expected demands on budget resources.

The report proposes a set of policy options to enhance the contribution of these infrastructures to economic and social development at home and abroad in the years to come. The options include recognition of strategic infrastructure (including gateways, hubs and key connections) in national policy frameworks and comprehensive measures to strengthen approaches and support the infrastructure development required.

The project from which this report is drawn followed on from previous OECD work on infrastructures to 2030, which addressed surface transport, energy, telecommunications and water infrastructures.

Funding and expert advice were provided by a Steering Group that included representatives from OECD member countries' ministries of transport, mobility and public works, environment and energy, sustainable development and the sea, as well as from other departments and agencies; non-OECD members (Chinese Taipei and India), international organisations (the European Investment Bank) and private enterprise. A full listing of Steering Group members is contained in Annex A.

The OECD International Futures Programme team managed the project, which was undertaken in consultation with the OECD/International Transport Forum and Joint Transport Research Centre, with OECD in-house and external experts participating as appropriate (see Annex A).

The project explored the future opportunities and challenges facing some key gateway areas, inland hubs and their inland connections. A case study approach was taken to help "drill down" to assess the opportunities and challenges related to infrastructure; case studies were chosen following discussions with the Steering Group members. Workshops were undertaken to ensure input from local experts and to allow discussion and more detailed consideration of the assessment results.

The Workshops were generally hosted by the country ministry principally involved and attended by participants from the relevant ministries of other countries as well as by staff of the OECD International Futures Programme. The purpose of these Workshops was to allow the project to focus on several key aspects: the current situation in relation to gateways, inland transport and transit traffic; expected future growth and development; the infrastructure planned, and related funding and financing arrangements; and opportunities and challenges related to the current and forecast positions.

The case study Workshop report topics are listed below:

- North-West European Gateway Area – Port of Rotterdam
- The Turkey Bosphorus Area – Istanbul Marmara, Mersin and Nabucco
- The “High North”/Barents Area – Strategic infrastructure in Finland and Sweden
- France’s Gateway Ports – Le Havre, Marseille
- Denmark – Greater Copenhagen Area
- Austria/Switzerland – Inland hubs
- India – Mumbai Gateway Area, JNPT and other ports.

These case studies are available on the OECD International Futures Programme website at [www.oecd.org/futures/infrastructure](http://www.oecd.org/futures/infrastructure), and may be viewed individually by clicking the individual web links. A consolidated document will also be available, enabling the reports to be downloaded with a single click.

Workshop reports include background and factual material (*e.g.* on national policy settings and investment programmes) provided by the host ministries, agencies and workshop participants. Each report includes an assessment prepared by the OECD International Futures Programme project team of the opportunities and challenges facing the gateway area or inland hub and their international and inland transport connections. Publication of the full report “Strategic Transport Infrastructure Needs to 2030” is foreseen for early 2012.

## KEY MESSAGES

Over the long term, world GDP is expected to grow strongly and could possibly double over the period to 2030. On this basis:

- Air passenger traffic could double in 15 years; air freight could triple in 20 years; and port handling of maritime containers worldwide could quadruple by 2030.

Quality infrastructure is a key pillar of international competitiveness. It is trade-enhancing – especially for exports – and has positive impacts on economic growth.

Major international gateway and corridor infrastructures are crucially important to the exports and imports of all the products and resources that the economies of all countries need. In the future, they will become even more important.

- There needs to be a new “strategic” infrastructure category that includes the major international gateways *and* their key inland connections.

Current gateway and inland transport infrastructure capacity will not be adequate to meet 2030 demand.

- Most of the current gateway and corridor infrastructure could not handle a 50% increase, let alone a doubling of passengers in 15 years or a tripling of freight in 20 years.

Despite the recent financial crisis and recession, which has increased deficits, debt and unemployment:

- Countries with good planning processes and strategic infrastructure plans linked to assured funding are continuing to successfully build the strategic infrastructure they need.

In the future, since funding of gateway and inland transport infrastructure from traditional sources will “dry up”:

- Improved funding is needed in many countries to ensure funding security and levels consistent with the development of the strategic infrastructure required to meet future needs.
- Countries without good funding arrangements may not see their strategic infrastructure built.

In many countries, there needs to be greater project certainty and funding assurance, because:

- Plans without assured funding can create a credibility gap, weaken stakeholder interest, and damage future gateway performance.

Given the risks to future infrastructure funding in countries with an over-reliance on budget sources:

- Infrastructure funds like the ones being used successfully in a number of countries could be central to the more secure *government* funding of strategic infrastructure needed in other countries in future.

In many countries, *private sector* financing has been important in helping deliver the equity and debt financing needed to make infrastructure projects operational.

- Private involvement can also help manage the transition to user-pays/self-financing investments.
- Part and full privatizations may increase efficiency as well as reduce public funding requirements.

Private funds invested directly in listed and unlisted infrastructure assets are already active in many infrastructure markets.

Pension funds are well-resourced and potentially larger investors in transport infrastructure. However:

- Access is needed to better-quality projects that have risk-reward balances consistent with fund contributors’ interests. *Strategic* transport infrastructure could be attractive in this regard.

In the future, given expected limitations on public funds:

- Increased private sector investment in strategic transport infrastructure will be essential.

There is increasing support for green growth and a “greening” of transport. Important contributions can be made during infrastructure planning and development stages. Once developed, good management and use of innovative and energy-efficient technologies can significantly increase those contributions.





## Introduction

The OECD Futures Project on *Transcontinental Infrastructure Needs to 2030/50* brought together experts from the public and private sector to take stock of the long-term opportunities and challenges facing gateway and corridor infrastructure (ports, airports, rail corridors, oil and gas pipelines, etc.). The intention was to propose a set of policy options to enhance the contribution of these infrastructures to economic and social development at home and abroad in the years to come.

The project followed on from work undertaken for the OECD's *Infrastructure to 2030* report (2006-07) and focused on gateways, hubs and inland corridors, which were not covered in the earlier report. The project's main findings, conclusions and key messages are set out in this summary.

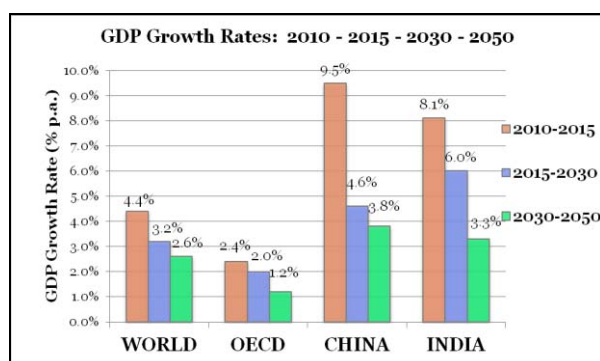
## Global outlook and infrastructure needs

### *Outlook for economic growth*

Over the long term, world GDP is expected to grow strongly and could in fact double over the period to 2030.

Differentiated patterns of global economic growth, already emerging before the recent financial crisis, are expected to continue. The highest economic growth is expected in the Asia/Pacific region; China and India would lead the way, with many other economies also growing strongly. Among the developed country regions, North America's GDP could be 50% higher and Europe's 40% higher by 2030.

**Figure 1**



Source: IEA 2010

GDP per capita levels in the high-income countries are expected to increase steadily. Higher than average GDP per capita growth can be expected in the largest developing economies. GDP per capita levels in China and India could increase three to four times by 2030. However, levels in the developing economies will still be much lower in 2030 than in the high-income group.

### *International trade*

Economic growth and growth in international trade are major drivers of increased passenger and trade flows. Other important drivers include population growth, the increasing proportions of people living in cities, and the growth of megacities.

The widespread economic growth expected over the period to 2030 will be associated with rapid growth in trade – especially within Asia and between the major regions.

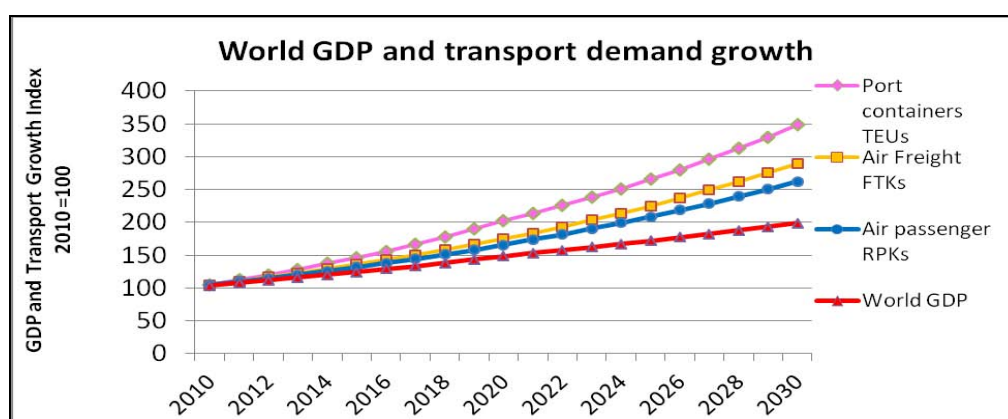
## Transport

The outlook is for increasing international transport demand, widely spread across regions and transport modes.

With global GDP doubling by 2030, airline traffic worldwide could grow by around 4.7% per annum over 2010-30; air freight could increase by around 5.9% p.a. over the same period; maritime container traffic could increase by more than 6% p.a.; and rail passenger and freight traffic worldwide could increase at around 2-3% p.a. On this basis:

- air passenger traffic could double in 15 years;
- air freight could triple in 20 years; and
- port handling of maritime containers worldwide could quadruple by 2030.

**Figure 2**



In line with expected GDP growth, high initial growth rates in transport demand are expected to moderate over time. The strongest growth will be in the Asia region and between the large emerging economies (China, India) and the Europe and North America regions.

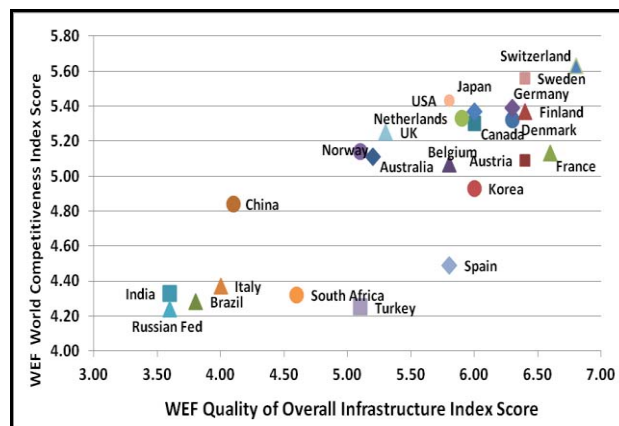
Caution is advised here, as these are reference case projections that only take into account policy changes that have already been announced. At present, there are many uncertainties about possible future policy changes and their impacts (mainly related to reducing CO<sub>2</sub> emissions and stabilising CO<sub>2</sub> concentrations in the atmosphere). There are also many other possible risks (*e.g.* related to financial crises and global shocks). Thus uncertainties are attached to all projections, particularly those involving maritime and aviation traffic.

The global outlook for oil and gas demand also remains highly sensitive to possible policy action to curb rising CO<sub>2</sub> emissions. According to the International Energy Agency's "Current Policies Scenario", global primary oil use would increase between 2009 and 2035, driven by population and economic growth. Under the IEA's "450 Scenario" (aimed at restricting CO<sub>2</sub> concentrations in the atmosphere to 450 ppm), oil demand in 2035 would be lower than 2009 levels. Natural gas demand is set to resume its long-term upward trajectory from 2010 and is expected to be higher in 2035, under all IEA scenarios.

## Competitiveness and infrastructure

Quality infrastructure is a key pillar of international competitiveness. Infrastructure networks reduce the effect of distance, help integrate national markets, and provide the necessary connections to international markets. Quality infrastructure is trade enhancing – especially for exports – and has positive impacts on economic growth. Not surprisingly, therefore, most of those countries with high-quality infrastructure also rank high in the world index for overall competitiveness.

**Figure 3**



### Infrastructure investment needs

Globally, future investment needs over the period to 2030 will depend in part on the infrastructure currently in place, the growth in demand expected over that period, and the additional capacity required in the different locations.

The *Infrastructure to 2030* report (OECD, 2006-07) concluded that global infrastructure investment needs across the land transport (road, rail), telecoms, electricity and water sectors would amount to around USD 53 trillion over 2010-30. Annual investment requirements for these sectors amount to some 2.5% of world GDP, which would rise to 3.5% of GDP if electricity generation and other energy-related infrastructure investments in oil, gas and coal are included.

**Table 1**

Global	Infrastructure Investment Needs 2009-2030				
	Annual Average Investment (\$ Billion)		Aggregate Investment (\$ Billion)		
Infrastructure facilities	2009 - 2015	2015 - 2030	2009 - 2015	2015 - 2030	2009-2030
Airports capital expenditure	70	120	400	1,800	<b>2,200</b>
Port infrastructure facilities capital expenditure	33	40	200	630	<b>830</b>
Rail 'new construction' (incl. maintenance)	130	270	920	4,060	<b>5,000</b>
Oil and Gas – transport & distribution	155	155	930	2,325	<b>3,255</b>
<b>Total</b>	<b>388</b>	<b>585</b>	<b>2,450</b>	<b>8,815</b>	<b>11,280</b>

The new assessments undertaken in this *Strategic Transport Infrastructure Needs to 2030* report conclude that global infrastructure investment needs for airports, ports, rail, and oil and gas (transport and distribution) alone could amount to over USD 11 trillion over 2009-30.

Infrastructure investment needs could be a higher percentage of GDP in fast-growing developing economies, reflecting the extensive new infrastructure they will require and the increased maintenance needs that can be expected beginning around ten years after the initial investment in that infrastructure.

## **Strategic transport infrastructure**

### ***The importance of gateways, hubs and inland infrastructure***

International gateways and trade corridors deliver services important to national and regional competitiveness, productivity, employment, quality of life and a sustainable environment.

The future growth in passenger and freight demand will lead to rapidly increasing volumes that will likely be concentrated along the major inter-regional passenger and trade routes – with increasing shares carried by extra-large aircraft and container vessels able to carry high volumes at lowest cost. And the major international gateway airports and ports will have both the high-volume capacity and the special facilities needed for these extra-large aircraft and shipping liners – and are therefore likely to benefit from both the increasing growth and a continuing concentration of demand. Increases in volumes can also be expected along inland connections from gateways to the cities and industrial areas in their hinterlands.

For these reasons, each country's key international gateways and inland trade corridor infrastructure will become even more important to their national economies in future.

### ***Opportunities and challenges to be faced***

A number of case studies to examine major infrastructure projects, both under way and in prospect, were undertaken for this book. Most studies benefited from workshops hosted by national authorities that allowed the OECD/IFP team to “drill down” to assess countries' opportunities and challenges and future infrastructure needs. The case studies focused on:

- The North-West European Gateway Area – Port of Rotterdam
- The Turkey Bosphorus Area – Marmaray project, Mersin container port, Nabucco gas pipeline
- The “High North”/Barents Area – Strategic infrastructure in Finland and Sweden
- France's Gateway Ports – Le Havre, Marseille
- Denmark – Greater Copenhagen Area
- Austria/Switzerland – Inland hubs
- India Mumbai Gateway Area – Mumbai, JNPT and certain other ports.

The case studies confirmed the role that major international gateways, inland hubs and inland trade and transport connections play in international trade and passenger transport. As key economic infrastructures, they are centrally important to national growth and development.

As to the strategic transport infrastructure being developed or under consideration, the case studies highlighted many opportunities and challenges that are summarised in this report and set out in detail in the separate case study/workshop reports posted on the OECD/IFP website: [www.oecd.org/futures/infrastructure](http://www.oecd.org/futures/infrastructure). Key among these opportunities and challenges:

- Benefiting from future economic and trade growth
- Changing policy objectives (competitiveness, green growth and a “greening of transport”)
- Better gateway structures and organisation
- Improved strategic planning and evaluation processes
- The significant increases needed in infrastructure capacity
- The improvements needed in international connections
- Better funding and financing for gateways and inland infrastructure
- National policy frameworks better adapted to strategic transport infrastructure

### ***Will current infrastructure be adequate?***

*The short answer is “no”.* Most of the gateway and corridor infrastructure currently in place could not handle a 50% increase, let alone a doubling or tripling of passengers and freight in 20 years. Many gateways need greater capacity to meet the projected rapidly increasing demand from 2010 to 2030. Importantly, greater inland transport capacity is needed to match additional gateway capacity.

The gateway and corridor infrastructures that actually get built will depend on broad national objectives and national and gateway policies and plans for handling such increasing demand. Major infrastructure can take 10-20 years to plan and develop, and the useful life of the infrastructure may be 50 years or more.

Countries will need to get two crucial things right at the same time if they are to plan, develop and fund the infrastructure needed in the locations and at the time required. The two essentials are national policy frameworks and assured funding.

### ***National policy frameworks***

National policy frameworks must set down how strategic infrastructure is to be planned, evaluated, developed and financed – as well as provide a solid basis for communication with stakeholders and the public. Most of the countries in which case studies were undertaken had good national policy frameworks; nonetheless, there is room for improvement.

National frameworks need to highlight the importance of strategic infrastructure. As the European Commission now recognises, there needs to be a focus on strategic, multimodal “core networks” that can be funded and will be able to handle the major share of the future growth and transport tasks.

A recurrent concern is that many countries do not assign the same priority accorded gateway ports to the key inland rail, road and waterway connections required to move freight between the gateway ports and the cities and industrial areas in the hinterlands they serve. There needs to be a (new) “strategic infrastructure” category that actually includes the major international gateways *and* their key inland connections. The inclusion and linking of gateway and inland connection needs in national policy frameworks will be important for the downstream actions required, including reservation of land for

gateway expansion, funding of the new corridors, and increasing capacity on the existing corridors needed for key inland connections.

National policy frameworks are also important for gateway structures and organisation. “Landlord port” models are widely used, with port terminal infrastructure and freight/logistics services provided on a competitive basis by private operators. Government-owned corporation structures – such as are used by the Port of Rotterdam – are a possible next step. In conjunction with user-pays, they create opportunities for ports to become fully self-financing, important for reducing demands on budget funding.

### ***Funding and financing major gateway port and inland transport infrastructure***

A well-performing transport network requires substantial resources to maintain the quality and condition of the infrastructure and to meet future needs. The impacts from any lack of investment are not only tangible but also economic. The construction-cost inflation associated with deferred investments can be greater than the borrowing and other financing costs involved in earlier funding – but the losses in economic and societal benefits are likely to be greater still.

National and local governments and their ports mostly retain primary responsibility for gateway port infrastructure provision and regulation, as well as for inland road and rail transport infrastructure. Major infrastructure is funded directly from government budgets.

In countries with major ports that are dependent on government funding, there are real concerns that given the post-crisis fiscal situation, future funding of gateway and inland transport infrastructure from traditional sources could “dry up” – at the same time as infrastructure needs increase quickly.

### ***Innovative funding and financing – possible options***

Improved funding arrangements will be needed in the future to ensure funding security and funding levels consistent with strategic infrastructure needs. The case studies uncovered good practice examples of funding and financing arrangements over five- to ten-year periods, including:

- Multi-year funding for *strategic/major projects*, supported by dedicated project-specific organisational and funding structures.
- Fully funding an entire multimodal *programme of infrastructure projects* for ten years. One example is Danish government approval of a *full multimodal land transport programme to 2020*, with its Infrastructure Fund providing the secure funding needed for that period. Another is Swiss infrastructure funds established for special financing of road traffic (1958) and major railway projects (1998). Also, in 2008, Switzerland established a new Infrastructure Fund for completion of the motorway network and metropolitan transport (road & rail) projects.
- Allowing savings on approved project costs to be retained for future programme funding.

These and other options can help balance long-term needs and the economic advantages of investing in infrastructure against short-term pressures and the costs and consequences of not investing.

In some countries with a high quality of overall infrastructure, *diversified infrastructure funds* play an important role in delivering project and programme funding. They could play a role in countries that are reliant solely or primarily on budget funding. Such long-term funds are likely to have:

- ear-marked, multiple sources of funding – *e.g.* budgets, fuel taxes, user charges, savings
- some cross-financing from road taxes and revenues to rail/public transport infrastructure
- any funding reviews signalled well in advance.

## Private sector investment

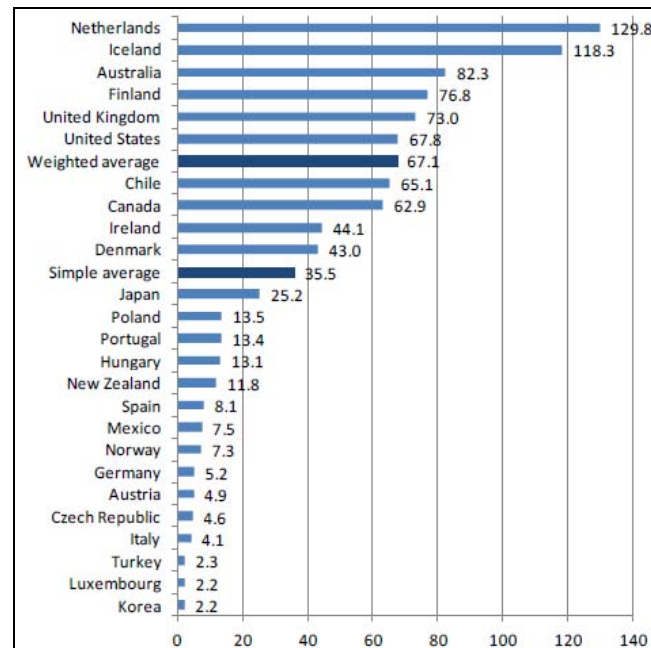
In many countries, private sector financing has proved important in helping deliver the equity and debt financing needed to make infrastructure projects operational. Private sector involvement can also help manage the transition to user-pays/self-financing investments.

Private funds invested directly in listed and unlisted infrastructure assets are already active in many infrastructure markets.

Pension funds are well-resourced and potentially larger investors in transport infrastructure.

**Figure 4**

**Pension assets as percentage of GDP in OECD countries, 2009**



Source: OECD Global Pension Statistics.

However, access is needed to better-quality projects that have risk-reward balances consistent with their responsibilities to fund contributors' interests. *Strategic* transport infrastructure could be attractive in this regard. Public-private partnerships (PPPs) are also widely used – in the transport sector, primarily for facilities that have a degree of monopoly in their geographic areas. Examples include major roads (in conjunction with user revenues from road tolls) and international gateway airports/terminals. PPPs are often successful but there have also been some significant failures.

Privatisation (full or partial) of publicly owned infrastructure also plays a major role.

In the future, given expected limitations on public funds, increased private sector investment will be essential.

## Planning and evaluation

National visions need to reflect wider objectives, including those related to economic and trade growth, productivity, competitiveness and sustainability. National infrastructure plans adapted to new international settings will help establish future directions and guide detailed planning.

Long-term strategic infrastructure (with consistent policies, co-ordinated developments and connected networks) is an essential element in project planning and evaluation. Planning horizons need to be long enough for full evaluations, and may well extend to 2050. Good projects can only be established on the basis of good planning and evaluation, with merit-based ranking.

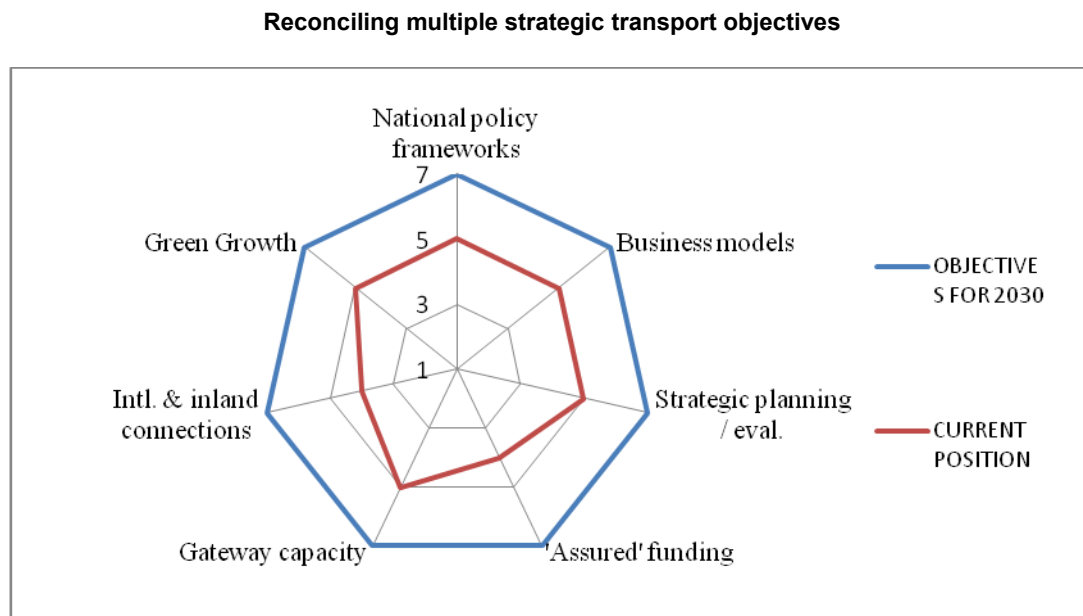


Protecting the environment and improving sustainability – including reducing CO<sub>2</sub> emissions – have also become more important policy objectives. There is increasing support for green growth and a “greening of transport”. Important contributions can be made during infrastructure planning and development stages. Once developed, good management and use of innovative and energy-efficient technologies can significantly increase these contributions.

Evaluation processes for strategic infrastructure need to be adapted to the changing objectives, including international competitiveness and green growth. Evaluations need to be improved to capture the full range of benefits and costs that can be expected over the longer periods involved. These improvements should include, *inter alia*: lower discount rates to better and more consistently value long-term costs and benefits (*e.g.* CO<sub>2</sub> reductions); analyses undertaken from an international as well as domestic perspective; and accounting for dynamic changes generated by strategic infrastructure over short *and* longer periods, in addition to “static” effects (*e.g.* estimated user savings).

In conclusion, an integrated package of measures is needed to get investments in strategic infrastructure back on track, in countries whose strategic infrastructure is not rated highly enough. The strategic infrastructure package needs to include improvements across all major factors, encompassing: national policy frameworks; more commercial business models; better planning and evaluation; “assured” long term funding and financing; adequate gateway capacity; efficient international and inland connections; and green growth and a “greening of transport”.

**Figure 5**



Once these improvements are made, along the lines of the objectives for 2030 described in Figure 5 above, better strategic infrastructure with clear construction schedules can be expected – and better stakeholder communications can be expected to follow.



## ANNEX

### The Project Steering Group

At the beginning of the project, a Steering Group was set up which provided funding for the project and overall advice to the OECD Project Team. It was composed of high-ranking experts and decision makers from public and private entities in infrastructure and infrastructure-related sectors. There were three meetings of the Steering Group over the course of the Project (19 November 2009, 9 July 2010 and 5 November 2010). Additionally a workshop on Future Funding Models was held on 20 November 2009.

#### Chairman

Michael Osborne (retired 2011), Director of the OECD International Futures Programme (IFP)  
*assisted by* Barrie Stevens, Deputy Director, OECD IFP, and  
Pierre-Alain Schieb, Counsellor and Head of Futures Projects, OECD IFP

#### The Members

Some members of the Steering Group were replaced during the two years of the Project and/or assisted by other experts from their organisations. The representatives of those organisations are listed below (titles and affiliations are those held during the course of the Project).

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