

Investing in our transport future

A strategic framework for investment in land transport

Department of Transport, Tourism and Sport

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Foreword by the Minister

A well-performing transport system is essential to the functioning of society and the economy. Failure to facilitate efficient transport creates costs for society, and acts as a barrier to economic growth. Increased transport demand and inappropriate supply inevitably leads to increased congestion, longer journey times, higher costs and suppressed economic activity. The investment challenge presented to Governments, here and elsewhere, is to allocate the resourcing required to maintain transport networks and add required new capacity. This requires investment of a considerable scale and must compete with other policy priorities for resources.

The funding landscape having changed dramatically in Ireland in recent years, the scope to implement major investment programmes in areas such as transport is tightly constrained. The time was opportune to consider what role transport needs to play in the future development of the Irish economy, estimate the appropriate level of investment in the land transport system and form a set of priorities to guide the allocation of that investment to best develop and manage Ireland's land transport network over the coming decades. In doing so, this report provides a valuable background against which future policy decisions can be made.

During the course of this work, the focus was put very firmly on economic objectives and how efficient transport can contribute to the Government's job creation agenda, enhancing competitiveness, increasing productivity, encouraging FDI and labour mobility always mindful that generating economic growth will help to create the fiscal space necessary to give attention to other important objectives such as balanced regional development and social inclusion objectives.

The work undertaken under the direction of the Steering Group was wide-ranging and included considering the evidence base on the link between economic growth and investment, establishing the steady state investment requirement which is assessing the cost of maintaining, managing and renewing land transport infrastructure and assets over time, and identifying future needs by modelling the scale of projected demand in a future year and where that demand will arise.

The evidence from these three key areas of work, along with our understanding of key transport and travel trends, the impact on travel demand of structural changes to the economy and consideration of how to manage demand provides the basis for the key overall principles to guide investment decisions in transport over the longer term.

One striking observation is the dramatic fall in the level of investment in land transport. This is best illustrated by consideration of Exchequer allocations for such capital investment which fell from a peak of around €3 billion in 2008 to about €855 million in 2013. In GDP terms this is a reduction from 1.64% of GDP in 2008 to 0.52% of GDP in 2013, and means funding levels as a percentage of GDP are at their lowest since the mid 1970's.

A significant gap now exists between the funding allocation for land transport and the funding levels required to maintain the existing system in adequate condition, even if all of the available funding is spent *only* on steady state. Moreover, these funding levels leave no scope for network improvements and capacity increases. We are now presented with the challenge of securing more appropriate investment levels in the future.

Paschal Donohoe, T.D.
Minister for Transport, Tourism and Sport

Acknowledgements

In finalising this report I want to recognise its instigator Dermot McCarthy who, after a short illness, tragically passed away earlier this year at too young an age. His initiative in commencing this work and his enthusiasm in championing it were typical of his dedication to the public service and are sadly missed. May he rest in peace.

I also want to acknowledge the immensely valuable contribution of the Steering Group members (listed below) who gave generously of their expertise and experience in formulating the conclusions arrived at and the investment priorities and principles proposed.

My appreciation also to the small team within the Department's Economic and Financial Evaluation Unit who gathered data and conducted a great deal of the research and study underpinning these findings, provided the secretariat and were the report's primary authors. I thank too my predecessor as chairman, Fintan Towey, from whom I took over a steering group with a very clear purpose and focus and with the groundwork for the analysis and findings well laid.

Although it is impossible to name them all, I would particularly like to thank a number of stakeholders who contributed analysis, input and evidence to this work, including Forfás and the enterprise agencies, the ESRI, the National Roads Authority and the National Transport Authority and the many people within Government, particularly within the Department for Transport, Tourism and Sport, who have contributed evidence to the study.

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Acronyms

BCR	Benefit to Cost Ratio
CBD	Convention on Biological Diversity
CEF	Connecting Europe Facility
CSO	Central Statistics Office
DPER	Department of Public Expenditure and Reform
DCENR	Department of Communications, Energy and Natural Resources
DTTaS	Department of Transport, Tourism and Sport
EC	European Commission
EIB	European Investment Bank
END	EU Environmental Noise Directive
EPA	Environmental Protection Agency
EU	European Union
FDI	Foreign Direct Investment
GNP	Gross National Product
GDA	Greater Dublin Area
GFCF	Gross Fixed Capital Formation
GHG	Greenhouse Gas
IDA Ireland	Industrial Development Agency Ireland
IFSC	Irish Financial Services Centre
ITF	International Transport Forum
ITS	Intelligent Transport Systems
LPT	Local Property Tax
MFF	Multi-Annual Financial Framework (of the EU)
NCT	National Car Testing
NRA	National Roads Authority
NSS	National Spatial Strategy
NTA	National Transport Authority
NTM	National Transport Model
OECD	Organisation for Economic Co-Operation And Development
PPP	Public–Private Partnership
RPG	Regional Planning Guidelines
RTP	Rural Transport Programme
SAC	Special Areas Of Conservation
SEA	Strategic Environmental Assessment
SFILT	Strategic Framework for Investment In Land Policy
SPA	Special Protection Areas
TAG	Transport Appraisal Guidance
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
VRT	Vehicle Registration Tax
V/C	Volume/Capacity Ratios
WEF	World Economic Forum

Key Issues

- Transport is fundamental to how we live and work. A well-performing transport system is essential to the functioning of society and the economy as a whole. Failure to facilitate efficient transport creates costs for society, and acts as a barrier to economic growth.
- There was remarkable growth in demand for transport in Ireland from 1990 to 2008, with the number of people travelling to work almost doubling, car ownership increasing from 798,000 in 1990 to 1.88 million in 2008, and the commercial vehicle fleet also doubling.
- While this growth in transport was strongly coupled to economic growth and also driven by demographic trends, the spatial pattern of development has played a key role in its form. The growth of dispersed commuter belts around our cities is not suited to effective public transport provision and results in embedded car dependency.
- Travel demand in the morning peak is projected by 2041, under conservative population growth assumptions, to be 35% greater than currently and to arise largely on corridors to and within our principal cities. This would imply, at a minimum, 650,000 additional daily trips to and from work.
- The sizable demand growth of the past 20 years was met predominantly by an overwhelming increase in car-based travel. Without the combined provision of effective alternatives to the car through increased public transport, walking and cycling provision and more effective implementation of spatial planning policies, this trend will continue.
- Improved spatial planning will be central to ensuring future demand growth can be catered for in an economically and environmentally sustainable way – not least through facilitating more cost effective delivery of public transport, cycling and walking infrastructure.
- Price-based demand management is likely to also be necessary although it must not increase the already high overall cost of transport, and will also require greatly enhanced provision of alternative modes.
- Transport investment provides a good return and has yielded efficiency and productivity gains for Ireland. Ireland's transport infrastructure competitiveness ranking has improved although it remains poor compared to well-developed economies with whom we compete for investment.
- Transport-related taxation represents a very significant revenue source for the Exchequer, with excise, carbon tax and VAT on motor fuels, annual motor tax and vehicle registration tax cumulatively remitting around €5.6 billion in 2008 and currently remitting around €4.8 billion per annum. This is in stark contrast to total Exchequer expenditure on transport (both capital and current) of around €1.32 billion at present.
- Household expenditure on transport represents a very significant proportion of household spending, on average €116 per week which equates to total national household expenditure of around €10 billion per annum.
- Capital formation in transport peaked in 2008 at €3.5 billion (1.9% of GDP) falling to €1.2 billion in 2012 (0.72% of GDP). This capital formation occurs principally through Exchequer investment, which for land transport capital expenditure has fallen from a peak of €3 billion (1.6% of GDP) in 2008 to a historic low level of €855 million (0.5% of GDP) in 2013.

- Steady state funding which is the funding necessary to maintain, manage and renew the existing land transport infrastructure to keep it in an adequate condition, together with capital commitments, has been estimated at €1.6 billion per annum in total. With investment levels of around €300 million expected from other sources (e.g. toll receipts) this would require €1.3 billion per annum in Exchequer funding.
- Currently, Exchequer funding for road improvement/maintenance and the Public Transport Investment Programme is of the order of €1.03 billion, which is over €260 million short of the funding required to maintain the existing system in an adequate condition. This is even if all the available funding is spent only on maintenance of this steady state, which is not currently the case.
- Restoring transport investment levels to our historic long-run average of 1.13% of GDP equates to annual investment of over €1.8 billion, based on 2013 GDP. With the cost of maintaining the existing road and rail networks estimated at €1.6 billion, this would leave only €200 million per annum available for all new investment.
- In view of the capital funding and operational subvention necessary to maintain and operate our rail network, together with the levels of revenue generated from the network, the current situation with regard to rail is not financially sustainable. The need to ensure value for money must be central to future rail policy.
- A strategic road network of national, regional, and strategically important local roads, vital to the functioning of our transport system and local economies, should also be defined and funding targeted there.
- Realistically, the necessary investment in new transport infrastructure will require increased Exchequer funding for the sector, in addition to any further investment potential generated through the vigorous pursuit of efficiencies within existing expenditure, and a reduction in the extent of the transport network that absorbs existing capital funding allocations.

Introduction

The period of 2000 to 2008 saw transport investment in Ireland of an unprecedented scale, followed by a period of retrenchment. It is now opportune to consider what role transport should play in the future development of the Irish economy. An optimum strategy for the development and management of Ireland's land transport network over the coming decades needs to be identified. This is particularly important given the likely constraints on available resources.

A steering group was convened and tasked with overseeing the preparation of an integrated, evidence-based framework that would guide key land transport investment decisions. While the longer-term aspects of the framework are considered over a 30-year period, shorter-term conclusions will frame consideration of both the 2015–2019 multi-annual capital funding framework and its successor.

Drawing on national and international data and research, evidence from key stakeholders, and analysis and research both commissioned and carried out within the Department and its agencies, this report presents, in summary form, the findings and conclusions of the steering group and the evidence on which they are based.¹

Key features of the framework policy

Focus on economic growth

The steering group felt strongly that investment in transport is made to meet a wide range of objectives – economic development, societal benefits (including promoting inclusion), environmental sustainability and the need for balanced regional and rural development, all of which have long exerted an influence on policymaking in the transport investment area. The importance of these various objectives in their own right was acknowledged. However, being conscious of the particular scarcity of Exchequer resources at this time and the key role that efficient transport can play in enhancing competitiveness, increasing productivity, encouraging FDI and labour mobility, the steering group considered that the primary objective for prioritising investment in transport should be the role of transport in supporting renewed economic growth, improved competitiveness and sustainable job creation.

Principles to frame future investment

The framework does not set out a list or map of projects to be prioritised. Rather, the principles outlined in Chapter 6 will provide the yardstick against which national and regional, comprehensive and single mode based plans and programmes will be drawn up and assessed. The work will provide a key input to the development of national and regional land use planning policy, including the development of a possible new spatial planning framework. It will also form a filter for transport investment projects prior to their appraisal for suitability for inclusion in national or regional programmes.

¹ Detailed background papers that informed the development of this framework are listed in Annex 3 and are published in association with this summary report.

Report outline

The report is set out as follows.

Section A sets out contextual factors for a new transport policy, exploring themes such as transport trends and the relationship between transport investment and economic growth.

Chapter 1 reviews past and current transport trends, and the spatial, demographic and economic drivers underpinning these trends. It shows how a clear understanding of past and current transport trends and the drivers behind these trends are key inputs to future transport investment plans.

Chapter 2 examines how, and to what extent, transport investment contributes to economic growth. It also reviews experience and impacts of transport investment in Ireland.

Section B addresses key factors and considerations for the development of a new transport policy, such as cost issues, funding mechanisms, identifying the scale and nature of demand, potential management approaches, and the relationship between transport investment and other national strategies and policy objectives.

Chapter 3 assesses the historical levels of transport investment in Ireland, and how they align with international levels. It also compares how current investment levels in Ireland compare to these historic levels. Significantly, it quantifies for the first time the cost of maintaining the land transport network at its current standard, reviews transport investment funding mechanisms and arrives at a recommended minimum suitable scale of long-run investment in land transport in Ireland.

Chapter 4 sets out an approach to identifying the scale and nature of transport demand in the medium to long-term and reviews potential demand management interventions that could be used to best manage this future demand growth.

Chapter 5 considers how land transport investment relates to other key national strategies and policy objectives.

Finally, **Section C** involves a thematic analysis of the key findings of this report, leading to a set of key principles and priorities for transport investment, as well as challenges ahead.

Chapter 6 summarises the key findings of this research and consultation process, before outlining the basis for a set of key principles, designed to frame, prioritise and focus the important land transport investment decisions to be taken in Ireland starting from now and over a 30-year time horizon.

Chapter 7 considers the key implementation challenges and issues with regard to ensuring this strategic framework is effectively implemented in future investment decisions and related policy developments.

Chapter 6 - A useful overview

Due to the complexity of the themes explored in this report, an executive summary is not included. However, **Chapter 6** can be read as a useful, stand-alone chapter, as it includes a thorough overview and analysis of the key conclusions and findings of this report, as well as its key outcomes: priorities and principles for future land transport investment.

SECTION A: Setting the context

1. Transport and travel trends

A clear understanding of past and current transport trends and the drivers behind these trends are key inputs to future transport investment plans. This chapter outlines key issues in this regard and provides some discussion and conclusions based on this information. Key themes include:

- **Population, economic and spatial issues;**
- **Transport demand trends, including modal issues; and**
- **Supply-side factors and outcomes.**

1.1 Population, economic and spatial issues

Population and economic growth

Demand for transport is largely a function of population, the level of activity taking place in an economy, and the spatial distribution of population and employment.

Economic activity

inherently increases demand for transport in terms of greater levels of commuting and movement of goods. However, increased wealth also impacts on travel behaviour, not least through higher car ownership and use.

Ireland's population increased from 3.53 million in 1991 to 4.59 million in 2011. Irrespective of any other social or economic changes, this has led to an increase in transport demand. This population growth was underpinned by extraordinary increases in economic output. Although the last five years have seen marked contraction in output followed by very subdued growth, gross national product (GNP) in 2012 was still double 1990 levels. The output growth to 2007 resulted in a significant increase in employment, much of which has been retained. In 1990, approximately 1.16 million people were in employment. This grew to a peak of around 2.16 million at the end of 2007. Current employment levels stand at around 1.9m.

Spatial issues

Spatial patterns also fundamentally influence demand levels and the forms of transport appropriate to meet demand. Census 2011 found that 33% of people in Ireland live in cities, 31% in rural areas, and the remainder in towns of varying size.² While recent trends are often interpreted as one of increased 'urbanisation', it is worth noting that this has tended to favour towns rather than cities. Table 1.1 shows that while the city-based population increased by around 20% in the last 20 years, towns grew by 72%. Therefore, rather than seeing a trend towards increased urbanisation and concentration of population, Ireland has, over the last 20 years, experienced greater suburbanisation and dispersal, with the

Table 1.1: Population change by settlement type, 1991 to 2011

Area	Population 1991	Population 2011	% change 1991–2011
Cities and suburbs	1,271,632	1,528,960	20
Towns 1,000+	819,411	1,410,938	72
Rural and small towns	1,434,676	1,648,354	15

Source: CSO census 1991 and 2011

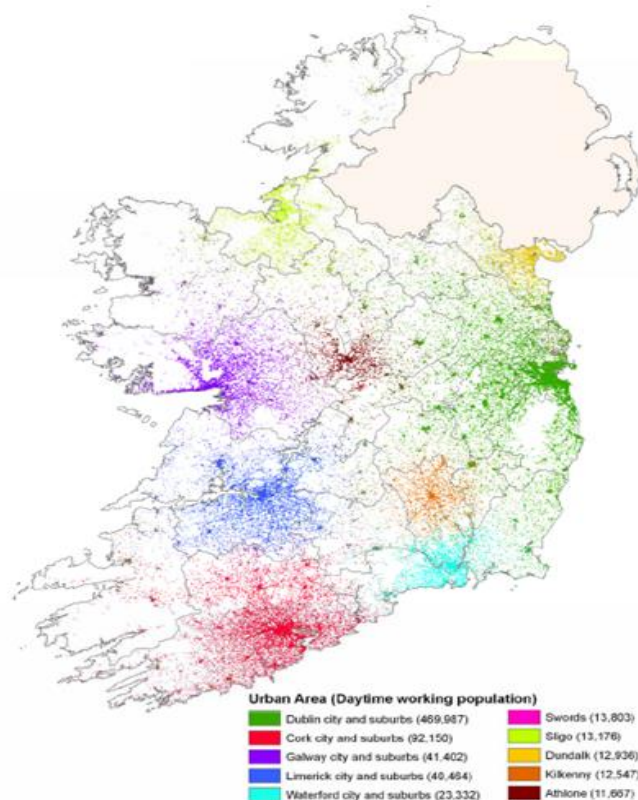
² Cities and towns referred to here are as defined by the CSO for each census. These boundaries reflect both legal environs of cities and towns where they exist, but also include built-up areas that extend beyond these environs. Full details are available [here](#).

proportion of people living in our cities actually declining. This trend has clear implications for distances travelled, commuting patterns and modal choice.

Changing trends in where people live are not matched by equivalent changes in the location of employment. The recent census data illustrate the continued importance of our cities as employment centres. While overall employment levels were around 6% lower in 2011 than in 2006, Census 2011 found that for non-mobile employment (i.e. those with a fixed place of work), jobs in our cities increased by around 3.5% between 2006 and 2011. In Dublin there were 455,000 such jobs in 2006 and 470,000 in 2011. Perhaps unexpectedly, the census also found that Dublin city and suburbs saw a 12% increase in the numbers travelling to work from elsewhere, from 105,000 in 2006 to 118,000 in 2011. Cork, Limerick and Galway cities also saw similar levels of increased inward commuting over the period.

The extent of the commuter catchments around our cities are seen in the CSO Census 2011 map of workplace commute origin and destinations for the top 10 employment centres (Figure 1.1). These extensive catchments suggest increased car dependency, more demand for road infrastructure, and difficulty in providing effective public transport options given the diverse range and dispersed pattern of journey origins and destinations. A major question for future transport investment planning is whether Ireland can afford to respond to these spatial patterns in terms of investment requirements and service provision costs, or whether future spatial policy and practice and transport investment should be better and more firmly aligned.

Figure 1.1: Travel to work origin and destinations for major workplace catchments



Source: CSO Census (2011), *Commuting in Ireland*

Finally, it should be noted that the above consideration of population and employment trends is very much at a national level. Regional and local level trends are vital to understanding

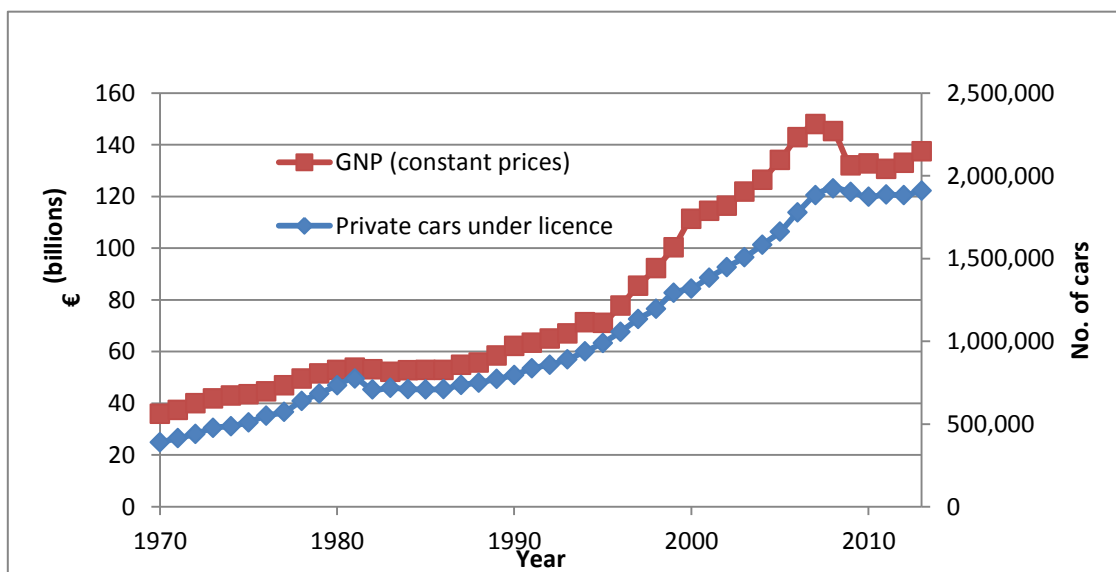
spatial variations in transport demand and arriving at the most appropriate interventions. This is perhaps particularly true within the GDA, where very specific pressures arise on transport infrastructure.

1.2 Transport demand trends and modal issues

Car demand

Figure 1.2 presents car ownership in Ireland and GNP from 1970 to 2012. The direct link between output growth and car ownership over this 40-year period is clear. As a result, car ownership in 2012 was roughly double 1995 levels.

Figure 1.2: GNP in constant prices and car ownership for Ireland, 1970 to 2013



Both the car fleet and commercial vehicle fleets have roughly doubled in size compared to their levels in the early 1990s. The net result is that, for example, there were 1.06 million people driving to work in 2011 compared to 440,000 in 1991 – an increase of 140%. The inevitable result of this growth in car demand has been a relative decline in the use of other modes. The census shows that combined mode share for walking, cycling and public transport stood at 34% in 1991 and had fallen to 24% by 2011. To put these changes in context, 625,000 more people drove to work in 2011 than in 1991 – but there were only 4,300 additional bus commuters. Since the introduction of the NCT test in 2000, reliable estimates of car kilometres travelled each year are available. These data show total car kilometres increased from 23.1 billion in 2000 to 32.6 billion in 2008; a 40% increase. Since then demand has remained relatively stable with, for example, 31.2 billion car kilometres travelled in 2011.

As noted with regard to spatial and employment patterns, there are again significant underlying regional and local trends behind these national figures. At a national level, car ownership is estimated at 410 cars per 1,000 people. This figure varies at county level, from a low of 354 per 1,000 people in Limerick City to a high of 474 per 1,000 people in North Tipperary. It is also noteworthy that many counties with predominantly rural populations such as Cavan and Monaghan have relatively low ownership levels (at 371 and 375 cars per 1,000 people respectively).

Public transport: Bus and rail

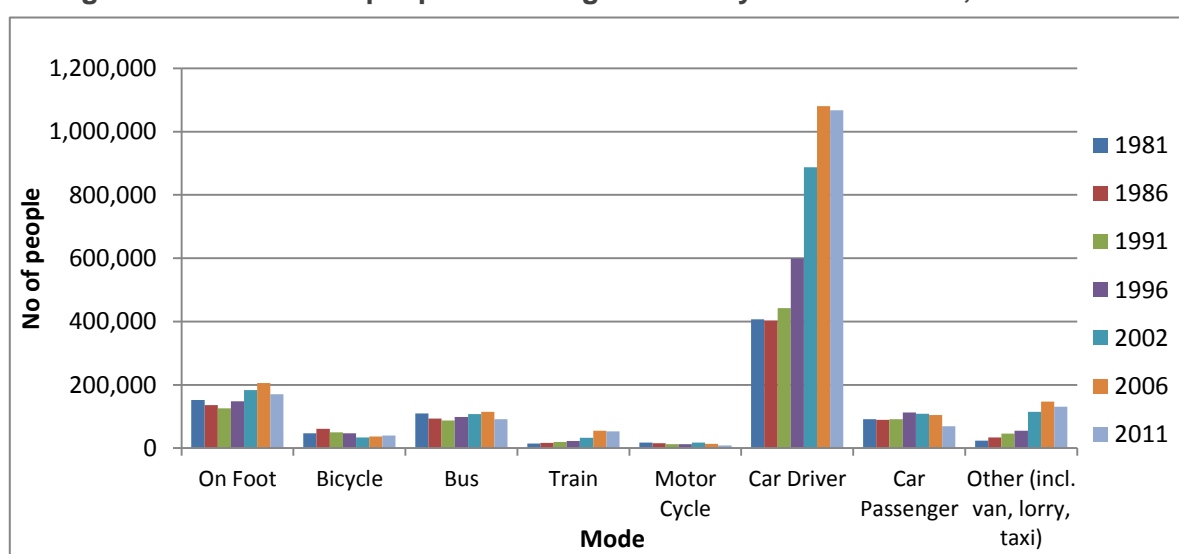
Unlike car ownership and use, public transport usage is generally adversely impacted by rising incomes.³ In 1998, combined Dublin Bus, Bus Éireann and rail services together accounted for 204 million public passenger journeys. This rose to 260 million trips in 2007, inclusive of LUAS trips. This 25% increase in trips compares reasonably well with growth in overall transport demand over the period and reflects investment in infrastructure and service improvements. However, by 2012 trips on these public transport services had reduced to 218 million. Total journeys made on these publicly provided services in 2012 therefore stood at only 7% above 1998 levels. These recent trends in public transport use are in marked contrast to the strong growth and stability of car use.

It should be noted that different public transport service types have exhibited different trends. Bus demand has, in general, seen significant declines. Dublin Bus demand in 2012 was 14% less than in 2000, and down around 23% on peak demand for 2004–2005. Provincial city services provided by Bus Éireann have seen similar trends, with 2012 demand 13% less than 2000 levels and 24% down on peak demand levels for 2006–2007. Combined DART and Dublin commuter services catered for a peak of 34.1 million trips in 2007, falling to 25.7 million in 2012. This is compared to levels of around 23 to 25 million trips per annum on these services over the period of 2000 to 2005. LUAS passenger numbers recorded their highest ever level in 2012, with 29.6 million trips in the year.

Mode shares

During the census, household occupants are asked which mode of transport they usually use for travel to work and education. Figure 1.3 below presents the number of people travelling to work by mode for each census, from 1981 to 2011. These commuting trends reflect the increased car ownership outlined above – with a 140% increase in the numbers commuting to work as a car driver since 1991. Such marked increases in car use, along with increased distances travelled and dispersed spatial patterns, pose many challenges in terms of effective provision of public transport for commuting.

Figure 1.3: Number of people travelling to work by mode of travel, 1981 to 2011



Source: Census (CSO), 1981 to 2011

³ Balcombe, R. et al (2004), *The demand for public transport: A practical guide*, TRL, London, available [here](#).

While peak commuting demand (for work and education) remains a major transport policy challenge, the 2009 National Travel Survey found that almost 70% of trips are made for non-work purposes. However, car use is dominant for all journey purposes. In rural areas, 91% of all trips were made by car (80% as a driver and 11% as a passenger). In urban areas, 61% of trips were as a vehicle driver, and a further 8% as a car passenger. Nationally only around 10% of all kilometres travelled are by modes other than a car or van.

In terms of trip distances, the 2009 National Travel Survey found that demand is dominated by short journeys. In total, 41% of all journeys are four kilometres or less, and a further 17% are between four and eight kilometres. While walking is the predominant mode for journeys of 2 kilometres or less (with a 51% mode share), over 40% of such short trips are carried out as a vehicle driver. For journeys between two and four kilometres, the vehicle driver mode share increases to almost 70%.

Goods vehicle demand

Efficient and competitively priced commercial transport is an important input to how our economy functions. Growth in the commercial vehicle fleet and travel has been broadly in line with overall output growth. In 1990, 143,000 goods vehicles were registered. By 2000 there were 205,000 registered goods vehicles, growing to 320,000 in 2011. In terms of vehicle kilometres, in 2000 goods vehicles travelled a total of 4.7 billion kilometres. Demand peaked in 2008, at eight billion kilometres, and has since fallen to 6.6 billion kilometres.

In terms of the impact of the recession, the CSO Road Freight Survey has measured significant reductions in the volume of freight movements since 2007. While all types of commercial journeys have shown declines, construction-related movements have seen by far the greatest reduction, at over 70%. These demand changes reflect the fact that transport, and in particular the movement of goods, is a derived demand based on levels of economic output.

International connectivity

Integration of seaports and airports with land transport modes is an important aspect in ensuring the availability of competitive and efficient transport services that meet the needs of users.

As with the other modes already considered, up to 2007 there was strong growth in air travel. In 1997, passenger numbers through Irish airports stood at around 12 million trips per annum, rising to 31.5 million trips per annum in 2007. By 2010, demand had fallen by around 25% to a level of 23.5 million trips. Marginal increases have taken place since then, with 23.7 million trips having taken place in 2012.

The geographical distribution of this demand has important implications for land transport investment. Table 1.2 below shows total passenger numbers handled by airports in Ireland for selected years. In 2001, Dublin accounted for 75% of all passengers handled, rising to 80% by 2012. This increased share of demand reflects steeper demand declines in other airports over the post-2007 period.

Table 1.2: Passenger throughput in Irish airports, 2001–2013

Airport passenger movements	2001	2004	2007	2010	2012	2013
Dublin	14,333,555	17,138,373	23,375,674	18,426,823	19,090,781	20,092,234
Cork	1,775,817	2,254,251	3,193,739	2,422,872	2,333,643	2,249,754
Shannon	2,404,658	2,395,116	3,524,533	1,531,309	1,286,139	1,284,308
All other airports	545,277	1,117,664	1,465,745	1,296,961	1,070,911	976,260

Sources: CSO aviation statistics. CSO figures for 2013 are not yet available; the 2013 figures here represent international movements only from [CSO airports pairings database](#).

Port throughput has also followed similar trends in terms of significant demand growth up to 2008 followed by a period of decline and then stabilisation. Total port throughput in 1997 stood at 36 million tonnes, increasing to a peak of 54 million tonnes in 2008. Throughput then declined to 42 million tonnes in 2009. Since then, however, demand has been increasing, with 46 million tonnes of goods handled in 2012. It is also important to note that reduced demand has been driven by falling imports. Export volumes are performing well, with 2012 export volumes of 16.5 million tonnes being the highest on record.

As with airport passenger demand, the regional distribution of this port traffic is an important consideration for future land transport investment. The table below presents the total tonnage of goods handled by selected ports for selected years. The three ports of Dublin, Shannon-Foynes and Cork dominate demand. Dublin Port's share of demand in 2012 stood at 42%, compared to a 35% share of demand in 2001.

Table 1.3: Port traffic through Irish ports, 2001–2012

Port /goods handled ('000 tonnes)	2001	2004	2007	2010	2012
Dublin	15,782	17,930	21,801	19,548	19,898
Shannon Foynes	10,708	10,619	11,072	9,134	10,094
Cork	9,446	8,923	10,098	8,466	8,708
All others	9,859	10,248	11,168	7,923	8,949

Source: CSO statistical data on port traffic

A further complexity with regard to port traffic is the evolution of the different demand types, such as dry bulk material, liquid bulk materials and roll-on/roll off traffic (otherwise known as Ro-Ro traffic). As noted above, total tonnage through Irish ports in 2012 was 31% above 1997 levels. However, growth in both Ro-Ro and lift-on/lift-off (or Lo-Lo) traffic was substantially higher than this, with demand up by 83% and 52% respectively compared to 1997 levels. Dublin dominates these sectors of port traffic. For example, in 2012, 84% of total national Ro-Ro traffic was through Dublin Port, with Rosslare Harbour accounting for virtually all other Ro-Ro demand. Similarly Dublin Port catered for 73% of Lo-Lo demand in 2012. Combined Ro-Ro and Lo-Lo traffic accounts for almost 75% of total tonnage through Dublin Port.

The stronger growth in Ro-Ro and Lo-Lo traffic is likely driven by the development of a more modern manufacturing base in Ireland, along with general economic growth driving higher imports of goods. The Ro-Ro and Lo-Lo traffic growth also points to increased road-based demand for the movement of goods to and from our ports

1.3 Supply-side issues

While the above analysis points to the fact that population growth, economic growth, spatial issues and increased car ownership have driven an increase in transport demand, significant supply-side changes have also taken place, particularly over the last decade.

While the total length of the country's principal inter-urban road network (known as national roads) have remained reasonably constant at approximately 5,400 kilometres, only 26 kilometres of this road length was motorway in 1990. This grew gradually over the next 10 years to reach 103 kilometres in 2000. However, by 2010 there was 900 kilometres of motorway, meaning that motorways went from being 2% of the total national road network in 2000 to 17% of that network by 2010. Clearly this improved network has offered significant benefits in terms of direct time savings and improved journey time reliability for users, as well as through ensuring that transport bottlenecks do not critically impact on economic growth. In many respects, this investment brought our transport infrastructure up to a reasonable standard in comparison with our peers.

However, these supply-side developments have undoubtedly influenced demand. For example, in the absence of any significant spatial constraints on residential development, reduced journey times provided for by the motorway network could tend to facilitate more dispersed population patterns than would have been the case without such infrastructure. They also extend the catchment areas of key international access points like Dublin Port and Dublin Airport.

1.4 Discussion

Over the 20 year period considered here, population growth, economic growth, changes in the spatial distribution of population and employment, and increased vehicle ownership have had marked impacts on transport trends.

Growth in car demand

Both the car fleet and commercial vehicle fleets have roughly doubled in size compared to their levels in the early 1990s. The net result is that, for example, there were 1.06 million people driving to work in 2011 compared to 440,000 in 1991 – an increase of 140%. The inevitable result of this growth in car demand has been a relative decline in the use of other modes. The census shows that combined mode share for walking, cycling and public transport stood at 34% in 1991 and had fallen to 24% by 2011. To put these changes in context, 625,000 more people drove to work in 2011 than in 1991, but there were only 4,300 additional bus commuters.

Transport policy has consistently had a stated aim of achieving modal shift away from the car. This aim has been based on reducing and avoiding the direct costs of congestion, recognising the cost of increasing road capacity to meet ever growing demand, and also recognising that for urban centres, increased road capacity is not an option. In terms of future transport investment, and indeed policy implementation, it must be recognised that such aims have not been achieved; even the most recent trends suggest further growth in car mode share for commuting.

Growth of commuter belts

While population and economic trends have driven increased demand, the spatial pattern of development has played a key role in the types of demand that have arisen. The growth of dispersed commuter belts around our cities is particularly striking. This inherently increases transport demand in the form of longer journey distances. Furthermore, these dispersed journeys are not suited to effective public transport provision and result in embedded car dependency. Supply-side improvements, which greatly reduced road travel times, may, without counterbalancing initiatives, be likely to facilitate an intensification of these spatial trends.

Need for more effective spatial planning

Without the combined provision of effective alternatives to the car and more effective implementation of existing spatial planning policies, these trends are likely to continue, placing further pressure on existing road infrastructure and perhaps leading to a renewed need for further major new road investment to meet demand. There are a number of possible concerns if this occurs. Firstly, it suggests a likelihood of future congestion – with costs imposed on both commercial traffic and all transport users. Secondly, it suggests that funding could be displaced away from public transport requirements. Thirdly, without more effective spatial planning, the feasibility of providing public transport solutions, and indeed investment in walking and cycling, may be weakened.

Need to address commercial transport requirements

In addition to the very significant issues around car use and personal transport demand, future transport investment will have to address the vital requirements of commercial transport and access to our principal seaports and airports. Increased car use for commuting and other purposes can adversely impact on commercial and access traffic. These competing demands for scarce road space need to be considered together. Effective and efficient transportation of goods to both the domestic and export sectors and high quality access to seaports and airports are vital to our economy and will play a central role in future growth. Equally, the future attractiveness of our country for enterprise investment will depend on efficient commercial and general transport, and indeed our international connectivity. The needs of the commercial sector must therefore be central to our investment plans.

Maximising value

This framework needs to reflect how to manage future demand and transport patterns over the next 20 years. It must indicate how past failures can be addressed, and transport investment and spatial planning and practice more formally aligned. This will serve to maximise the value of future transport investment for both our economy and our quality of life. The framework must also indicate how investment will contribute to economic efficiency, increasing our attractiveness to inward investment and enhancing quality of life.

2. Contribution of transport investment to economic growth

2.1 Introduction

It is widely recognised that major benefits accrue to the economy and society through investment in transport infrastructure.⁴ This chapter outlines the evidence base in this regard before noting specific impacts of recent transport investment in Ireland. Key themes include:

- **Evidence on benefits and outcomes of transport investment in Ireland;**
- **The impact of transport investment on Ireland's global competitiveness; and**
- **The impact of transport investment on regional development.**

2.2 Evidence of return on transport investment

Historically, improvements and advancements in transport services and technologies have been catalysts for periods of accelerated economic growth. The development of shipping routes, ports, roads, canals, railways, urban mass transit systems and airports have on each occasion facilitated increased economic activity and trade, at both a national and international level.⁵

More specifically, three key benefits arise from such investment. Firstly, new product, service and labour markets can be opened up through better access and reduced travel times. Secondly, improved journey times and reliability can increase productivity and reduce costs within the economy. Thirdly, transport investment can promote the development of economic clusters and have positive agglomeration impacts. These benefits accrue to both business and society in general. For example, shorter or more reliable journey times will also benefit non-commercial travellers. Furthermore, the increased output yielded from transport improvements implies a society that is better off due to that investment. Additional benefits, such as improved safety and reduced environmental impact, can also arise through investment.

A large body of empirical research shows that transport investment has a positive impact on private sector productivity.⁶ There are a wide range of estimates as to the size of this impact. Our analysis of the literature suggests national output increasing by between 0.06% and 0.2% for every 1% increase in transport capital. If the lower value was applied to the net capital stock of roads at end of 2012 (€26.2 billion) and GDP is €163 billion, the above implies that an increase of 1% (or €262 million) in cumulative transport capital would lead to an increase in GDP of €97.8 million. Such returns obviously depend on prudent project choices that can increase productivity and achieve competitiveness gains.

Notwithstanding the general findings of transport investment offering a good return on investment, it is of course the case that while many projects may yield an excellent return, many others will not. Detailed economic appraisal of projects is therefore essential to ensure that public money is being put to its most productive use. This is true with regard to both

⁴ Eddington, R., Sir (2006), *The Eddington transport study: The case for action, Sir Rod Eddington's advice to Government*, HM Treasury, London, available [here](#).

⁵ Crafts, N. and Leunig, T. (2005), 'The historical significance of transport for economic growth and productivity: Background paper for the Eddington report'.

⁶ Banister, D. and Berechman, J. (2000) *Transport Investment and Economic Development*. New York: Routledge among others – see background paper for details.

transport investment itself and in the wider sense of ensuring that public money is put to its most productive use across all sectors.^{7, 8}

Furthermore, as with any investment, it is likely that diminishing returns exist in terms of investment in transport. However, this would be associated with high existing transport capital, implying a well-developed transport network with limited supply issues.

2.3 Outcomes of recent transport investment in Ireland

The National Development Plans 2000–2006 and 2007–2012 saw substantial transport investment. Significant roads projects were funded, such as the development of the major interurban motorway network (M1, M2, M3, M4/M6, M7/M8 and M9), delivery of the Dublin Port Tunnel, and the upgrade of several sections of the Atlantic corridor ((M18, N25/N27 interchange, N7 Limerick Tunnel and N18 Ennis bypass). Investment in rail also occurred with, for example, renewal of the mainline rail network and rolling stock and the construction of two LUAS lines and subsequent extensions, the Western Rail Corridor Phase 1, and the Cork to Middleton rail line. Bus transport also witnessed significant investment, in particular through the development of quality bus corridor networks and fleet replacement and expansion programmes in Bus Éireann and Dublin Bus.

To attain a better understanding of the economic impact of such investment, analysis has been undertaken of two projects – the M4/M6 motorway corridor and the original Red and Green LUAS lines. In both cases, a revisiting of the original ex-ante business cases, which included cost–benefit assessments of the investments, was undertaken. This work revised the cost–benefit calculations with the benefit of outturn costs and known demand levels for each project. In addition to this quantitative work, the potential wider economic benefits of the projects were investigated through interviews with stakeholders and a short review of any relevant available data.

The original business case for the M4/M6 calculated a benefit to cost ratio (BCR) of 1.8. This analysis was revised to account for known outturn costs and adjusting benefits for known demand levels, leading to a suggested BCR of 1.56.

The positive role of the road in contributing to social and economic progress across different catchment areas is indicated by the views of stakeholders and data on the wider economy. The M4/M6 has had the effect of linking much of the country more closely to Dublin Airport. Although it may have contributed to the closure of Galway Airport, it is more generally seen as a clear improvement by stakeholders, enhancing the accessibility and attractiveness of many locations to IDA clients and changing the organisation of business, even reducing the need for businesses to have multiple bases around the country. On balance, it has been positive for tourism on the west coast; most visitors will inevitably arrive via Dublin and spend at least part of their stay there. The road corridor has had effects all along its route. NUI Maynooth has benefitted from better access for students and staff and Athlone has become a shopping destination for residents of east Galway. It allows the IDA to present locations some distance from Dublin city centre as being part of the Dublin conurbation, increasing the land and labour force available in Dublin as an investment destination.

⁷ Bougheas, S., Demetriades, P. O. and Mamuneas, T. P. (2000), 'Infrastructure, specialization, and economic growth', *Canadian Journal of Economics*, Canadian Economics Association, Vol. 33(2), pp. 506–522.

⁸ De la Fuente, A. March (2000), *Infrastructures and productivity: A survey*, Working paper, Instituto de Análisis Económico, CSIC, Barcelona.

The original business case for the LUAS calculated a BCR of 4.5. Revising this to account for known outturn costs and demand levels shows a BCR of 2.96. The main reason for this lower ex-poste ratio is a near three-fold increase in project costs compared to the ex-ante estimate. However, this BCR still represents an excellent return on investment.

Stakeholders interviewed believe that the LUAS has increased accessibility both within and to the city centre, by directly and permanently linking outlying suburbs with the centre of Dublin. A key example of how businesses benefited from this investment is provided by one large employer with multiple locations within the city centre. They indicated that the LUAS has significantly increased the efficiency of the transfer of employees between locations. Stakeholders also mentioned the effect of the LUAS in assisting with the creation of important employment clusters in areas such as the IFSC and Sandyford. In general the business groups interviewed suggested that the introduction of the LUAS has had a net benefit for businesses in the GDA. Turning to perception, several stakeholders put forward the idea that a light rail system within the city has improved the image of Dublin as a modern and contemporary city. Tourism authorities highlight this outcome, as well as the fact that the LUAS has increased attractiveness of facilities that were on the margins before the introduction of LUAS, such as the Irish Museum of Modern Art and Collins' Barracks. Finally, the local authorities within the city indicated that due to recent LUAS extensions locating close to brownfield sites, this will allow additional development to take place on these sites, at a considerable saving in the provision of other public infrastructure compared to new greenfield sites.

2.4 Impact on Ireland's global competitiveness

The above evidence shows that transport capital investment in the period to 2008–2009 has yielded efficiency and productivity gains for our economy. These gains have largely been concentrated on interurban road transport, connectivity to our seaports and airports, and specific improvements on a number of public transport corridors.

The impact of this investment on our competitiveness can be seen through the improvements in global perceptions of our transport infrastructure. The table below outlines our ranking in transport-related indicators within the World Economic Forum (WEF) competitiveness report. This has improved significantly since 2008, when our ranking in roads quality in this global index stood at 59 in 2008, before rising to 28 by 2011, the most recent year for which data are available. It is perhaps likely that further marginal gains in perception could be achieved in the coming years given the relatively recent nature of many infrastructure improvements.

Table 2.1: Ireland's ranking in transport-related indicators

Transport sector indicators from the WEF competitiveness report	2008 rank	2009 rank	2010 rank	2011 rank
Quality of overall infrastructure	65	69	53	37
Quality of roads	59	52	40	28
Quality of railroad infrastructure	50	42	32	31
Quality of port infrastructure	53	45	32	30
Quality of air transport infrastructure	48	52	36	32
Available airline seat km/week millions	39	45	46	47

Source: WEF competitiveness reports

While these gains are welcome, and show the benefit of our investment, it is important to note the WEF classify 35 economies, including Ireland, as being at the modern, 'innovation driven' stage of development. Therefore, Ireland's overall infrastructure ranking and transport rankings remain poor compared with those economies with which we are competing for investment. Clearly further investment would be required to improve Ireland's standing in terms of how our transport infrastructure contributes to the competitiveness of our economy.

In this context it is also worth noting a 2009 Forfás report, 'Our cities: Drivers of national competitiveness'. This considered the necessary policies and investment to improve the competitiveness of our cities. The report's conclusions specifically recognised the poor performance of urban transport in Ireland and the need for sustained investment to improve public transport in our key urban centres. Given that road capacity cannot be significantly increased in our urban centres, investment in public transport will be vital if we expect our cities to grow sustainably, be good places to live in, and become world class hubs for modern enterprises.

2.5 Land transport priorities for enterprise

The previous section highlighted the competitiveness gains brought about through recent transport investment, while also showing there is much scope for further improvement in this regard. One of the key challenges for future investment is to deliver further productivity and competitiveness gains. The development agencies, Forfás, Enterprise Ireland and the IDA were therefore asked to provide insights into the key priorities for transport investment from the point of view of their clients. A report entitled, 'Land transport priorities for enterprise' was prepared for the steering group to inform this issue.

While the full report highlights a myriad of issues and investment needs, its key points can be summarised here:

- While Ireland has made significant investment in transport infrastructure in recent years, further targeted investment is required to support economic growth and minimise congestion and associated costs as transport demand increases.
- Catering for the needs of our main exporting sectors should be a key driver of investment decisions. Our economy supports a very diverse range of manufacturing and services sectors, each with different transport needs. Furthermore, our economy continues to evolve; in particular, internationally traded sectors are becoming relatively more important. While the efficiency of road, sea and air freight is central to the competitiveness of our manufacturing sector, for services sectors the efficient movement of people is vital.
- Related to the above, the needs of our main urban centres are highlighted, both in terms of movements within our cities and international connectivity. It is noted that Dublin, Cork and Galway accounted for 82% of employment in new foreign firms for the period 2007 to 2011. Development of better public transport to meet customer needs is specifically highlighted, as is the need for completion of the ring roads in Cork and Galway. It is also noted that improving the competitiveness of our cities will benefit the wider hinterland.
- In terms of developing the hinterlands and regional development, the quality of access between urban centres and to seaports and airports is highlighted. Amongst other

requirements, the need for improved connectivity to the northwest and along the Atlantic corridor is specifically noted.

The above is not exhaustive, with a wide range of specific projects flagged that support urban, hinterland and regional development. Achieving such improvements will increase the attractiveness of Ireland to foreign investors, and indeed improve the productivity of existing foreign and domestic businesses currently contributing to our economic output. However, the wide-ranging needs identified and challenging funding environment together suggest major challenges in achieving such development of the transport network in the short to medium term.

2.6 Transport investment and regional development

Infrastructure investment, and particularly transport investment, is often seen as an important policy tool for regional development. It is argued that such investment allows more peripheral regions to overcome the disadvantages of peripherality by improving accessibility, promoting economic growth, increasing employment, attracting tourism and enhancing social inclusion. However, although transport investment can mitigate some of the effects of peripherality, it cannot eliminate them. Transport investment must therefore occur in the context of other supporting policies and measures that aim to address underlying competitiveness issues.

One of the main benefits of transport infrastructure investment in peripheral regions is that it reduces the transport costs for producers in such regions. In theory, this will help maintain and attract more economic activity. However, such improvements will also inherently reduce costs for those who wish to supply peripheral regions from more central locations. Rather than promoting a dispersal of the location of production, a reduction in transport costs results, in general, in increased concentration of manufacturing.

It must also be borne in mind that in cases where transport infrastructure is not a constraint, investment will have a low return. Indeed, if more non-transport related constraints exist that are impacting on productivity then investment in these constraints should achieve a better return than investment in transport. Furthermore, investment that alleviates congestion on a key route in a neighbouring region, rather than within the peripheral region itself, may well be the most beneficial transport investment to make, even for producers in the peripheral region.

2.7 Discussion

It is recognised that transport investment yields an array of benefits, and it has been shown empirically that it provides a good return on investment. In a broader sense, the failure to ensure that the transport system can facilitate the evolving demands of the economy and society will act as a barrier to economic growth and impose costs on society. Maximising the return on investment points to the need for full economic appraisal of transport projects, which ensures that public funds are put to their most productive use.

Positive returns on investment

Revising both the M4/M6 and LUAS Green and Red line business cases to take account of known outturn costs and demand figures shows a positive return on investment. BCRs of 1.56 and 2.96 respectively were calculated. Wider benefits are also identified by stakeholders. While this cannot be taken to imply all transport investment has yielded such

benefits, the results support the case that transport infrastructure investment in Ireland can yield a good return on investment.

Improving competitiveness through further investment

Recent transport investment has seen Ireland's competitiveness ranking for transport infrastructure improve – however it remains poor when compared to those well developed economies with which we compete for investment.

Efficiently meeting the transport needs of enterprise is a key aspect of ensuring competitiveness. The enterprise development agencies have noted the need for further targeted investment in transport, particularly with regard to meeting the requirements of our export sectors and addressing urban congestion. The latter is identified as increasingly important in terms of attracting service sector enterprises to invest in Ireland.

Given the increasingly globalised nature of key sectors of our economy and the continuing trends of both business travel and freight, it is important that the framework prioritises the interconnections between the national road and rail network and the key seaports and airports.

Need for coherent regional development policies

In terms of regional development, while transport investment can mitigate some of the effects of peripherality, it is vital that it addresses real productivity issues and output constraints. It is also essential that such investment is made in the context of other supporting policies and measures, as part of an overall coherent regional development strategy that aims to address the issues facing the region.

SECTION B: Considering the context

3. Assessing transport investment need in Ireland

3.1 Introduction

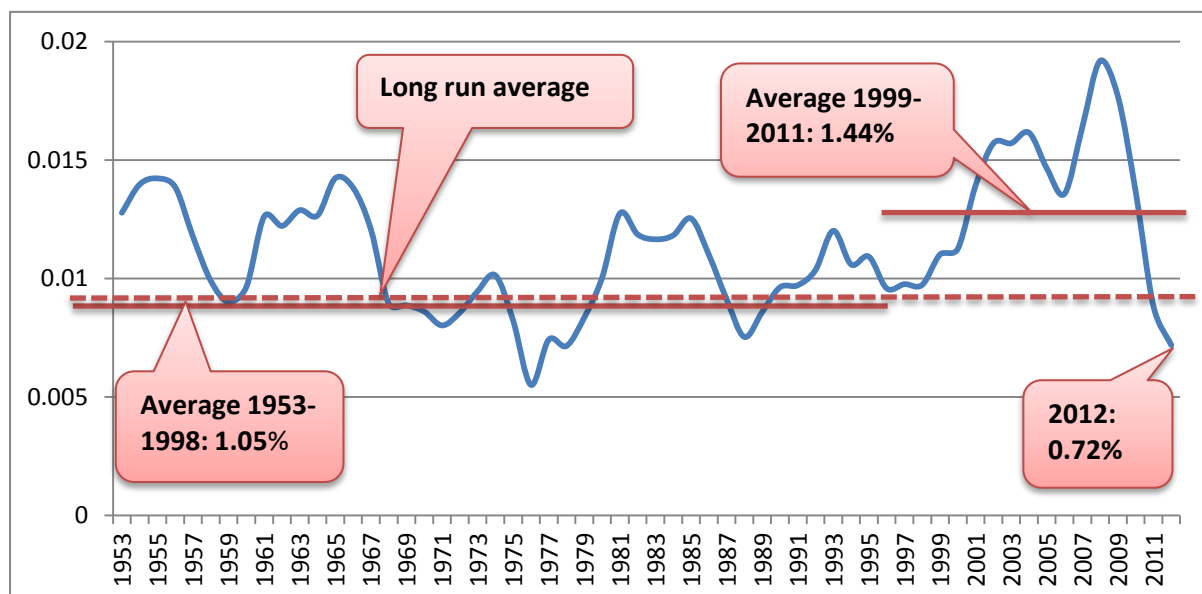
Investment in transport infrastructure is necessary to ensure that our existing transport system functions effectively, and to implement improvements where necessary, both of which are vital for economic competitiveness. This requires that our investment levels are in line with international norms, and are sufficient to ensure the continuing efficacy of our existing system and to incrementally improve our transport infrastructure to meet the needs of a growing economy. Key themes of this chapter include:

- Comparing current transport investment with historical and international levels;
- The impact of Exchequer funding and alternative funding sources;
- Funding requirements for a steady state network; and
- Addressing the steady state funding shortfall.

3.2 Transport investment in context

Historically, Ireland has invested between 0.5% and 1.9% of GDP in land transport: road and rail.⁹ Between 1953 and 2012, the average level of investment annually was 1.13% of GDP. The average for the period 1953–1998 was 1.05%. After 1999 there was a very large increase in transport investment levels, averaging 1.44% of GDP in the period 1999–2011. Capital formation in transport had peaked in 2008 when the value of capital formed in land transport was €3.5 billion. This fell to €1.2 billion in 2012, the most recent year for which CSO figures are available. Expressed in terms of GDP this has meant a reduction in capital formation within the sector from 1.9% of GDP in 2008 to 0.72% of GDP in 2012. It has fallen further since (Figure 3.1).

Figure 3.1: Annual land transport capital formation as a % of GDP, 1953–2012



Note: Prices are constant.

⁹ The analysis in this section is strictly limited to gross fixed capital formation, with data sourced from the CSO national accounts.

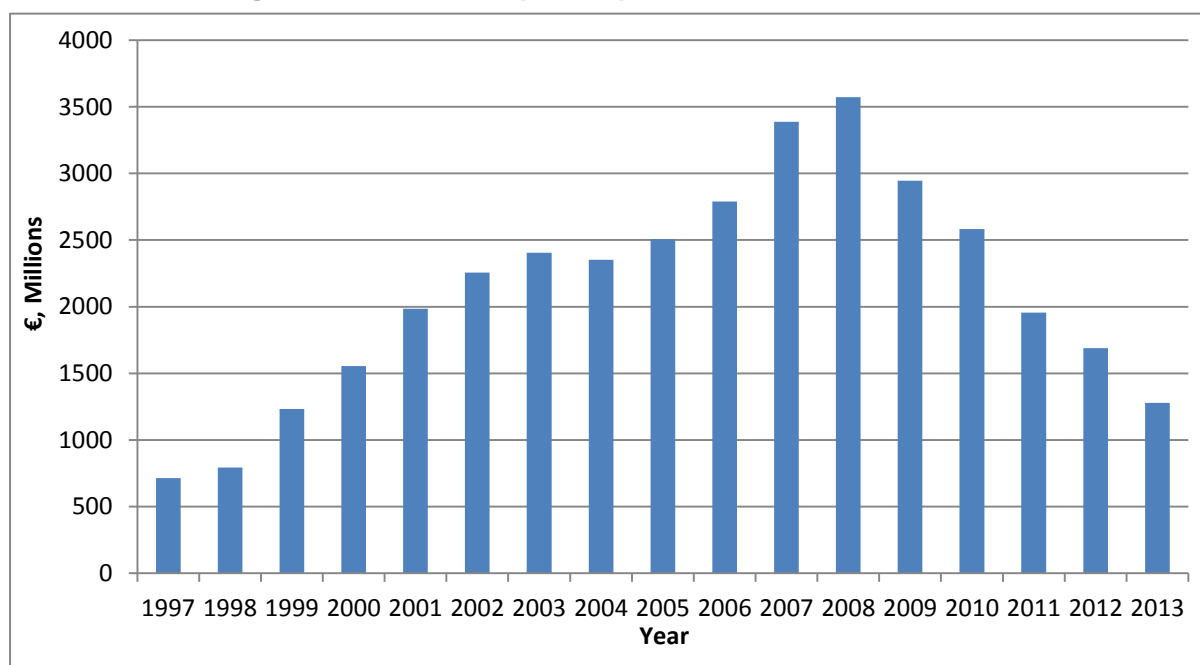
In times of economic growth, investment tended to be ramped up, as capacity constraints emerged. However, during economic downturns investment was cut back very rapidly. Pro-cyclicality is particularly problematical in the transport sector given the very long lead times associated with transport projects, as well as the speed with which capacity constraints and congestion re-emerge once economic growth picks up.

Capital investment by the Department of Transport, Tourism and Sport from Exchequer allocations represents the vast majority of land transport capital formation in Ireland. The contribution of this expenditure to gross fixed capital formation (GFCF) in transport is illustrated by the fact that cumulative Exchequer land transport capital allocations for the period 1997–2012 were approximately €25.3 billion. This compares to cumulative land transport capital formation over the same period of €31.6 billion (in current prices).

The dramatic fall in the level of investment in transport is best illustrated by consideration of Exchequer allocations for capital investment in land transport outlined in Figure 3.2. The allocation for such investment fell from a peak of around €3 billion in 2008 to approximately €855 million in 2013.¹⁰ In GDP terms this is a reduction from 1.64% of GDP in 2008 to 0.52% of GDP in 2013.

The Exchequer land transport capital allocation in 2000 stood at around €920 million. This appears comparable to the overall figure of approximately €855 million in 2013. However, construction material and labour costs have increased very significantly, reducing the real value of this allocation. In line with this, in GDP terms funding in 2000 stood at 0.87% of GDP compared to 0.52% of GDP in 2013. As such, land transport capital allocations are at an historic low.

Figure 3.2 Land transport capital allocations, 1997–2013



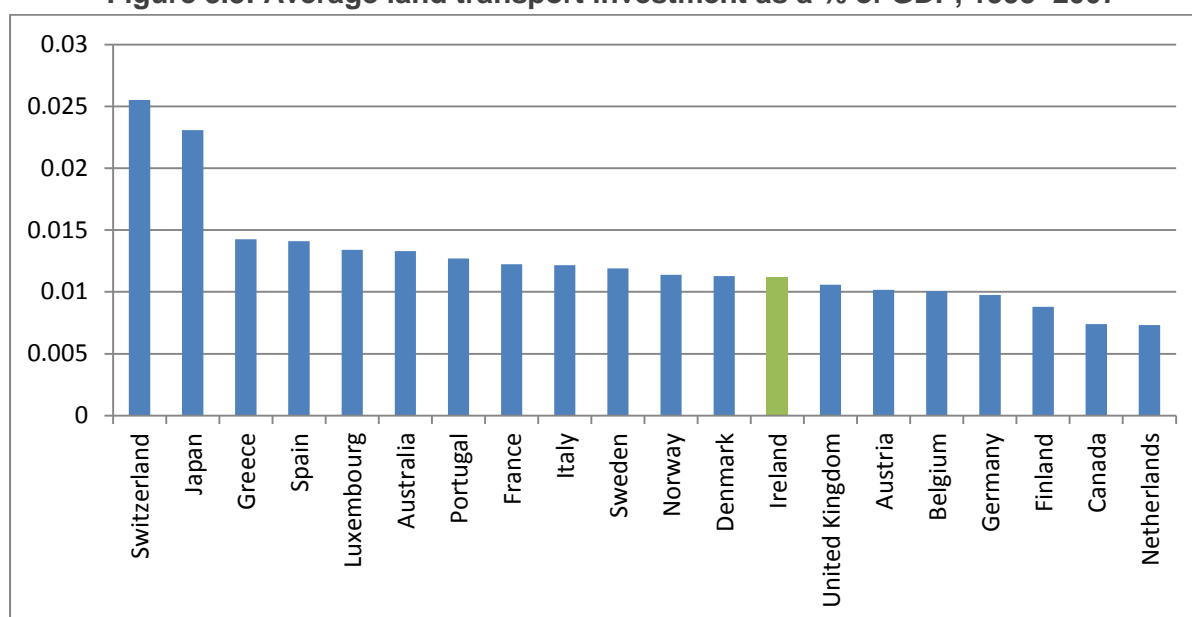
Note: Allocations made to the Department of Transport, Tourism and Sport, reflecting current prices.

¹⁰ Department of Public Expenditure and Reform (2013), *Revised estimates for public services*, Sectoral Policy Division, Central Section, 18 December.

International comparisons of funding for investment in transport are difficult, especially given complexities around issues such as the level of transport infrastructure already in place within a country, or the relative importance of rail between different countries.

The International Transport Forum (ITF) produces detailed reports on the levels of land transport investment within OECD member countries. According to ITF data, Irish investment was comparable with developed countries' infrastructure investment. Over the period 1995–2007, Irish investment was on average 1.12% compared to the average for developed countries of 1.23%.¹¹ Significantly, transport investment can be an enabler of competitiveness improvements. Countries such as Switzerland, Finland, France and Austria consistently rank above Ireland in WEF infrastructure rankings. These countries invest an average of 1.41%, compared to average Irish investment over the same period of 1.12%.

Figure 3.3: Average land transport investment as a % of GDP, 1995–2007



More recently, the ITF have reported that 2011 OECD average investment levels in land transport were estimated to stand at 1% of GDP.¹² As one would expect, developing countries, which would have less capital built up in transport infrastructure, have higher investment levels. By contrast, more developed countries, with a history of investment in transport, tend to have lower investment levels.

Based on this measurement of average international investment levels, the long-run average for Ireland of 1.13% would be consistent with international norms. However, Exchequer allocations have fallen from around €1.43 billion in 2011 to around €855 million in 2013, meaning that the current funding situation is well below both historic Irish levels and international norms. It is also important to note that, because we have limited capital built up in areas such as urban public transport, funding above this average level would be required

¹¹ The term developed country is based on a developed countries list provided in the statistical annex of the UN report, World economic situation and prospects 2013, available [here](#). New EU countries as described in the report have been omitted from the developed country metric as presented in the text due to the historically large investment sums associated with new entrants to the EU. The countries included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States.

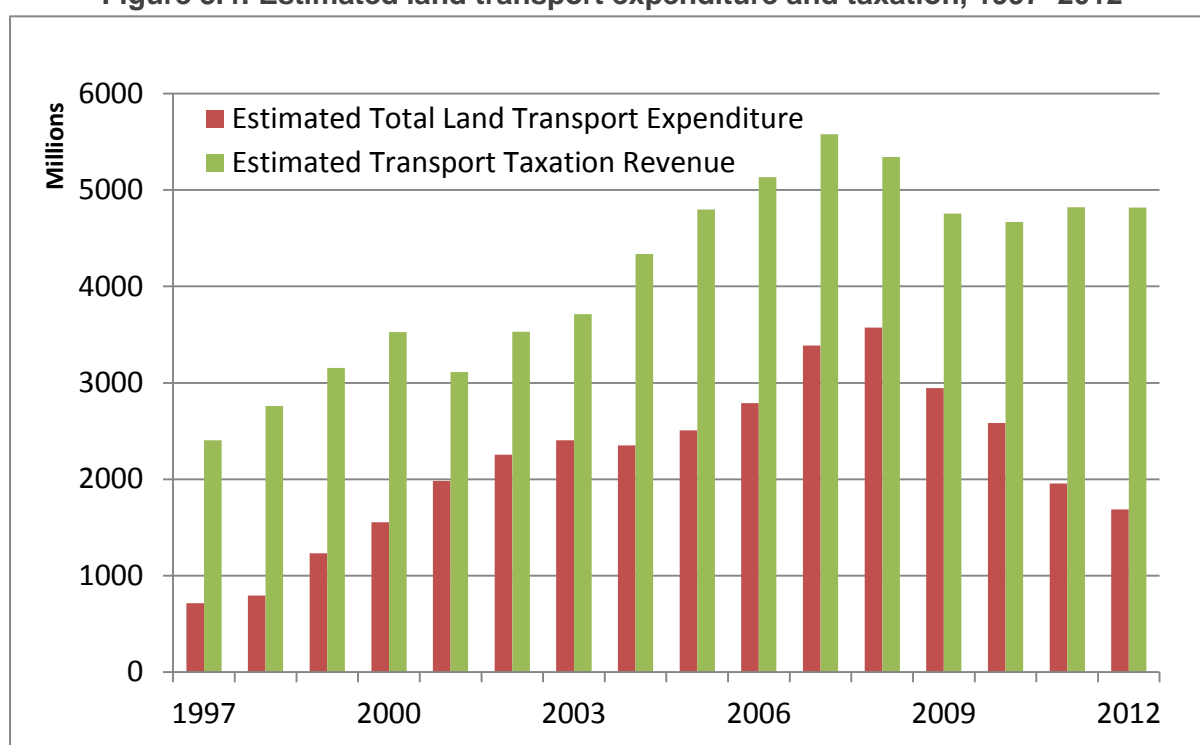
¹² International Transport Forum (2013), Spending on transport infrastructure 1995–2011, OECD, Paris, available [here](#).

for us to improve our competitiveness in transport relative to other countries, which our WEF ranking suggests is necessary.

3.3 Exchequer impacts and alternative funding models

While major transport investment took place over the period 2000–2009, the sector generated tax revenue well in excess of the investment made. Figure 3.2 shows the estimated taxation revenue raised from transport-related sources from 1997 to 2012. The revenues considered in this calculation were excise, carbon tax and VAT on motor fuels, annual motor tax and vehicle registration tax. Revenue from these transport taxes peaked at €5.6 billion in 2008. Since then, cumulative taxes per annum have reduced to around €4.8 billion. Current year figures are likely to be similar, given relatively stable demand and slightly higher taxation rates.

Figure 3.4: Estimated land transport expenditure and taxation, 1997–2012



Over the period 2000–2012, the total estimated tax take was in the region of €58 billion. This compares to a total estimated expenditure on land transport (both capital investment and current expenditure) of €32 billion. By 2012, transport current and capital allocations accounted for only 35% of transport tax revenue. Given the level of Exchequer funding relative to tax take, it is worth considering whether more of this transport tax revenue should be used to fund future transport investment needs.

In recent years Exchequer expenditure has been augmented by some alternative funding mechanisms. These non-Exchequer funding sources such as PPP programmes and EIB funding only relate to the delivery of new projects and are not an option in terms of meeting the large ongoing capital costs of maintaining existing infrastructure.

To date, the most important source of non-Exchequer funding has been through PPP programmes. For example, the private funding element of PPP schemes for national roads over the period 2000-2010 was approximately €2 billion- compared to total Exchequer

expenditure on national road improvement and renewal works of over €13 billion¹³. This shows that whilst important, private funding has contributed a relatively small share of funding requirements for such programmes. A key issue with regard to PPPs is the overall annual cost and affordability of PPP availability payments in future years. While such funding mechanisms may allow additional infrastructure delivery in the short term, additional use of the PPP mechanism will reduce the funding available for transport investment in the future. This is because PPP payments will have first preference on future Exchequer capital allocations for land transport in the Vote of the Department of Transport, Tourism and Sport and will therefore reduce the amount available for spending on actual works in any individual year. The long-term impact on the capital budget for transport of undertaking additional PPP projects needs to be considered very carefully, because it pre-empts future expenditure.

EIB loans have supported and will continue to support a number of transport projects, including a number of important PPP road projects. However, in the case of Exchequer funded projects, EIB loans are not considered as extra funding for individual projects. Rather, they are lower cost loans that replace more expensive Exchequer borrowings. Under the EU Multi-Annual Financial Framework (MFF) for the period 2014–2020, there is some scope for EU funding for transport, though this potential is very limited due to the eligibility criteria, the fact that Ireland no longer qualifies as a cohesion country and the high level of matching funding required by the Exchequer (i.e. up to 80% of project costs). Funding is primarily available for pre-identified projects of common interest on an agreed core network of 10 corridors under the Connecting Europe Facility (CEF). The Belfast–Dublin–Cork road and rail links are included in one core corridor. The emphasis is on improving connections by removing bottlenecks. It is estimated that the Exchequer drawdown for eligible transport projects up to 2020 is unlikely to exceed €70 million in total, due to the eligibility criteria and the lack of Exchequer resources to fund eligible projects on the core corridor such as DART Underground. In relation to transport grants under the structural funds there is even less scope for funding conventional road and rail projects and any drawdown would be minimal. Overall the criteria for EU structural funds is moving away from heavy rail and roads investment in favour of more sustainable transport measures.

Other potential sources of non-Exchequer funding include user payment mechanisms, development levies, concessions or other commercial income opportunities. All of these sources of revenue are already employed in the transport sector to a greater or lesser extent. However, whilst bolstering investment levels to some extent, it is considered unlikely that they will generate significant additional funding for Exchequer directly funded projects in the short term.

With regard to the potential for user payments to be channelled to meet investment requirements, the specific issues around user payments are considered in detail in Chapter 4; however, it is important to note that transport represents a very significant and stable share of household expenditure, standing at 15.6% of total household expenditure in 2004–2005 and 14.3% in 2009–2010. This equates to average expenditure on transport of €131 and €148 per week, respectively. Indeed, household expenditure on transport fuels increased by 28% between 2004–2005 and 2009–2010. The possible scope for potential user payment mechanisms would need to be considered in the context of these existing

¹³ <http://www.nra.ie/policy-publications/general-publications/general-publications/A-Decade-of-Progress.pdf>

transport cost burdens on households, as well as in the context of overall economic policy. This includes the potential for equity issues to arise with regard to those who are most dependent on car transport for their economic and social needs.

3.4 Funding requirements for a steady state network

In setting out the appropriate scale of transport investment in the long term, it is necessary to determine the minimum amount of investment required to allow the physical assets relating to the transport network to continue to operate as they currently do. This is known as the 'steady state' investment requirement. It is an estimate of the funding necessary to maintain, manage and renew all of our existing transport infrastructure so as to keep it in an adequate condition. While the steady state investment requirement does not include any provision for new investment to upgrade the network for the purpose of delivering higher levels of performance or increased capacity, there are capital commitments, which the Exchequer is obliged to meet, arising from existing contractual agreements. Although considered to be enhancements of the network, these projects have an associated capital commitment in future years, for which the Exchequer must make provision. These commitments include items such as payments to private investors for both existing and new PPP schemes, as well as capital obligations arising from projects such as LUAS Cross City. The overall estimate therefore also includes such commitments.

The steady state figures for public transport relate to capital investment requirements only. The figures do not include the ongoing cost to the Exchequer of subventing public transport services under public service obligations as these are outside the terms of reference for this framework. All costs to maintain roads (both current and capital) to the requisite standard are included in the steady state estimate, primarily due to the fact that almost all road expenditure adds some long-term value to the asset.

Estimated average annual steady state investment costs for the period 2014–2016 and the period post-2016 are set out in Table 3.1 below. The table sets out the total average annual costs alongside the cost attributable to the Exchequer when additional sources of funding, such as tolls and local authority own resources, are included for roads, and track access charges are included for heavy rail.¹⁴

The average steady state cost for the transport network is estimated to be in the range of €1.6 billion per annum, for the period 2014–2016, as well as for the post-2016 period. However, when additional sources of funding are included, the average steady state cost to the Exchequer drops to €1.3 billion per annum for the period 2014–2016 and to €1.2 billion post-2016. A full background paper, which provides further detail on how steady state estimates were arrived at, is available.

¹⁴ In line with an EU directive requiring separation of infrastructure management and transport operations, the railway undertaking part of the business must pay the infrastructure manager a charge to access the track network.

Table 3.1: Average annual steady state estimates, 2014–2016 and post-2016

Area of expenditure	Steady state cost			
	Total average annual 2014–2016 (€m)	Attributable to DTTaS 2014–2016 (€m)	Total average annual post-2016 (€m)	Attributable to DTTaS post-2016 (€m)
Roads				
National roads	585	481 ¹⁵	573	469 ¹⁴
Regional and local roads	580	480 ¹⁶	580	480 ¹⁵
Heavy rail	291	195 ¹⁷	291	195 ¹⁶
LUAS	81	60 ¹⁸	49	21 ¹⁷
Buses	61	61	61	61
Integration initiatives	15	15	15	15
Total	€1.6 billion	€1.3 billion	€1.6 billion	€1.2 billion

It is important to consider the estimated steady state investment requirement of €1.3 billion in the context of the DTTaS capital allocation in the 2014 revised estimates volume for public services. In total, €982 million is allocated for capital across all areas of the Department in 2014, including civil aviation, land transport, maritime transport, sports and tourism.

The 2014 capital allocation for road improvement/maintenance and the public transport investment programme is €880 million. As almost all road maintenance expenditure adds long-term value to the asset, an additional €154 million representing the current expenditure allocation for road improvement/maintenance is also included in the steady state figure for 2014. Accordingly, the total allocation for road improvement/maintenance and the public transport investment programme for 2014 is of the order of €1.03 billion. This is over €260 million short of the funding required to maintain the existing land transport system in an adequate condition even if the available funding is spent *only* on steady state.

3.5 Addressing the steady state funding shortfall

Steady state investment is based solely on existing levels of demand. Therefore, the shortfall in funding is likely to be exacerbated when future demand needs are taken into account. Furthermore, this annual underspend will result in a backlog of investment, merely to return our transport assets to their current level of performance.

Given the scale of the shortfall in funding identified above and the likely impacts of future demand, there is a need to examine ways of addressing this shortfall. Four possible mechanisms, which could reduce the gap between funding required and funding available have been identified:

¹⁵ Projected toll revenue accruing directly to the NRA is offset against the total average annual steady state costs for national roads.

¹⁶ Projected local authority own resources direct contribution to maintenance of regional and local roads is offset against the total average annual steady state costs for regional and local roads. This amount is not guaranteed and may increase or decrease, depending on available funding.

¹⁷ Total average annual steady state cost to the Exchequer assumes that fleet heavy maintenance is a matter for the railway undertaking. The figure of €195 million also assumes funding from track access charges.

¹⁸ The steady state cost of LUAS to the Exchequer is reduced because the cost of maintenance is assumed to be met in the future by the accumulated cash reserve.

- Increase the efficiency of our expenditure;
- Reduce the size of the funded road and rail network to a more appropriate scale;
- Reduce the required level of performance required of certain assets; or
- Increase the Exchequer allocation for transport and/or find alternative sources of funding.

Option 1: Increase efficiency of expenditure

Firstly, investment must be undertaken in the most effective and efficient manner possible. Focus must be maintained on the drive for efficiencies undertaken in recent years. The Department will be seeking from the agencies concerned an efficiency dividend of 5% over five years, on steady state investment costs across all modes. This dividend should be reviewed after a five year period. This proposed efficiency dividend is being set in the context of materials and labour costs making up the vast majority of transport infrastructure costs. However, it is important to note that even with an efficiency saving of 5%, the total steady state cost to the Exchequer is €1.24 billion, leaving an annual shortfall of approximately €200 million between the funding allocation and what is required to allow the physical assets of the transport network to continue to operate as they currently do.

Option 2: Reduce size of state-funded road and rail network

The basis for the State continuing to bear the bulk of the cost of a very extensive existing road and rail network, given the extent of usage in some areas, must be considered. As national and regional roads account for 75% of traffic, the maintenance of these roads is important from a strategic perspective to support economic activity across a range of sectors. National and regional roads together account for 19% of the network and the remaining 81% of the network comprises local roads. It is recommended that local authorities should be required to identify and submit for approval their road networks of strategic priority on the basis of criteria set by the DTTaS. Available Exchequer funding should then be focused on maintaining this strategic road network.

With regard to the non-strategic parts of the road network, local authorities are best placed to decide on the prioritisation of funding for the maintenance of these roads that meet local transport needs. Maintenance of these roads is currently underfunded and it is recognised that these roads will continue to be subject to major funding constraints. It is also important to note that the arrangements for funding investment in regional and local roads may be subject to change in the near future following decisions on the use by local authorities of local property tax (LPT) proceeds. In any move to fully fund regional and local roads solely from local resources (including LPT), the strategic nature of such roads, particularly the regional roads, should be recognised and some oversight role should be retained by DTTaS to ensure compliance with national policy objectives in selection of the local investment priorities.

With regard to the existing heavy rail network, heavy rail mode share accounts for 1%–2% of passenger trip demand, 4%–5% of passenger kilometres and around 1% of freight tonne kilometres. The steady state requirement for this heavy rail network accounts for almost 20% of total steady state costs for the entire land transport network. Given the scale of this commitment relative to the level of demand, the steady state requirement for rail must be assessed on a value for money basis. The extent of the railway network, in the context of demand levels on routes, must be critically examined. The significant current funding, which

subvents rail services in Ireland, stood at €127 million in 2013. This adds to the costs of our existing rail network.

There is therefore a need for a new rail policy. This should address key questions such as:

- What is the future envisaged role of rail transport in Ireland?
- What extent of the rail network is it appropriate to retain?

The latter issue should include regard to the total level of transport funding likely to be available in the medium to longer term, the transport needs uniquely addressed by the rail network, now and in the future, and other wider policy considerations (including sustainable development).

Option 3: Reduce performance level required of certain assets

A third option to address the steady state funding shortfall is through a reduction in the level of performance required of certain parts of the transport network. Any reduction in the required level of performance of assets must ensure that safety standards are maintained, but it is likely that operational performance will be adversely affected. In the case of the heavy rail network, an increase in temporary speed restrictions, for example, will result in slower and less reliable journey times, which in turn will have implications for the ability of Iarnród Éireann to retain existing customers and to attract new patronage to the railway. The proposed rail policy will have a role to play in setting out where reductions in performance level may be appropriate in certain circumstances, subject to an overall value for money objective. In the case of the road network, while it is recommended that available funding should be focused on the maintenance of the strategic road network, measures should also be identified to reduce the required level of performance of non-strategic roads. This could, for example, include lower speed limits and weights restrictions or acceptance of a lower level of service.

Reduced performance levels that allow for the deferral of maintenance and renewals commonly result in a higher investment requirement eventually. While savings are made in the short term, the ultimate cost over the lifetime of the asset is significantly higher.

Option 4: Increase the Exchequer allocation for transport and/or find alternative sources of funding

The previous three options all relate to an attempt to reduce the level of capital expenditure to align with the existing level of capital allocations. However, given such funding levels are at historic lows and the extent of the challenges that transport faces, consideration of an Exchequer role in addressing the shortfall is unavoidable.

However, regardless of such an increase, in terms of ensuring the most effective use of Exchequer resources, efficiency savings must be achieved wherever possible. It also remains the case that the extent of the network and performance level should be aimed at optimising value for money- even with increased Exchequer allocations. These efficiency savings, along with increased allocations, will be necessary to maintain and improve the transport network.

The potential alternative of non-Exchequer funding sources have been considered in Section 3.3. The most important source of non-Exchequer transport funding has been through PPP programmes. The Exchequer already has significant forward commitments relating to the road network in the form of availability payments to remunerate private investment in PPP

projects that are not tolled. The latest round of PPP road schemes requires provision to be made for annual availability payments in excess of €100 million post-2017. As noted previously, additional use of the PPP mechanism will significantly reduce the funding available to meet the steady state transport network requirements.

Furthermore, while every effort will be made within the constraints mentioned to maximise draw-down from EU funding programmes and to access EIB loans, alternative, additional sources of funding will be severely limited in the short to medium term. This highlights the importance of ensuring appropriate Exchequer funding for the sector, which as previously noted over the long term has been at an average level of 1.13% of GDP per annum over the economic cycle.

3.6 Discussion

Transport investment and resultant transport capital formation have been highly cyclical. According to CSO statistics, capital formation in transport peaked in 2008 when the value of capital formed in land transport was €3.5 billion. This fell to €1.2 billion in 2012, the most recent year for which CSO figures are available. Expressed in terms of GDP, this has meant a reduction in capital formation within the sector, from 1.9% of GDP in 2008 to 0.72% of GDP in 2012.

In terms of assessing the historical level of transport capital formation in Ireland, the 50 year long-run average level of capital formation stands at 1.13% of GDP. Over the 10 year period of 1998 to 2008, average annual land transport capital formation was 1.4% of GDP.

Investment sources and levels

The vast majority of this capital formation occurs through Exchequer investment. Other minor sources of investment include, for example, own resource investment by Irish Rail and private sector investment. The Exchequer allocation for land transport capital expenditure fell from a peak of €3 billion in 2008 to approximately €855 million in 2013. In GDP terms, Exchequer allocations stood at 1.6% of GDP in 2008 and fell to 0.5% of GDP in 2013. Present funding levels are at an historic low.

Based on past funding levels, the evidence suggests that transport investment should be, at a minimum, at our long-run average level of 1.13% of GDP per annum over the economic cycle. Achieving a target of 1.13% of GDP suggests transport capital formation should be in the region of €1.8 billion per annum. This is based on GDP for 2013 and would need to increase in line with future GDP increases.

Examination of international comparators shows that, for developed countries, average transport investment levels in 2007 were around 1.23% of GDP. More recently an ITF report indicated that 2011 transport investment levels in OECD countries averaged 1% of GDP. This suggests that while our long-run average investment levels are consistent with developed country levels, existing funding levels are much lower than average. It is also important to note that given Ireland has limited capital built up in, for example, urban public transport. Funding above this average level would be required for us to improve our competitiveness in transport relative to other countries, which our WEF ranking suggests is necessary.

When considering Exchequer investment in transport, it is worth noting that taxes on transport represent a very significant revenue source for the Exchequer. The cumulative

taxation raised from excise, carbon tax and VAT on motor fuels, annual motor tax and vehicle registration tax peaked at €5.6 billion in 2008 and is currently estimated at €4.8 billion per annum. This is in stark contrast to total Exchequer expenditure on transport (both capital and current), of around €1.32 billion at present.

Estimating the necessary funding level

An estimate has been made of the funding necessary to maintain a 'steady state' transport system. According to this analysis, **€1.6 billion per annum** is necessary to maintain the steady transport system. The steady state cost to the Exchequer reduces to **€1.3 billion**, due to non-Exchequer funding sources such as tolls. This estimate includes the funding required to maintain, manage and renew all of our existing transport infrastructure, so as to keep it in adequate condition, along with other capital commitments that the Exchequer is obliged to meet. However, it includes no provision for investment to increase capacity or build new projects beyond those already contractually committed and is also exclusive of the cost of subventing public transport services.

Addressing funding issues

Given the absence of this required level of funding, there is a need to examine options to address the steady state funding shortfall. Four options were identified here;

- Increase the efficiency of our expenditure;
- Reduce the size of the funded road and rail network to a more appropriate scale;
- Reduce the level of performance required of certain assets; and
- Increase the Exchequer allocation for transport and/or find alternative sources of funding.

With regard to the above, the Department will seek from the agencies concerned a cumulative efficiency dividend of 5% over five years on steady state investment costs across all modes. However, efficiency savings alone cannot bridge the gap between the steady state funding requirement and the present Exchequer funding allocation. Therefore, in the absence of appropriate funding, further savings would be required through reducing the extent and/or performance of the land transport network.

Our rail network accounts for a disproportionate amount of steady state funding, almost 20%, while catering for only 1%–2% of passenger trip demand, 4-5% of passenger kilometres and 1% of freight kilometres. It is recommended that a new rail policy is drawn up to address the future role of rail transport in Ireland, taking account of the low level of demand as well as the benefits of the markets it serves, in particular those travelling from wider, more dispersed areas to city centres.

The identification of a strategic road network for priority maintenance will also play a key role in managing our constrained budgets. With regard to the non-strategic parts of the road network, local authorities are best placed to decide on the prioritisation of funding for the maintenance of roads that help to meet local transport needs. It is recognised, however, that these roads will continue to be subject to major funding constraints. Finally, consideration should be given to reducing the level of performance on parts of the road and rail networks in the context of setting an appropriate scale for the state-funded road and rail networks and with the objective of achieving value for money on investment across the network.

Even with increased efficiencies and reduced costs through reductions in network extent and performance, there is a pressing need for an increase in the Exchequer allocation for transport. While clearly challenging in the context of current public finances, it is essential to protect the existing network and allow vital investment to facilitate demand growth and support economic growth.

The preceding analysis has very much focused on steady state funding requirements, with no provision being made for investment in new projects necessary to ensure we have an efficient and effective transport system that can support demand growth and facilitate economic growth. The provision of new transport infrastructure would require significantly more funding than the €1.3bn identified as a steady state requirement. The M4/M6 and the original two LUAS lines were discussed in terms of return on investment in Section 2.3. Adjusting known outturn costs to 2013 prices using the CPI shows total costs of €2bn and €1.4bn respectively for M4/M6 and the two LUAS lines (in current prices). This illustrates the scale of funding necessary for new projects, over and above steady state requirements if we are to ensure our transport system can meet the demands of our economy and society.

4. Network use and travel demand

This chapter sets out the current nature of travel demand on the network and looks at the scale of projected demand in 2041. It also considers demand issues arising from international connectivity requirements and structural changes to the economy. Finally, in recognition of the need to move away from the ‘predict and provide’ approach to transport planning and investment, key interventions that can support better management of existing and future demand are considered. Key themes can be summarised as:

- Existing demand patterns and scenarios of future demand growth;
- Implications of existing and future demand for the transport network;
- Other key influences on travel demand; and
- Managing current and future transport demand.

4.1 Existing demand patterns and future demand growth

Understanding the level of current and expected future transport demand is crucial in deciding the appropriate quantum and type of public expenditure on land transport. Future travel demand is driven by forecasted growth in key demographic and land use variables and the levels of activity that are assumed to occur due to, for example, employment levels and education figures.

Analysis of future demand is based on a population scenario of 5.27 million in 2041. This scenario represents a deliberately conservative view of population growth, particularly over the next 15 to 20 years. An additional scenario of 6.1 million in 2041 is also examined to assess the implications of higher population growth.¹⁹ Two land use scenarios were considered, the first based on current population and employment distribution trends, and the second on more urban consolidation of population and employment.

In terms of spatially assigning population and employment, a settlement hierarchy was used to allocate existing population and future population growth across 85 settlements. Using the population and land use scenarios, the volume of trip demand in the base year of 2011 was then compared to trip demand arising in future year scenarios.²⁰

The current spatial distribution of demand shows the importance of our cities. For example Dublin city generates 24% of all trips and Cork, Galway and Limerick cities generate a combined further 8% of trips. Our most significant towns²¹ generate a further 20% of trips. The remainder of trips (48%) are generated by smaller scale settlements and rural areas. In many ways, this trip profile identifies a major policy issue for transport in Ireland: cities, smaller urban areas and rural areas each generate significant levels of transport demand.

The projected future scenario does not change these shares of demand significantly. As would be expected, under urban consolidation scenarios there is a growth in the share of trips with origins and/or destinations in urban areas, whereas trips with a rural destination

¹⁹ The conservative and high population projections used in the strategic framework are in line with scenarios M0F2 and M1F2, respectively, of the CSO publication, Population and labour force projections 2016–2046.

²⁰ See background paper, Assessment of existing and future levels of travel demand, for further detail on settlement hierarchy, distribution of future population and calculation of future travel demand.

²¹ Significant settlement towns are defined by population and employment activity and broadly relate to towns greater than 2500, see background paper for further detail

decline by 17%. It is likely that the higher number of urban trips can be served by public transport. However the number of rural trips also remains high and will be much more difficult to serve using public transport.

Given the modest population growth assumptions, demand growth is also modest, with trip growth essentially in line with population growth. However, the major demand and supply issues arise due to peak time commuting. The following key issues emerged from the projections in relation to peak demand for travel to work and education.

1. In 2041, there will be an increase in travel demand arising from work trips of 35% and 57% for the conservative and high population scenarios respectively. There are currently 1.9 million people in employment. The scale of demand growth indicated here implies between 650,000 and 1.1 million additional trips to and from work for the conservative and high population scenarios respectively.
2. The substantial increase in demand is not only the result of population increase but also of a projected decrease in the unemployment rate in the medium to long term. In fact, even without any population growth, a reduced unemployment rate of 7% will result in a notable increase in the number of trips in both morning and evening peak travel periods.
3. Census 2011 showed 69% of commuters used a car to travel to work. If trends of increased car dependency continue and growth in travel demand is not managed, the ability of the existing road network to accommodate such a significant increase in car commuting trips during peak periods will be severely tested.

A key message from this analysis is the significance of Dublin city as a trip generator and attractor, and the fact that this will continue into future years. Similarly, the role of the regional cities will also grow. However, rural-based transport demand remains significant, even with increased consolidation of population in urban areas. Even under modest growth assumptions, peak demand growth is very significant. It is projected that peak commuting demand could grow by between 35% and 57% for conservative and high populations respectively. Such growth would represent a major challenge in terms of managing our roads and also in terms of being able to cater for people using public transport and alternative modes.

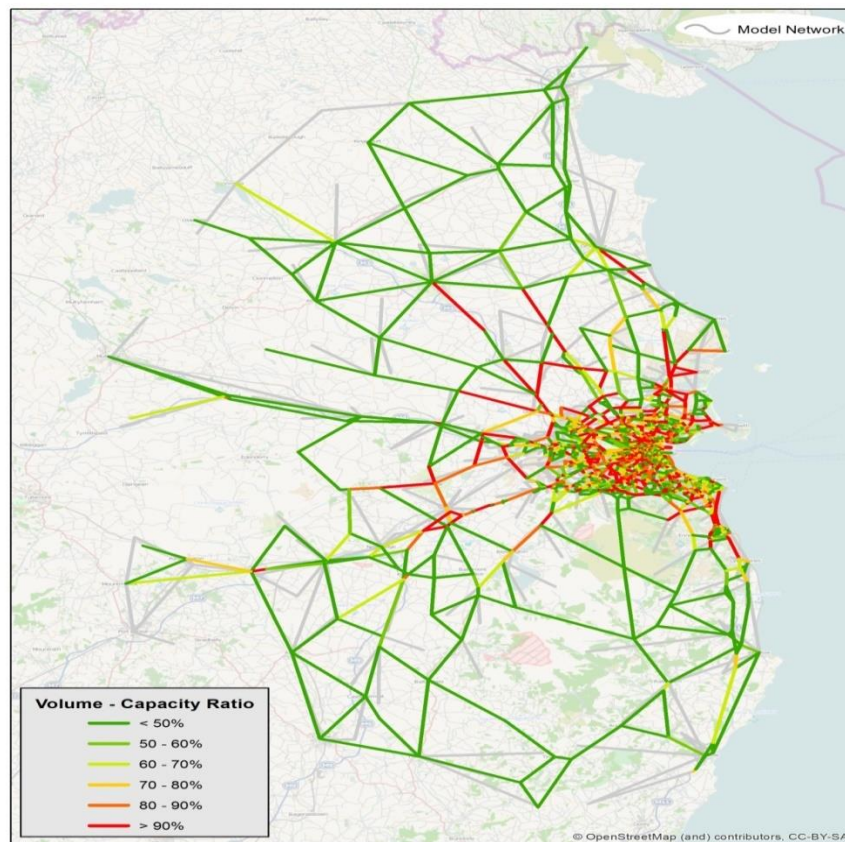
4.2 Implications of existing and future demand

While the settlement structure is a useful framework to analyse trip demand based on existing and future population levels, it is important to incorporate the concept of capacity into the assessment of the transport system as it currently exists. Given the continuing importance of Dublin city as an origin of and destination for trips, it is useful to assess capacity issues regarding the network in Dublin. Figure 4.1 below shows a map of the greater Dublin area and associated volume/capacity (V/C) ratios from the NTA's GDA transport model.²² The map shows that while much of the wider GDA network operates under relatively free-flow conditions, V/C ratios on some of the approaches to Dublin city and within the city itself are already operating at levels in excess of 90%. Given that an increase in work-related travel demand in peak periods of at least 35% under a conservative population growth scenario is expected, the network in and around Dublin city is likely to

²² Volume/capacity (V/C) ratio is an indicator of capacity sufficiency on the network and shows where demand exceeds capacity on parts of the network.

experience a significant deterioration in performance in the short to medium term, as the unemployment rate decreases and population increases result in more trips.

Figure 4.1: NTA GDA model volume/capacity map



The NRA's national transport model (NTM) has also been used to assess the existing transport system and to identify where performance issues on the network are likely to arise in 2040. Figures 4.2 and 4.3 below show that while the road network in general operates at a high level of service, there are significant sections of corridors around Dublin and the regional cities of Cork and Galway where the level of service is already at forced or breakdown flow.²³ These corridor issues will become more prevalent in 2040. Furthermore, some of the other corridors into Dublin, Cork and Galway currently operating at a good level of service show a demonstrable deterioration in flow conditions in the future. Roads such as the N28 and N25 in Cork will experience V/C ratios in excess of 90% in contrast to existing V/C ratios of 50%–60%. In the GDA, an increase in V/C ratios to over 90% is observed on parts of the M50, N11, N7, N4 and M1 that are currently operating at V/C levels of around 80%. In Limerick, although V/C ratios show an increase from the base year to future year scenario, very few parts of the network are shown to experience V/C ratios in excess of 90%. Galway shows a deterioration in V/C ratios from around 50% to 60% on the N59, N17 and N18. However the road network in Galway for 2040 shows V/Cs of less than 60% in general.²⁴

²³ This corresponds to 'Level of Service F' in the Highway capacity manual. Level of service is a qualitative measure used to describe traffic conditions with Level A being the best and Level F being the worst.

²⁴ Further output from the NRA model is contained in the background paper, Assessment of existing and future levels of transport demand, including level of service and V/C ratio maps for the GDA, Cork, Galway and Limerick.

Figure 4.2: Level of service, national, 2013

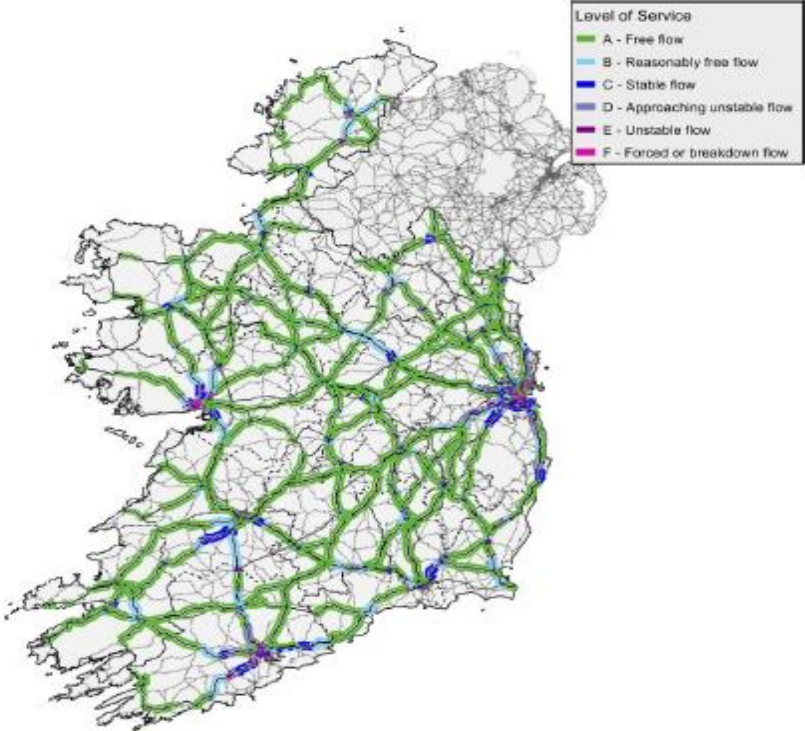
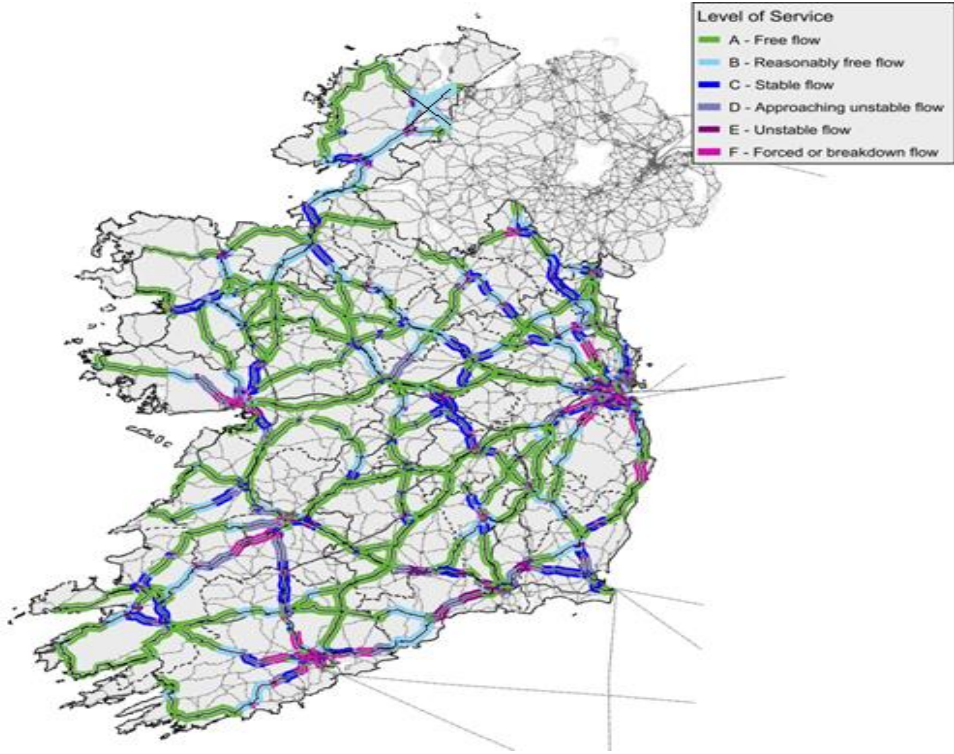


Figure 4.3: Level of service, national, 2040



4.3 Other key influences on transport demand

While the demand modelling focuses on personal mobility, national and international commercial transport demand is of vital importance to the functioning of our economy. Specifically, access to seaports and airports is another important component of overall travel demand. Future requirements in this regard relate to both demand increases driven by economic growth and structural changes in demand due to changes within our economy.

Road is, and will remain, the primary mode of transport for accessing airports and seaports for the movement of both people and freight. The 2013 National Ports Policy notes that, 'the interconnections between the national primary road network and the commercial port network will continue to be of primary importance'. In 2011, 43.2% of all merchandise moved by sea was handled in Dublin, 22% by Shannon-Foynes and 18.7% by Cork.²⁵ While the National Ports Policy 2013 states that there is no short-term pressure on national port capacity, it notes that Tier 1 Ports 'have clear potential to lead the development of future port capacity in the medium and long term when and as required'.²⁶ It is important that the development of port capacity in the future is not constrained by a lack of investment in effective hinterland connections to these ports.

With regard to travel demand arising from the main airports, Dublin Airport is fundamental to providing good international access both for passengers and freight. In 2011, it handled 79% of all passengers into and out of Ireland and 85% of air freight. A recent study on future aviation demand growth by Eurocontrol suggests a doubling of aviation demand by 2050 under assumptions in line with our existing economic and demographic environment.²⁷ Such significant demand growth will again manifestly have implications for land transport provision to our airports and for the balance to be struck between private car and public transport access to them. This is particularly in the case of Dublin Airport, where increased demand levels over time should positively impact on the potential to deliver value for money investment in public transport options.

Transport demand patterns and trends in future years will also be influenced by structural changes in the economy, which may particularly influence the scale and type of commercial demand. While these changes are difficult to predict with certainty, the growth of particular sectors will have implications for the transport needs of enterprise. So for example Food Harvest 2020, the strategy for the agri-food sector, targets a 42% increase in the value of food exports by 2020. Ensuring that the transport needs of the food sector are met is particularly challenging given the dispersed nature of the sector compared with other sectors. Service sector growth on the other hand will have implications for personal mobility requirements in urban centres, not least due to the expectations of companies locating here.

4.4 Managing current and future transport demand

Given the significant projected increase in travel demand in future years described in this chapter, coupled with trends of increased car dependency, we should, in the light of pressures on investment budgets, move on from a 'predict and provide' approach to transport planning to an approach centred on how to best manage our existing assets and provide the best transport services within our resource limitations.

²⁵ CSO (2012), Transport omnibus 2011, available [here](#).

²⁶ Tier 1 ports are Dublin Port Company, Port of Cork Company and Shannon Foynes Port Company

²⁷ Eurocontrol (2013), Challenges of growth 2013: Task 7 – European air traffic in 2050, available [here](#).

Demand for transport is a derived demand, driven by factors such as demographics, economic activity and spatial patterns. In simple terms, the supply of transport infrastructure and services can be thought of as being provided to meet this demand. However, in reality, transport demand is not independent of supply. In the short term, infrastructure or service improvements reduce the effective cost of travel, which in turn increases demand from existing users and attracts new users. Over the longer term, such supply changes can have structural impacts on demand. For example, decisions such as housing location and places of work are influenced by supply changes. An obvious positive example of this is where investment in good quality public transport can facilitate more consolidation of urban areas and encourage the development or re-development of mixed living and working areas. A more negative effect would be where motorway investment might facilitate more dispersed settlement by reducing commuting times and travel costs, thus increasing demand. Furthermore, these more dispersed transport patterns and longer trip distances reduce the potential for non-car modes to satisfy demand.

Spatial planning, network management and user charging are three key interventions that can assist in managing demand and demand growth. Alignment between land use, spatial planning and transport is essential to ensuring that the growth in demand for trips occurs in a way that can be catered for effectively. Continuing to improve our network management, particularly through the use of information technology, should allow us to yield further benefits from our existing infrastructure. Ultimately, should demand patterns and demand growth erode the functioning of our networks and impact upon economic output, fiscal interventions such as road user charging may become necessary.

Spatial planning

The most effective way of managing transport demand is by ensuring that the type, location and time of trips that people undertake can be catered for in a cost-effective and environmentally sustainable way. Good land use and spatial planning policy and implementation is central to facilitating this. Alignment of transport and spatial planning policies can serve to build up sustainable communities, limit transport demands arising from dispersed locations and reduce commuting time and costs for people. It can create conditions whereby people find it more convenient and time or cost effective to use more sustainable modes, such as public transport, and whereby service provision of these modes becomes more cost effective.

As outlined in Chapter 1, settlement trends over the last 20 years have not, in general, been consistent with this vision. While stated policy has aimed for more sustainable settlement patterns, the reality has been patterns that have given rise to longer distance commuting, car dependency, and cities growing more slowly than their hinterlands. The value of future investment will be maximised if land use and spatial planning is aligned with transport investment plans. Implementation of recently changed national planning legislation, such as the improved regional planning guidelines and local authority development plan core strategies, coupled with a possible successor to the National Spatial Strategy will, therefore, be a key factor in the development of more sustainable communities and retaining both the value of past transport infrastructure investment while providing more accessible and efficient public transport into the future.

The demand assessment work, outlined above, suggests the number of trips taken in the morning peak will increase by 35%–57% by 2040 compared to current levels. If this demand growth is based on further growth in car commuting, it will compromise the functioning of our

road system, especially around and within our urban areas. However, the scale of demand growth will also require dramatic improvements in public transport capacities and efficiency. The economic and practical ability to achieve this will be greatly influenced by future settlement outcomes.

Network management and technology solutions

Given existing demand levels and likely future demand growth, the effective management of our transport networks will become increasingly important in terms of maximising operational capacity and minimising safety risks. Less congested roads are inherently safer, and enforcement technologies reduce unsafe and illegal driving. By managing our networks better, in particular at peak times or during unforeseen events, delays are minimised for the public.

Network management already plays a significant role in enhancing the safety and capacity of our transport systems, for example the National Roads Authority's motorway traffic control centre. 'Intelligent transport systems' (ITS) form an integral part of this network management. They are advanced applications, which aim to provide innovative services relating to different modes of transport and traffic management, enabling users to be better informed and make safer, more co-ordinated use of the transport network. Many such ITS initiatives in transport have yielded major efficiency benefits, for example, barrier-free tolling on the M50, real time passenger information on our public transport services, and integrated ticketing. Investment in such ITS projects that can yield real benefits should be accelerated.

There is a clear role for the ITS technology toolkit in management and operation of our transport system, enabling us to enhance the capacity of existing infrastructure, perhaps in lieu of more capital intensive infrastructural solutions. Where investment in new infrastructure is occurring, the deployment of complementary technologies that can ensure its more efficient use and integration must also be encouraged.

The risk always exists that technology solutions are proposed to address shortcomings in processes and arrangements without addressing the core issue. The use of technology must always be driven by operational needs and user requirements, and as with all investment must be subject to full appraisal. The role of the appraisal framework again becomes significant here. An assessment of the potential for technology to substitute or complement traditional capital investment should be incorporated into the investment appraisal process. In other words, project promoters should be required to demonstrate that the benefits posited for a proposed piece of new infrastructure cannot be achieved through the use of management measures, including ITS applications, applied to existing infrastructure. Appraisal methods may also need to be modified to better capture the benefits and costs of intelligent transport systems.

Demand management through fiscal measures

Even if we succeed in better aligning transport and land use policy and optimising the use of our networks, capacity issues will arise if, as expected, transport demand continues to grow. Some capacity constraints will need to be addressed through investment in new infrastructure. However, in many places, such as our urban centres, expanding road supply is not an option. Furthermore, constantly increasing the supply of road infrastructure to deal with ever increasing car demand is neither economically nor environmentally sustainable.

Because of this, there is a need to better manage existing and future transport patterns, with network management and technology deployment having significant roles to play. Demand pressures on roads could also be reduced through better provision of alternatives aimed at encouraging mode shift. However, where demand exists, and supply cannot or should not be increased by such means, demand management through fiscal interventions may be the only option to manage that demand.

As outlined in Chapter 3, there is already a very significant taxation burden on transport users. These existing taxes and charges include vehicles purchase taxes, vehicle ownership taxes, fuel excise and destination car parking charging. While fuel and ownership taxes impact on aggregate demand through increasing the cost of ownership and use, they do not reflect the true costs of specific travel choices. For example, the cost imposed on users through such taxes does not reflect externalities such as congestion. Road user charges that vary according to location, distance travelled and time of travel could maximise the value of our transport networks where demand begins to impact on efficiency.

Given the already high cost of transport to households and businesses, any future pricing mechanisms should not have the aim of raising additional revenue. However, as vehicle technology improvements will reduce the effectiveness of the current excise regime, a long-term move towards user charging could result in a fairer form of taxation, which better reflects the costs imposed on society by individual users. In this context, it must also be borne in mind that mode shift is a desired policy outcome of such user charging. If this is to be achieved, these alternative mode choices must be available – and revenue raised from such user charging could be used to fund the provision of alternative modes of transport.

4.5 Discussion

The analysis undertaken has identified the most important likely future trends in transport demand. While our cities represent major trip generators and attractors, smaller settlements and rural areas also generate much demand. Future consolidation of growth would increase demand in our urban areas, though other demand types will remain substantial.

Projected increases in travel demand

Peak time travel demand in 2041 is projected to be between 35%–57% greater than current demand levels. While much of the transport network currently operates under relatively free flow conditions, capacity constraints already exist on some of the approaches to, and within, Dublin and the regional cities. The projected demand increases would impact most strongly on these corridors around and into cities which are already subject to strong demand.

Due to availability issues regarding models and data, the consideration of capacity issues focuses on roads. However, it is important to note that should transport demand grow as strongly as suggested, investment in public transport and walking and cycling must take place to cater for as much as possible of that demand, while also ensuring that the road network is capable of handling the remaining demand as efficiently as possible.

This chapter has also highlighted the impact of structural changes to the economy on travel demand, and the related issue of access to seaports and airports. It is important that future sectoral growth opportunities are not constrained by a lack of investment in transport. For example, it is vital to ensure that growth in services employment is supported by public transport provision necessary to cater for urban transport demand and to ensure effective hinterland connections to key ports in the future.

Need for better management of transport demand

Given expected demand growth over the period of this framework, better management of transport demand will be necessary to maintain the efficiency of our networks, reduce future investment needs and facilitate better provision in respect of sustainable modes (public transport, cycling and walking). Spatial planning will be central to ensuring future demand growth is of a type that can be catered for in an economically and environmentally sustainable way. Network management, network efficiencies and technological developments should allow us to maximise the supply side and ensure we get the most value out of what we already have.

Demand management through fiscal measures – and specifically road user charging – may be necessary to deal with future demand. This should not increase the overall cost of transport, and should be viewed as part of a more comprehensive suite of interventions. It would also require greatly enhanced provision of sustainable modes, which could potentially be at least partly funded through such pricing mechanisms.

5. Supporting other policy objectives

This chapter considers how land transport investment can support other Government policy objectives. The policies are first set out individually, with a discussion on the implications of these policies for the framework at the end of the chapter. Key themes can be summarised as:

- The impact of transport on combating social exclusion; and
- The role of transport policy in relation to environmental, biodiversity and climate policy.

5.1 Social inclusion

Transport plays a crucial role in combating social exclusion through providing access to jobs, education, health services and social networks. Population groups particularly vulnerable to social exclusion include older people, particularly in rural areas, low-income households, and people with disabilities.

Transport in rural areas

Levels of access to transport services differ across the country. The major transport infrastructure facilitating access to services in rural areas is the national, regional and local roads network. Ireland has a very high number of road kilometres per capita and the state allocates a significant proportion of public expenditure to maintaining the road network.

For most rural dwellers, access to scheduled public transport services is limited. Given dispersed origins and destinations, the provision of public transport to meet any significant proportion of rural travel needs is, in general, prohibitively expensive and inefficient. The Rural Transport Programme, which provides services to people whose travel needs are not met by existing bus or train services, aims to enhance and sustain nationwide accessibility, through community-based participation, particularly for those at risk of social exclusion, as well as people with mobility, sensory and cognitive impairments. It can play a role in combating rural isolation.

Transport and older people

The National Action Plan against Poverty and Social Exclusion 2007–2016 highlights the Rural Transport Programme (RTP), which is identified as a particularly important service for older people.²⁸ While services are open to the general public, older people and people with disabilities have to date formed the core customer base of the Programme. Maintaining the road network assists with ensuring access to services for older people in rural areas. Public transport also contributes strongly to the mobility of the older population in urban areas.

Transport for low-income households

As noted in Chapter 3, transport represents a significant item of household expenditure in Ireland – at 14.3% in 2009 it was not far behind housing costs and food expenditure, which stood respectively at 18.2% and 16.2% of household expenditure.²⁹ The share of transport expenditure as a percentage of total household expenditure appears to be largely

²⁸ The Programme has recently been restructured, with the NTA publishing the report, *Strengthening the Connections in Rural Ireland* (2013), NTA, Dublin.

²⁹ CSO (2012) *Household Budget Survey 2009–2010*, CSO, Cork. All following statistics in this section are taken from the same study.

independent of measures of deprivation. Households at risk of poverty spend 13.4% of their expenditure on transport, compared to 14.5% for households not at risk of poverty.

Maintaining access levels to transport and services for vulnerable groups remains a matter of concern. Given recent reductions in mean household income, it can be argued that there is very little flexibility in household expenditure for many people. Any significant increases in transport costs could limit the accessibility of jobs, health services, education services and social networks for these households.

Transport for people with disabilities: Accessibility policy

The most recent Department of Transport, Tourism and Sport sectoral plan for people with disabilities, *Transport Access for All* (2012), which feeds into the government's *National Disability Strategy Implementation Plan 2013–2015*, reflects the considerable recent improvements in increasing the accessibility of public transport fleets and infrastructure. The Rural Transport Programme identifies people with disabilities in rural areas as one of its target customer groups. Most importantly, there are stringent accessibility requirements now in place for all transport projects and any future transport investment must incorporate accessibility for older people and people with disabilities as a core element.

5.2 Environmental, biodiversity and climate policy

Air quality, noise, biodiversity and energy use/renewables

The Environmental Protection Agency (EPA) has responsibility for monitoring Ireland's air quality. Ireland's air quality is generally of a good standard. However, the EPA notes it is now evident that, due mainly to the very significant increase in the number of vehicles on our roads, emissions from the transport sector represent the greatest threat to Ireland's air quality. The DTTaS *Smarter Travel* policy outlines actions to be implemented to achieve the reduction in emissions required under EU legislation. Measures that help reduce congestion, promote fuel efficiency and maintain investment in public transport are key to addressing future potential air quality problems.

International obligations and measurement of progress in relation to noise, biodiversity and energy use are set out in Annex 1 of this report. The framework's impacts on environmental factors are captured through the Strategic Environmental Assessment (SEA) process, being carried out in accordance with the SEA Directive (2001/42/EC). In addition, an Environmental Report is being published in conjunction with this steering group report and draft framework. It assesses the consistency of overall outcomes of transport investment governed by this framework with our environmental and biodiversity objectives and obligations.

Climate policy

Ireland is on track to complying with its UNFCCC Kyoto Protocol greenhouse gas reduction obligations for the first commitment period (2008–2012). However, it faces a significant challenge in meeting its EU emissions targets for greenhouse gases under the EU Climate and Energy package 2020 goals, and anticipated longer term targets up to 2050. The package targets (known as the 20-20-20 targets) is comprised of a range of measures aimed at reducing GHG emissions, renewable energy and energy efficiency. The transport sector

represented 19% of Ireland's total emissions in 2012.³⁰ From 1990 to 2011, there has been close coupling between emissions from the transport sector and output from the economy as a whole. Reducing emissions from transport would require a transformation in the sector, relying on technological innovation and security of alternative fuels supply, supported by enabling policies and widespread behavioural change.

Changing urban travel patterns, which would have the most potential for modal shift to public transport, though important would be unlikely to make a major impact on CO₂ targets. This is because most urban journeys are relatively short in distance. Similarly promoting modal switch to active travel modes will not yield significant CO₂ reductions; those transport journeys with most potential for modal switch to walking or cycling are by definition, short journeys, with relatively few benefits in terms of CO₂ reductions. The main benefit of behavioural change programmes or public transport investment is the resultant reduction in congestion, with emissions reduction and localised environmental improvements being co-benefits of modal shift.

A co-ordinated, cross-governmental approach to reducing national emissions is under development, for which the Department of Transport, Tourism and Sport is preparing a low-carbon sectoral roadmap. The challenge for this framework is to prioritise investment that can contribute to national economic productivity while meeting Ireland's international obligations and emissions targets.

5.3 Facilitating regional economic development

Transport and regional balance

As considered in more detail in Chapter 2, infrastructure investment, and particularly transport investment, is often seen as an important policy tool for regional development. The data show that almost all parts of the country have benefited from major roads projects undertaken. Given its central location, the midlands region has benefited the most in this respect. However, while transport investment can mitigate some of the effects of peripherality, it cannot eliminate them. Transport investment must therefore occur in the context of other supporting policies and measures that aim to address underlying competitiveness issues.

Transport and tourism

Tourism is a key driver of social and economic development at both national and regional levels in Ireland. Tourism is central to the government's economic recovery programme, with the focus on growing export earnings and employment through the sector. In 2011–2012 surveys, tourism and hospitality employed approximately 185,000 people and generated €5 billion in domestic and overseas spending.

As an island economy, the vast majority of international tourists (87.2%) arrive in Ireland via air transport.³¹ High quality access from the major international airports (Dublin, Shannon and Cork) to all parts of the country via the national transport network plays a significant role in contributing to tourism-led economic growth outside the major cities.

³⁰ EPA (2014), Ireland's Greenhouse Gas Emissions in 2012, EPA.

³¹ CSO (2013) CSO statistical release: Tourism and travel, Quarter 4 2013, CSO, Cork.

Transport and the agri-food industry

Also of significance for development at regional level is the Government's *Food Harvest 2020* plan which contains an ambition to increase agri-food exports by 42% to €12 billion by 2020. The quality of the road network and quality of access to international ports will be of significant importance in delivering this target, by ensuring efficient access to international logistics chains for the sector. Securing appropriate levels of investment and maintenance for the national and regional roads network, and in road access to international ports, is a priority for the framework. This investment will be key in enabling the projected growth in international agri-food exports.

5.4 Transport and health

The HSE's Framework for Action on Obesity (2011) noted that obesity was emerging as one of Ireland's most serious health problems. The European Charter on Counteracting Obesity includes 'promotion of cycling and walking by better urban design and transport policies' as one of the key elements of a package of essential preventative action. The relatively short average length of urban trips in Ireland represents a significant opportunity for modal shift to active travel modes. Research has demonstrated that there are significant health benefits to be gained from cycling regularly, and this applies even to people who are already active in sport and other physical activities.³²

5.5 Discussion and conclusions

A further key objective in recommending transport investment priorities, despite being primarily designed to respond to economic activity requirements, is to improve transport services and accessibility for all, including population groups vulnerable to social exclusion such as older people, particularly in rural areas, low-income households and people with disabilities.

Urban and rural responses

Capital investment in capacity increases will primarily be targeted at urban areas and their catchments, and developments and improvements to urban transport networks should benefit all social groups living in urban areas.

Taking account of existing settlement patterns and the limited extent to which significant change can be effected within the medium term, meeting rural travel demand through additional public transport capital investment will be prohibitively expensive and inefficient.

Recognising the necessary role of the road network and the private car, and the current strain on public funds, it is critical that a strategic regional road network is identified and maintained to an appropriate level.

Meeting the needs of vulnerable groups

Because transport represents a significant element of household expenditure in Ireland, taxation and pricing policy also needs to remain aware of the social impacts of affordability and lack of access to transport, which can particularly affect rural areas.

³² Anderson LB et al (2000), 'All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work', *Arch Intern Med*, 12;160(11): 1621–8; Rabl, A and Nazelle, A (2011), 'Benefits of shift from car to active transport', *Transport Policy*, Vol. 19: 121-131; Rojas, Rueda et al (2011), 'The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study', *BMJ*, Vol. 343.

All current and future transport project investment must incorporate accessibility for older people and people with disabilities as a core element of planning and construction.

Addressing environmental issues

The framework's impacts on environmental issues are captured through the Strategic Environmental Assessment (SEA) process, being carried out in accordance with the SEA Directive (2001/42/EC) and assessing the consistency of overall outcomes of transport investment governed by this framework with our environmental and biodiversity objectives and obligations.

The framework's recommendations balance the requirements for economic growth and emissions reduction from transport. In the medium term, economic growth needs to decouple from transport emissions growth. Key policy proposals to deliver a transport system with fewer emissions rely on reducing use of the private car, through for example, demand management and/or modal shift.

Supporting the tourism and agri-foods sectors

Transport has a significant role to play in the growth of many economic sectors, but particularly tourism and agri-foods, which are considered to have particular importance to the Irish economy and particular transport needs. Government targets for growth in these areas cannot be delivered without an efficiently functioning transport system and access to international seaports and airports with appropriate levels of investment.

Addressing population health

The role that a shift to active travel modes can play in furthering population health and tackling obesity and the opportunities for so doing afforded by shorter often urban trips are acknowledged.

SECTION C Towards a new framework

6. Identifying priorities and principles

This chapter begins with a discussion of the findings, which forms the basis for two key outputs of this report:

1. A series of **priorities**, or key issues that need to be addressed, regarding future land transport investment in Ireland, in a period of continuing constraints on the public finances; and
2. A series of **principles** that should underpin and frame all future investment in land transport in Ireland.

6.1 Discussion

Meeting increasing demand: An ongoing challenge

There was remarkable **growth in demand** for transport in Ireland from 1990 to 2008, with the number of people travelling to work almost doubling, car ownership increasing from 798,000 in 1990 to 1.88 million in 2008, and the commercial vehicle fleet also doubling.

This growth in transport demand was strongly coupled to economic and population growth. Spatial patterns and mode choice have been key drivers behind how transport demand has evolved. The growth of dispersed commuter belts, a marked increase in car ownership and use, and falling mode share for alternative modes are the most striking trends over the period.

Since 2008, there has been a **stabilisation of demand**, reflecting the changed economic circumstances. While future demand growth is unlikely to be as rapid as during that 20 year period, a return to economic growth coupled to our demographic trends suggest that further significant demand pressures will arise in the future.

Transport policy has consistently had a stated aim of promoting **modal shift** away from the car. This policy direction has been based on attempting to limit urban congestion, the high cost of providing additional road capacity to deal with ever increasing demand and, in terms of accessing urban centres, recognising that road capacity increases are not always the best solution and are sometimes almost physically impossible. However, implementation of this mode shift policy has to date proved unsuccessful, as trends show an ever increasing dependency on car-based travel.

The road network meets the overwhelming majority of travel need (catering for cars, buses, commercial vehicles, cycling and walking). This will remain the case even if policies to limit growth in car use are successfully implemented.

Similarly, to reduce travel distances, limit dispersed transport demand, and facilitate more efficient public transport provision, the effective implementation of national and regional land use policies has been recognised as key. However, the available evidence clearly shows that implementation to date has proved unsuccessful and that current spatial patterns remain very unfavourable to efficient and sustainable transport provision.

Transport investment is critical to economic growth

Transport investment yields an array of **benefits** and has been shown empirically to provide a good return on investment. Such investment is necessary for facilitating access to markets

and productivity gains and in general is most effective when it is focused on addressing key constraints.

Failure to invest in our transport network to meet the needs of enterprise and society as a whole will lead to long-term **costs** through reduced competitiveness and productivity. An inadequate and inefficient transport system creates costs for society, and acts as a barrier to economic growth. Increased transport demand and deficient or inappropriate supply inevitably leads to increased congestion, longer and less reliable journey times, higher costs and suppressed economic activity.

Transport projects can provide a good **return on investment**. Recent transport investment, through the National Development Plans 2000–2006 and 2007–2012, has led to major improvements in terms of the country's motorway network, the delivery of the Dublin Port Tunnel, upgrade of sections of the Atlantic corridor and various improvements to the public bus and rail systems. Reviews undertaken of sample projects – a key interurban motorway corridor (Dublin-Galway M4/M6) and a key urban public transport investment (the original two LUAS lines) – indicate that transport infrastructure investment in Ireland can yield a good return on investment, particularly with regard to LUAS. However, the achievement of such returns depends on prudent project choices.

Notwithstanding the recent improvements in our transport system, it continues to score relatively poorly in terms of our **global competitiveness ranking** according to the World Economic Forum (WEF). Efficiently meeting the transport needs of our economy is a key aspect of ensuring competitiveness. The enterprise development agencies have noted the need for further targeted investment in transport, particularly with regard to meeting the requirements of our export sectors, addressing urban congestion and outstanding roads deficits. The need to tackle urban congestion is identified as increasingly important in terms of maintaining and attracting service sector enterprise investment to Ireland.

Transport investment can mitigate some of the effects of peripherality but is not of itself sufficient to stimulate **regional growth** and productivity improvements. Such investment is likely to be most effective when it is made in the context of other supporting policies and measures, as part of an overall coherent regional development strategy. Moreover, it should be focused on addressing real productivity issues and output constraints and facilitating improved accessibility between regional centres and their hinterlands, as well as between regional centres themselves.

Appropriate scale of investment

Land transport investment in Ireland, with its resultant transport capital formation, has been highly **cyclical**. CSO statistics show that transport capital formation peaked in 2008 at €3.5 billion and by 2012, the most recent year available, had fallen to €1.2 billion. Expressed in terms of GDP this has meant a reduction in capital formation from 1.9% of GDP in 2008 to 0.72% of GDP in 2012.

The vast majority of transport capital formation occurs through **Exchequer investment**. The Exchequer allocation for land transport capital expenditure has fallen from a peak of €3 billion in 2008 to approximately €855 million in 2013. In GDP terms, Exchequer allocations stood at 1.64% of GDP in 2008 and fell to 0.52% of GDP in 2013. Present funding levels are, therefore, historically low.

Reviewing the historical level of transport capital formation in Ireland, the 50 year long-run average level of capital formation stands at 1.13% of GDP. Average transport investment levels for developed countries, for the period 1995-2007, were around 1.23% of GDP. More recently, the ITF have reported that 2011 OECD average investment levels in land transport were estimated to stand at 1% of GDP. This suggests that while our long-run average investment levels are consistent with **OECD levels**, existing funding levels are much lower than the OECD average. It is also important to note that, given we have made only limited investment in some parts of our transport network compared with our competitors, for example in urban public transport, funding above this average level would be required for us to improve our competitiveness in transport relative to other countries, which our WEF competitiveness ranking suggests is necessary.

Achieving land transport capital formation equivalent to our long-run average level of 1.13% of GDP per annum over the economic cycle suggests capital formation in the region of **€1.8 billion per annum**. This is based on GDP for 2013 and would need to increase in line with future GDP increases.

With regard to the level of Exchequer investment in transport, it is worth considering that **taxes on transport** represent a very significant revenue source. The cumulative taxation raised from excise, carbon tax, VAT on motor fuels, annual motor tax and vehicle registration tax peaked at an estimated €5.6 billion in 2008 and is currently estimated at €4.8 billion per annum. This compares to a total (current and capital) Exchequer spend on transport of around €1.32 billion at present.

Furthermore, **household expenditure** on transport represents a very significant proportion of household spending. The average household spends €116 per week on transport-related expenditure. This equates to total national household expenditure of around €10 billion per annum. This existing burden of taxation and level of household expenditure must be borne in mind when considering any potential for additional revenue-raising mechanisms within the sector.

An estimate of the **funding necessary to maintain a 'steady state'** transport system has been made. This is the funding necessary to maintain, manage and renew all of our existing transport infrastructure so as to keep it in an adequate condition, along with other capital commitments that the Exchequer is obliged to meet. However, it includes no provision for investment to increase capacity or build new projects beyond those already contractually committed and is also exclusive of the cost of subventing public transport services. This estimate shows a total funding requirement in the region of **€1.6 billion per annum**, of which the Exchequer element amounts to around **€1.3 billion per annum** before any additional infrastructure projects can be delivered.

A significant **gap** exists between the total present funding allocation for land transport and the funding levels required to maintain the existing system in adequate condition, even if all of the available funding is spent *only* on steady state.

Given the scale of the shortfall in funding, there is a need to examine **measures that could** address this shortfall. Identified options are:

- Increase the efficiency of our expenditure;
- Reduce the size of the funded road and rail network to a more appropriate scale;
- Reduce the required level of performance required of certain assets; and

- Increase the Exchequer allocation for transport and/or find alternative sources of funding.

The Department will seek from the agencies concerned an efficiency dividend of 5% over five years on steady state investment costs across all modes. However, **efficiency savings** cannot bridge the gap between the steady state requirement and the Exchequer funding allocation. Furthermore, alternative, additional sources of funding from taxation or user charging will be severely limited in the short to medium term. Consequently, there is a need to examine the size of the state-funded road and rail network.

Our **rail network** accounts for a disproportionate amount of steady state funding – almost 20% – compared to the level of demand it caters for: 1%–2% of passenger trip demand, 4%–5% of passenger kilometres and 1% of freight kilometres. It must be acknowledged that rail often provides social and economic benefits. It is recommended that a new rail policy, that addresses the future role of rail transport in Ireland from an economic and social viewpoint, is developed.

The identification of a **strategic road network** for priority maintenance will also play a key role in managing our constrained budgets. As national and regional roads account for 75% of traffic, the maintenance of these roads is important from a strategic perspective, to support economic activity across a range of sectors.

With regard to the non-strategic parts of the road network, **local authorities** are best placed to decide on the prioritisation of funding for the maintenance of those roads that are key to meeting local transport needs, although these roads will continue to be subject to major funding constraints. Consideration should be given to reducing the required level of performance on parts of the network in the context of an appropriate scale for the state-funded road and rail network and with the objective of achieving value for money on investment across the network.

Achieving a target of 1.13% of GDP suggests an annual investment of over €1.8 billion (based on GDP for 2013). The cost of maintaining the existing road and rail networks in the steady state funding described earlier is estimated at €1.6 billion, leaving only a net €200 million per annum available for all new investment. This funding level for new investment could be increased, at the most optimistically doubled, by the vigorous pursuit of **efficiency measures** from existing expenditure and a reduction in the extent of the transport network.

It is clear such funding levels would not allow the delivery of major infrastructural projects that would be required to meet our increased demand projections. For example, developing a high quality public transport system in urban areas and major new road projects would not be possible with such funding envelopes. Even with increased efficiencies and reduced costs through reductions in network extent and performance, there is a pressing need for an increase in the Exchequer allocation for transport. While clearly challenging in the context of current public finances, it is essential to protect the existing network and allow vital investment to facilitate demand growth support economic growth.

Following consideration of alternative funding sources, it is concluded that, even with private funding mechanisms, ultimately the cost must be borne through either Exchequer allocations, user charging or a combination of both. Exchequer funding remains essential-although it can be supplemented through such alternative sources.

Assessing travel demand

Transport demand growth will occur into the future. **Future demand** scenarios have been considered based mainly on a conservative growth scenario of the national population reaching 5.2 million by 2040. There will be significant growth in peak demand as the economy grows and more people are at work. A 5.2 million population in 2041 and a projected unemployment rate of 7% are expected to result in work commuting trips increasing by 35% from current levels. If such demand increases were coupled with a continuing trend towards long distance commuting and increased car use, our transport system would be placed under even further pressure.

Supply constraints will arise particularly on the principal corridors into and within our urban areas. Our analysis identifies a significant number of sections of corridors around our cities where traffic flow conditions are already under significant pressure; these will grow in scale and extent as the economy resumes growth. Satisfactorily addressing these will be of importance to our economy and our ability to attract investment. It must also be recognised that urban road congestion issues will be most pressing if the trends of increased car dependency continue.

Our cities represent major travel trip generators and attractors, yet smaller settlements and rural areas also generate much demand. Any successful future consolidation of growth would increase demand further in our urban areas, but other demand types will remain substantial.

Managing travel demand

Given expected demand growth over the period of this framework, better management of transport demand will be necessary to maintain the efficiency of our networks, reduce future investment needs and facilitate better provision in respect of sustainable modes (public transport, cycling and walking).

Spatial planning will be central to ensuring that future demand growth is of a type that can be catered for in an economically and environmentally sustainable way. Effective and mutually supportive land use and transport planning policy, in the form of national and regional frameworks, are key to the development of more sustainable communities, maximising the value of past transport infrastructure investment and ensuring the provision of more accessible and efficient public transport into the future. However, while the recently strengthened planning frameworks and new initiatives, such as any new national spatial planning framework, may help to ensure more sustainable future development, the reality is that the greater part of our existing development does not support the provision of a sustainable transport system.

Network management and technology can also play an important role in maximising operational capacity and minimising safety risks on our roads to ensure we get the most value out of what we already have.

It is likely that over the timeframe envisaged by this framework, and even with better spatial planning and appropriate public transport and walking and cycling provision, demand growth will erode the economic efficiency of our transport network, in particular in or near major urban areas. Demand management through **fiscal measures** – and specifically road user charging – may be necessary where it can efficiently address the issue. To secure the most efficient outcomes, any such pricing should be based on distance and time. In some

circumstances, for example where schemes are aimed at addressing urban congestion or environmental impacts, then additional or alternative factors may need to be considered.

The scope for such additional charges is currently limited by the existing burden of transport taxation and levels of household expenditure on transport. However, demand pricing schemes could also serve to refocus over time our excise-based transport taxes, the revenue from which will decline over time, while encouraging more sustainable travel behaviour. Where people have no or inadequate access to more sustainable transport, cost-effective alternatives will need to be provided in the event of pricing mechanisms being implemented. Investment in these alternatives could potentially be at least part-funded through those pricing mechanisms.

Integration with other policy objectives

Transport investment can support other important government policy objectives. Developments and improvements to urban public transport networks will benefit all social groups living in urban areas. However, **rural transport** demand makes up a very significant share of total transport demand in Ireland and good transport links will remain central to the success of the rural economy and society. Policy also needs to remain aware of the social impacts of affordability and lack of access to transport, which can particularly affect rural areas. Given dispersed origins and destinations, the provision of public transport to meet any significant proportion of rural travel needs is, in general, prohibitively expensive and inefficient.

The central role of land transport policy in supporting important government economic development objectives in the tourism and agri-food sectors lies in securing efficient access from airports to tourism destinations and to ports and markets for agri-food products. The strategic road network, maintained in an adequate condition, will continue as the key support.

Transport is a key sector contributing to **carbon emissions** and some reductions have occurred though reduced economic activity, improved road vehicle engine technology and the use of biofuels. Mode shift away from private car use has the potential to reduce emissions in urban areas. Improved demand management can also reduce transport emissions. It is essential, both from an economic and environmental perspective, that the environmental, including biodiversity, impacts of transport are fully reflected in decision making.

The role that a shift to active travel modes can play in furthering **population health** and tackling obesity and the opportunities for so doing afforded by shorter often urban trips are acknowledged.

Implementation challenges

A key finding of this work is that present transport **capital funding** levels are not sufficient to maintain our existing network. Moreover, they leave no scope for network improvements, highlighting the challenge of ensuring more appropriate funding levels in the future.

Work has commenced, led by the Department of Public Expenditure and Reform, on revisiting and updating the existing **Multi-Annual Capital Investment Framework 2012–2016** (now at mid-term) to develop ceilings to 2019. This work provides the key land transport input to that review.

Transport priorities, established as part of a revised spatial planning national and regional framework considered in conjunction with the priorities and principles set out here, should form the central basis for identification of the land transport component of the multi-annual capital investment framework to commence in 2020 and any thereafter.

Given the finding that funding levels are not sufficient to adequately maintain the full extent of the road and rail network, an assessment must now be made of the appropriate scale of network that can be maintained and yield best value for money. A new **rail policy** will be developed, which will answer key questions regarding the most appropriate extent of the network in the context of funding levels and ensuring value for money. Local authorities will assist in the process of identifying roads of strategic importance to be prioritised for maintenance.

In any move to fund **regional and local roads** at a local level, it is important that the strategic nature of key roads, within the context of a land transport network, be recognised and some oversight role be retained by DTTaS to ensure that local investment priorities are aligned with national policy objectives.

To ensure effective integration between land use and transport planning, the key interface between transport investment in line with this framework and the planning system begins at the national level. Evidence and findings presented here will form key inputs to any new **national spatial planning framework**, informing and thereby strengthening the practical underpinnings of its transportation aspects.

The preparation of **regional transport strategies** should be undertaken by the NTA, either as stand-alone strategies or as a key input to the regional, spatial and economic strategies, to ensure that future transport investment has maximum effect and that there is optimum co-ordination between transport and wider spatial and development policies.

Expenditure of public funds on transport needs to be carefully evaluated. All investment proposals should be subject to comprehensive and rigorous **appraisal** taking account of all costs and all benefits in accordance with a robust and published methodology. Appraisal outcomes, prepared consistently and incorporating the consideration of alternative options (including non-infrastructure options) and appraisal on a corridor basis, will provide the primary basis for ranking investment proposals.

Regional transport strategies should include an assessment of corridor demand and specific project appraisal should address how this demand is best met with all viable options considered.

6.2 Priorities for future investment

This report has shown that present funding levels are not sufficient to maintain our existing land transport network. Furthermore, there is essentially no scope for investment in infrastructure improvements that will be vital to cater for future demand growth and support competitiveness and economic growth. Therefore, the key challenge with regard to future investment in land transport is the need to attain funding levels that are consistent with maintaining, renewing and improving an appropriate transport network that can efficiently support the economic and social needs of the country. **Restoring transport capital funding to such a level is an overarching imperative.**

Priority 1: Achieve steady state maintenance

The first priority for future investment will be the steady state maintenance of the strategically important elements of the land transport system. This covers the maintenance and renewal expenditure required to keep the system in an adequate condition. Those elements of the system to be considered as strategically important will be identified by local authorities in respect of roads and by the proposed rail review before the end of this year. Efficiencies in infrastructure maintenance and management must be driven continuously to ensure that the value of this investment is maximised.

Priority 2: Address urban congestion

The next priority for future investment will be measures to address urban congestion and to improve the efficiency and sustainability of urban transport systems. This will be guided by demand/capacity assessments and will recognise the role of urban centres as key drivers of economic activity, nationally and regionally. The priority measures to be funded will include:

- Improved and expanded public transport capacity;
- Improved and expanded walking and cycling infrastructure; and
- The use of ITS to improve efficiency and sustainability and to increase the capacity of existing urban transport systems.

Investment in measures to improve the quality and time competitiveness of alternatives to the car can play an important role as a driver of modal shift and will be provided with funding support. Demand management measures may be necessary to maximise the value of our transport infrastructure and to manage urban transport demand. To receive funding, projects must be implemented in conjunction with supportive spatial planning policies.

Priority 3: Maximise the value of the road network

The value of the road network will be maximised through targeted investments that:

- Enhance the efficiency of our existing network, particularly through the increased use of ITS applications;
- Improve connections to key seaports and airports and poorly served regions and complete missing links;
- Support identified national and regional spatial planning priorities;
- Provide access for large-scale employment proposals; and
- Address critical safety issues.

As national and regional roads account for 75% of traffic, the maintenance of these roads is important from a national policy perspective to **support economic activity** across a range of sectors. The proposed devolution of funding for regional and local roads to local authorities must, therefore, be accompanied by concrete mechanisms for ensuring compliance with national policy objectives in the selection of local investment priorities.

Importance of a strategic and longer-term planning approach

The economic downturn has meant that some major planned road and rail investments have been deferred, most notably Metro North, DART Underground and the M20. It is highly unlikely that a transport capital allocation will be available in the medium term to fund these

projects, or to finance a private funding arrangement. Furthermore, there is a very high opportunity cost in delivering a single large project as opposed to investing across the network. Additional public transport capacity requirements for the greater Dublin area will, therefore, be met in the medium term through investment in **lower-cost alternatives**. Failure to meet demand increases through public transport investment will carry the risk of an acceleration of past trends of ever increasing car use.

Recognising the inefficiencies of cyclical investment patterns and the long lead-in times required for the delivery of transport projects, early planning and five-year minimum budgetary cycles are essential. The timeframe for planning major projects generally exceeds 10 years and it is already too late to start planning when increased congestion or a capacity constraint becomes a reality. Funding will be provided to permit the timely planning of projects that are consistent with the principles and priorities set out in this document.

All investment proposals will be subjected to comprehensive and rigorous appraisal taking account of all costs and all benefits in accordance with a robust and published methodology. Appraisal outcomes, prepared on a consistent basis, will provide the basis for ranking investment proposals and deciding on investment priorities. To be eligible for Exchequer funding, projects will have to be consistent with the transport investment priorities and principles set out here and aligned with national and regional development priorities.

6.3 Principles for land transport investment

In order to maintain the transport network and provide for some limited investment to address additional demand, capital investment in land transport should at a minimum be restored to and maintained at its long run average level of 1.1% to 1.15% of GDP per annum (circa €1.8 billion, based on 2013 GDP).

The foremost priority for land transport funding should be the maintenance and renewal of identified strategically important elements of the existing land transport system, so as to protect earlier investment and maintain essential functioning.

The second key priority for future investment involves measures to address current and future urban congestion including, in particular, improved public transport and additional public transport capacity, better and additional walking and cycling infrastructure, improving efficiency and increased use of ITS. Any further investment in additional road capacity needs to focus on:

- Improving strategic access to major seaports and airports;
- Supporting any identified national or regional spatial planning priorities (including improving access to currently poorly served regions);
- Providing necessary access to support significant employment opportunities; and
- Undertaking essential safety works.

Any successor to the NSS must deliver land use policies and practices that support and maximise the value of investment in a more sustainable transport network. To receive funding, transport projects must be implemented in conjunction with the implementation of supportive national and regional spatial planning policies, along with other demand management measures where appropriate.

The overall outcomes of transport investment, as governed by these principles, should maintain and improve the quality of life of our citizens and be consistent with our environmental and biodiversity objectives and obligations, including those arising from the EU Habitats Directive.

7. Implementation

For this framework to be effective in policy making and implementation, the priorities and principles outlined in Chapter 6 must be reflected in both transport investment decisions, and indeed wider policy choices concerning adding to our network capacity and how we use our existing network. This chapter considers issues relating to implementation:

- Accessing sufficient funding levels;
- Deciding the appropriate scale of the road and rail network;
- Integrating land use and transport planning;
- The important role of appraisal and evaluation; and
- Transport policy development.

7.1 Size of the funding envelope

The development of a strategic framework for investment in land transport was intended, in the short to medium term, to underpin the land transport element of the next government capital programme, expected to run from 2017 to 2021, and over the longer term to provide the framework for decision making on the appropriate quantum and type of public expenditure on land transport.

One of the key findings of this work is that present transport capital funding levels are not sufficient to maintain our existing network and leave no scope for network improvements. Therefore, a key challenge will be to ensure more appropriate funding levels in the future.

Work has commenced, led by the Department of Public Expenditure and Reform, on revisiting and updating the existing Multi-Annual Capital Investment Framework 2012–2016 (now at mid-term) to develop ceilings to 2019. One of the objectives of this work is to ensure that capital investment, 'is in line with emerging government priorities and continues to focus our limited resources on the areas that can best support continued, sustainable and equitable growth' and that contractual commitments and necessary care and maintenance of existing stock are identified to be prioritised over new or additional investment projects. A final comprehensive expenditure report will be published alongside Budget 2015 and this work will provide the key land transport input to the review.

However, the time horizon of our analysis and investment priorities extends beyond the next multi-annual capital investment framework. The further work we have proposed, to specify the appropriate scale of the land transport network to be maintained, will be undertaken as early as possible. A new national spatial planning framework could be adopted by 2015 with new regional, spatial and economic strategies in 2016. Regional transport investment priorities should be identified and integrated with these regional development strategies, in line with the framework provided by these principles. The following factors should form the central basis for consideration of the land transport component of the multi-annual capital investment framework to commence in 2020, as well as those thereafter: the transport priorities established as part of that work; a review and update of the analysis undertaken in preparing this framework; and trends and developments over the intervening years,

7.2 Decisions on the appropriate scale of the network

Given the finding that funding levels are not sufficient to adequately maintain the full extent of the road and rail network, an assessment must now be made of the appropriate scale of network that can be maintained and yield best value for money.

The scale of capital funding, and current subvention for rail transport points to the need to consider the appropriate scale of and performance levels on the rail network. A new rail policy will be developed as early as possible, which takes a view on the future role of rail transport in Ireland based on transport needs, safety, commercial realities and current indications of available funding.

Similarly, consideration of the appropriate scale of the road network to be funded by central government is necessary. Local authorities will be required to identify and submit for approval their road networks of strategic priority, using criteria established by DTTaS. Available funding should then be prioritised to maintain this strategic road network. With regard to the non-strategic parts of the road network, local authorities are best placed to decide on the prioritisation of funding for the maintenance of those roads that are key to meeting local transport needs.

For regional and local roads, arrangements regarding how these roads are funded may be subject to change following final decisions on local property tax (LPT) proceeds. In any move to fund regional and local roads at a local level, it is important that the strategic nature of key roads, within the context of a land transport network, be recognised and some oversight role be retained by DTTaS to ensure that local investment priorities are aligned with national policy objectives. Such supervision should include guidance on approaches to road maintenance and systems for monitoring and reporting on the condition of the network.

7.3 Integration of land use and transport planning

To ensure effective integration between land use and transport planning, the key interface between transport investment in line with this framework and the planning system begins at the national level and, specifically, through the National Spatial Strategy.

The current NSS was published by Government in 2002 with proposals for its successor expected to be advanced during 2014. A new national spatial planning framework will also set a strategic, national context for the proposed new regional, spatial and economic strategies to be prepared by the three new regional assemblies as replacements for the current regional planning guidelines (RPGs), which expire at the end of 2016.

The ongoing and close collaboration between the Department of the Environment, Community and Local Government and the Department of Transport, Tourism and Sport in the development and undertaking of this framework is expected to continue during the development of a new national spatial planning framework. The evidence and findings here will form key inputs to the new national spatial planning framework, informing and thereby strengthening the practical underpinnings of its transportation aspects by providing a reference framework for the determination of strategic priorities from a spatial development perspective.

It is likely that the regional, spatial and economic strategies will, as with the previous RPGs, play an important part in translating the broad national level spatial planning objectives into

more actionable development objectives and requirements at the level of the local authority statutory development plan.

Effective integration is a two-way process and certainty in the investment planning process is a key mechanism to ensure that spatial/land use and transport planning are aligned. A capital investment plan can become a determining influence on the spatial planning process. Although a transport strategy for the greater Dublin area has been prepared by the NTA, consistent with land use policy, no adequate mechanisms are in place for the other cities or for their wider regions.

Development of capital investment proposals for transport infrastructure outside of the greater Dublin area and regional cities has been a matter for other mode-specific bodies, such as the National Roads Authority and Iarnród Éireann, leading perhaps inevitably to the development of mode-specific proposals rather than a more integrated approach.

It is recommended that the preparation of regional transport strategies be undertaken by the NTA, either as stand-alone strategies or as a key input to the regional, spatial and economic strategies, to ensure that future transport investment has maximum effect and that there is optimum co-ordination between transport and wider spatial and development policies. These strategies should have a similar statutory footing to the GDA transport strategy.

7.4 Key role of appraisal

Expenditure of public funds on transport needs to be carefully evaluated. All investment proposals should be subject to comprehensive and rigorous appraisal, taking account of all costs and all benefits in accordance with a robust and published methodology.

This framework establishes the overall principles guiding expenditure decisions in transport over the longer term. Under this framework, investment programmes will be developed regionally with the framework priorities and principles providing a standard against which the Department will assess those plans.

There is an existing comprehensive framework in place for appraising investment in transport projects. The Department of Public Expenditure and Reform (DPER) sets the overall structure for ensuring that all public expenditure is properly appraised and provides value for money in the Public Spending Code. The DTTaS sets out further detailed guidance for the appraisal of transport projects. In addition, key transport agencies have developed their own appraisal guidance documents.

The Department's transport appraisal guidance (TAG) is currently being reviewed and updated. This review will update many of the parameter values used in a cost-benefit analysis. It will provide detailed appraisal guidance in a number of new and important areas (e.g. sustainable transport modes), increase the transparency of the appraisal process and reduce the level of discretion in appraisal. The role of this revised appraisal framework will be to ensure that only projects that demonstrate a well thought out need, offer a high return on scarce public resources, and are consistent with these framework principles will be considered for funding support.

Appraisal outcomes, prepared consistently and incorporating the consideration of alternative options (including non-infrastructure options) and appraisal on a corridor basis, will provide the primary basis for ranking investment proposals. Those proposals, in turn, will already have been developed in accordance with the framework principles and will be consistent

with national spatial development priorities and regional transport strategies. In essence, the case for investment should originate in regional transport strategies – themselves consistent with the principles of this strategic framework and national spatial development priorities. Regional transport strategies should include an assessment of corridor demand. Specific project appraisal should address how this demand is best met, with all viable options considered.

7.5 Transport policy development

The analysis of the land transport sector undertaken as part of this work, in addition to the development of investment priorities, arrived at conclusions and recommendations across transport policy including the role of demand management and ITS, addressing rural transport needs. It also refers to aviation and shipping policies and climate change mitigation and biodiversity policies. This analysis, and any conclusions arising from it, will play a key role in future transport policy development.

Annex 1 International environmental and energy obligations

The overall outcomes of transport investment governed by this framework should be consistent with our environmental, biodiversity and energy use objectives and obligations.

Noise policy

The EU Environmental Noise Directive (2002/49/EC), relating to the assessment and management of environmental noise, aims to provide a common framework to avoid, prevent or reduce on a prioritised basis, the harmful effects of exposure to environmental noise.

Under the directive, member states are required to undertake noise mapping every five years. The first round of strategic noise mapping in Ireland was completed in 2007 and noise action plans were required covered the period 2008–2012. The second round of strategic noise mapping was completed in 2012 and noise actions plans cover the period 2013–2018. The third round of strategic noise mapping will be completed in 2017.

Biodiversity

Ireland has a rich and varied natural heritage, which has an importance to the social and economic fabric of Ireland far beyond scientific interest. As a signatory to the Convention on Biological Diversity (CBD), Ireland is committed to protecting our biodiversity and has developed a national biodiversity strategy and action plan, which follows on from the EU's biodiversity strategy.³³ It aims to prevent and eliminate the causes of biodiversity loss and maintain and enhance current levels of biodiversity. These strategies are underpinned by EU and national legislation.

At the top of the hierarchy, and forming the cornerstone of Europe's nature conservation policy, are the [EU Birds Directive](#) and [EU Habitats Directive](#). Together they give effect to the [Natura 2000 network](#) of protected sites and a strict system of species protection. The Natura 2000 network provides an ecological infrastructure for the protection of sites that are of particular importance for rare, endangered or vulnerable habitats and species within the EU and include both special areas of conservation (SAC) and special protection areas (SPA).

These directives have been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011, which consolidates the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats)(Control of Recreational Activities) Regulations 2010.

Other related EU directives include the [EU Floods Directive](#) and the [EU Water Framework Directive](#). The framework for investment in land transport is being prepared within the framework set out in these strategies and legislation for the protection of biodiversity.

As required, appropriate assessment screening under the EU Habitats Directive [92/43/EEC] shall be undertaken for all policy documents such as plans, strategies and implementation programmes for which funding is prioritised in accordance with this framework.

Energy use in transport policy

At a national level, the 'National energy efficiency action plan 2009–2020' (DCENR, 2009) and 'Ireland's second national energy efficiency action plan to 2020' (DCENR, 2012) set out

³³ Department of Arts, Heritage and the Gaeltacht (2011), Actions for bio-diversity 2011–2016.

Ireland's continued progress towards a more sustainable and energy-efficient transport sector, in particular through promoting improved technology and actively supporting changes in travel behaviour.

Ireland has fully endorsed the objectives of the EU's strategy, 'Energy 2020 – A strategy for competitive, sustainable and secure energy'. At an EU level, the Renewable Energy Directive (2009/28/EC) mandates that 20% of energy generated in the EU must come from renewable energy sources. Each EU member state has legally binding targets they must reach. As such, Ireland must reach a mandatory 16% of gross energy to be sourced from renewables by 2020, with the transport sector renewables target set at 10%.

The Energy Efficiency Directive (2012/27/EU) (amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC) establishes a framework of measures to also promote energy efficiency within the EU.

Annex 2 Glossary

Brownfield site	Land previously used for industrial purposes or some commercial uses.
Benefit–cost ratio	A benefit–cost ratio (BCR) indicates the amount of benefits returned for each euro invested. For example, a BCR of two indicates that benefits accrue over the lifetime of the infrastructure that comprise twice what it costs.
Cost–benefit analysis	A formal appraisal of the impacts of a measure of a programme. It is designed to assess whether the advantages (benefits) of the intervention are greater than its disadvantages.
Greenfield sites	Undeveloped or agricultural land that has potential for urban development.
Fixed Capital Formation	The net increase in physical assets (investment minus disposals) within the measurement period. It does not account for the consumption (depreciation) of fixed capital, and also does not include land purchases.
Heavy rail network	Intercity, commuter and freight train infrastructure.
Lift-on/lift-off (Lo-Lo)	Freight and cargo that is containerised and loaded and offloaded by a port's cranes and derricks
Roll-on/roll-off (Ro-Ro)	Freight and cargo that is carried on vehicles and driven on and off ferries, trains or airplanes
Steady State Requirement	An estimate of the cost of maintaining land transport infrastructure at its current standard together with capital commitments which the Exchequer is obliged to meet arising from existing contractual agreements

Annex 3 List of Background Papers

Paper No.	Document Title	Most Relevant Chapter
1	Mandate and Timeframe	N/A
2	SFILT Objectives	N/A
3	Proposals for Workstreams	N/A
4	Travel Demand Discussion Note	1
5	Population, Economic Growth and Demand	1
6	Transport Infrastructure Investment and Economic Growth - A Review of Evidence	2
7	The Regional Development Impacts of Transport Infrastructure	2
8	Impact of Previous Investment	2/3
9	Wider Economic Impacts Case Studies	2/3
10	An Examination of Historical Trends and International Benchmarking Exercise	3
11	Transport Taxation Revenue and Allocations - Profile of Major Transport Revenue Sources	3
12	Alternative Funding and Delivery Models for Land Transport in Ireland	3
13	Steady State Cost	3
14	Demand Side Initiatives	4
15	Demand Management Discussion Note	4
16	Future Road Needs	4
17	Regional Breakdown of Road Expenditure	3
18	Land Transport Priorities for Enterprise	5
19	Climate Change - Background and Context	5
20	Spatial Planning Background and Discussion Paper	5
21	A New Transport Appraisal Framework	7