Long Term Planning Process: Freight Market Study

October 2013

NetworkRail

What's inside this document

Foreword

Introduction

I am pleased to introduce the Freight Market Study, which follows the Freight Market Study Draft for Consultation, published in April 2013.

The Freight Market Study, together with the Long Distance Passenger, London & South East Passenger and Regional Urban Passenger Market Studies, set out how demand for freight and passenger movements by rail are expected to change in each of these markets in Great Britain up to and including the next 30 years.

The Freight Market Study looks at each of the freight market sectors in turn, setting out how each sector, for example intermodal, coal, and the developing market of biomass, have changed and developed in recent years, and how they might be expected to change in the future. Overall, the study finds that rail freight is expected to continue to grow strongly. Total freight traffic, in terms of tonne kilometres moved, is forecast to increase at an average of 2.9 per cent per annum through to the year 2043, implying that the size of the market more than doubles over this period. This particularly reflects expected growth in the intermodal and biomass sectors.

Publication of the Freight Market Study Draft for Consultation provided the opportunity for a wide range of end users in industry, as well as any other interested parties, to comment on the forecasts set out in the Draft for Consultation. All responses have been reviewed and they have significantly strengthened this study through provision of a wide range of views as to how the freight market has, and could, change in the future through both industrial developments and changes in the wider economy.

The Freight Market Study has been developed jointly with the wider rail industry including the Association of Train Operating Companies, DB Schenker Rail (UK), Department for Transport, Direct Rail Services, Freight Transport Association, Freightliner, GB Railfreight, Office of Rail Regulation, Rail Freight Group, Transport Scotland and the Welsh Government. It has benefited from the wider engagement with the Rail Delivery Group's Planning Oversight Group and the Rail Industry Planning Group. I would like to take this opportunity to thank all those who have contributed to the development of this study.

The next stage in the process is the development of a series of Route Studies, which will develop options to deliver the conditional outputs, across the four markets, in each of Network Rail's devolved routes, and test them against funders' appraisal criteria.. The output will be a series of choices for our funders to consider.

I look forward to continuing to work with the rail industry and wider stakeholders on the next stages of the Long Term Planning Process.

Paul Plummer

Group Strategy Director

Executive Summary

Introduction

The rail industry has changed the way it approaches long term planning. The new Long Term Planning Process (LTPP) is designed to enable the industry to take account, and advantage of, long term strategic investment being made in Great Britain's rail network. This document, the Freight Market Study, is a key element of the LTPP. When established, with the other Market Studies, it will form a key input to route planning and investment decision making over the next 30 years.

Scope and Context

Increasingly, long term strategic investments are being made in the rail network. These include plans for the development of a high speed line between London, Birmingham, Leeds and Manchester, implementation of modern signalling systems, development of the Strategic Freight Network, and electrification of significant parts of the system.

The balance of funders' objectives has changed, both in the light of the tighter fiscal environment brought on by economic uncertainty and as a result of the 'Rail Value for Money Report' (McNulty report), published in May 2011. This has led to an increasing focus on making best use of the rail network, and Governments are seeing an increasing role for rail in supporting economic activity.

The LTPP has been designed to take these changes into account; building on work completed in the preceding Route Utilisation Strategy process, and will enable an informed view to be taken of the role of rail in the economic life of Great Britain. Planning over 30 years clearly involves uncertainties. However the LTPP approach is designed to take into account strategic change in the economy, and Great Britain's approach to social and environmental responsibility, so that the rail industry can respond to change over the long term life of the assets used to operate the rail network.

There are three key elements to the LTPP:

- Market Studies. These will articulate strategic goals for each particular market sector, forecast future rail demand, and develop conditional outputs
- Cross-Boundary Analysis, which will consider options for services that run across multiple routes
- Route Studies, which will develop options for future services and for development of the rail network.

The LTPP will provide a key part of the evidence base for future investment in the rail network.

Four Market Studies have been published:

- Long Distance passenger
- London & South East passenger
- Regional Urban passenger
- Freight.

It is important to emphasise that each Market Study will consider a particular market, rather than a particular set of train services. The outputs from the market studies will be conditional on both affordability and a value for money business case being determined.

This Freight Market Study includes demand forecasts over a 10, 20 and 30 year planning horizon, with preferred routeing of services and the implied requirements in terms of network capacity and capability.

Further information on the Long Term Planning Process can be found on Network Rail's website at **www.networkrail.co.uk**.

Study Approach

The Freight Market Study has looked at the overall freight market in Great Britain and has produced demand forecasts for freight over a 10, 20 and 30 year planning horizon, which will enable the freight market to be considered in the same planning timescales, and at the same level of detail, as the passenger market. The study includes preferred routeing of services and the implied requirements in terms of network capacity and capability. Scenarios are used to reflect market uncertainties.

The work to produce this study has been overseen by a Working Group comprising rail freight operators, the Rail Freight Operators Association, funders and central Governments, the Association of Train Operating Companies and the Office of Rail Regulation. The Working Group has reviewed the development of the study at key points, and has provided support and strategic guidance through a significant number of bilateral discussions.

The Freight Market Study was published as a Draft for Consultation in April 2013 and attracted a wide range of responses. In general, respondents expressed support for the Long Term Planning Process and welcomed the rationale for examining the various markets. In particular comments were received which indicated that further consideration should be given to a number of the forecasts presented. As a consequence the Working Group has undertaken further analysis on a number of sectors and this is presented in Chapter 4. Other responses suggested a number of new markets that the rail freight sector may wish to exploit – these are detailed in Chapter 6.

Freight Market

The story of rail freight since privatisation is one of success. Since the mid 1990s, rail freight, measured in terms of tonne kilometres, has increased at about 2.5 per cent per annum. Rail freight has also performed well following the recent recession, with both tonnes and tonne kilometres increasing between 2009 and 2012.

Recent years have seen a continuation of structural change in the rail freight market which first became evident just over a decade ago. Great Britain's manufacturing industry is in long term decline – in common with many other Western nations – and Great Britain has become an economy which imports a wide range of goods. This has affected rail freight in two ways over the last decade:

- traditional bulk markets for rail, such as domestically based coal and steel production, have diminished substantially
- the import of goods through major ports, particularly involving freight from the Far East, has increased greatly, and the handling of these goods has been dominated by growth in the trend towards containerisation.

The net effect of these changes in production, consumption and logistics has been that containerised (that is, deep sea intermodal) freight, mainly consisting of consumer goods, has become the single largest commodity conveyed on rail. Domestic flows of consumer goods to and from major terminals like Daventry have contributed to the predominance of intermodal rail freight.

For rail to make this structural change it had to convert itself from a mode dominated by the bulk haul of relatively low value goods to a market increasingly influenced by fast moving consumer goods (FMCG). In order to penetrate the FMCG market, rail has had to seek lower margin business in strong competition with road hauliers. This has required step changes to productivity and service standards – which rail has negotiated successfully, gaining market share against road.

Freight forecasts

The forecasts contained within this Freight Market Study are based upon a thorough understanding of the freight market. For each sector, forecasts are provided for the financial years 2023, 2033 and 2043. For the purposes of the Long Term Planning Process, forecasts for all three future years are required. In this document, forecasts are presented for these three years, but for some of the analysis, for example the market share analysis and the scenarios, the average annual growth rates focus on the period to 2033, to illustrate trends during the forecast period.

The intermodal sector covers three sub-sectors, containerised traffic to and from the ports (ports intermodal), traffic between inland terminals (domestic intermodal) and traffic through the Channel Tunnel (excluding traffic using the HGV shuttle service). Strong growth is forecast for this sector. The forecasts show average annual growth to 2043 of approximately 6 per cent, in terms of tonne kilometres. This reflects growth of about 5 per cent per annum for the ports and Channel Tunnel sub-sectors, and 10 per cent per annum for the domestic sub-sector. The overall growth reflects forecast trade growth and an improvement in the competitiveness of the rail industry. This improvement in competitiveness reflects the forecast growth in fuel and labour costs. To reflect the uncertainties surrounding these forecasts, higher and lower scenarios are also presented.

The Electricity Supply Industry (ESI) coal sector covers coal used by power stations. The forecasts are based on the Department of Energy and Climate Change (DECC) projections of energy use, which were published in October 2012. They show a projected decline in coal and a rise in gas, renewables and nuclear, between 2011 and 2030. The projected fall in coal, relative to a 2011 base, is 74 per cent by 2023 and 90 per cent by 2030. The forecasts for rail traffic related to ESI coal reflect these projections.

The biomass sector also covers fuel used by power stations. The sector has only emerged as being potentially significant for rail over the last three years. Biomass has enormous potential to grow as a rail market and major investment is already taking place in rail based supply chains. However, there is considerable uncertainty around the volume of biomass likely to move on rail to fuel power stations and a number of generators are still developing their strategy for this sector. Working assumptions for the forecasts are based on electricity industry announcements to date and an assessment of Government policy. A central estimate of 14 million tonnes or 2.3 billion tonne kilometres is presented for 2023, as a working assumption. To reflect uncertainties, higher and lower scenarios for 2023 are also presented. The 2023 forecasts are assumed to apply to 2033 and 2043. These scenarios will be reviewed in the course of the LTPP in order to refine planning assumptions.

The forecasts for the other market sectors indicate much less change than for the intermodal, power station coal and biomass sectors.

For the construction materials sector, growth of approximately one per cent per annum to 2043 in tonne kilometres is forecast. This reflects growth in the total (road and rail) market for construction materials and an improvement in the competitiveness of the rail industry. This improvement in competitiveness reflects the forecast growth in fuel and labour costs.

For the metals, petroleum, chemicals, industrial minerals and automotive sectors, growth of between about 0.5 and 1 per cent per annum to 2043 in tonne kilometres is forecast, reflecting improvements in the competitiveness of rail. No change in the total market is forecast for these sectors.

For the other sectors, iron ore, non-power station coal and domestic waste, changes to markets may take place but the volume of business carried on rail is not expected to vary significantly.

Overall forecast freight growth is for an increase in total tonne kilometres of 2.9 per cent annual growth to 2043, compared to annual growth of about 2.5 per cent since the mid 1990s. In terms of total tonnes lifted, the forecast is for 2.0 per cent annual growth to 2043, compared with the recent trend of broadly stable tonnage. The growth rate in terms of tonnes is lower than that for tonne kilometres as a result of changes in the composition of traffic, such as the reduction in coal flows and the increase in longer distance intermodal flows.

Freight Routeing

Freight flows have been mapped onto the Network for the three forecast years 2023, 2033 and 2043. In many cases the routeing assumptions that have been developed by previous Route Utilisation Strategies have not changed and in these circumstances the existing assumption have been set out and used to inform the Freight Market Study.

There are some flows where the routeing assumptions have required some review, principally in relation to the developments of strategic investment schemes such as East West Rail and High Speed Two.

Maps in Chapter 5 set out the summary number of off-peak train paths per hour for the various market sectors within the study. The forecast freight train paths per hour for 2043, will, along with the conditional outputs from the passenger market studies, be the starting point of the forthcoming Route Studies and Cross Boundary Analysis.

01 Background

Introduction

Since the start of the RUS programme in 2004 there have been changes in administrations in England, Wales and Scotland and there have been changes in planning policy context.

Freight and passenger trains on the intensively used West Coast Main Line.

1.1 Background to the development of the Long Term Planning Process

In June 2005 the Office of Rail Regulation (ORR) modified Network Rail's network licence to require the establishment and maintenance of Route Utilisation Strategies (RUSs), for the use and development of the network consistent with the funding that is, or is likely to become, available. This modification to the Network Rail network licence followed the Rail Review in 2004 and the Railways Act 2005.

The geographic RUS programme led by Network Rail commenced in late 2004 and a suite of strategies were produced covering the whole of the country, culminating in the establishment of the West Coast Main Line RUS in August 2011. As the network licence requires the maintenance of RUSs, the completion of the initial programme of geographic RUSs gave the opportunity to review how best to discharge this requirement in the future. Since summer 2011, Network Rail and the industry have worked to develop a revised methodology to the RUS process to continue to develop the long term strategic direction of the rail network. This successor programme, the Long Term Planning Process, was endorsed by the ORR in April 2012.

1.2 Changes of context

Since the start of the RUS programme in 2004 there have been changes in administrations in England, Wales and Scotland and there have been changes in planning policy context.

Long term strategic investments are being made in the rail network rather than tactical solutions to individual problems – examples include the development of a high speed line between London and Birmingham and beyond to Leeds and Manchester (HS2), investment in freight routes through the development of the 'Strategic Freight Network', electrification of significant route mileage, Crossrail, changes to signalling technology through deployment of the European Rail Traffic Management System (ERTMS) and development of the Network Rail Operating Strategy. Therefore, there is a need for the industry to consider network-wide long term infrastructure development rather than 'as now plus isolated enhancements' to the rail network.

This will also need to inform maintenance and renewal strategies in both the short and medium term.

The balance of funders' objectives has also changed in the light of a significantly tighter fiscal environment and the conclusions from the 'Rail Value for Money' report published by Sir Roy McNulty in May 2011. Indeed, the Rail Value for Money report explicitly recommends that rail planning should place more emphasis on making best use of the existing network, before considering further infrastructure investment. All administrations see greater emphasis on the role of transport in supporting the economy, for example by widening access to labour markets and by improving connectivity between businesses.

Network Rail has recently restructured to become more accountable to its customers with the creation of ten devolved Routes to enable greater local decision making.

In the context of these changes, the RUS process required updating as it needs to consider step changes in services, for example to look beyond existing service patterns running across several RUS areas, to take into account developments such as the Strategic Freight Network, including gauge clearance works, and other investments such as HS2 and electrification, which give opportunities for step changes in train service, not only on the parts of the network directly affected, but well beyond.

1.3 Long Term Planning Process overview

The Long Term Planning Process consists of a number of different elements, which when taken together, seek to define the future capability of the Network. The individual elements are detailed below:

- Market Studies, which will forecast future rail demand, and develop 'conditional outputs' for future rail services, based on stakeholders' views of how rail services can support delivery of the market's strategic goals
- Route Studies, which will develop options for future services and for development of the rail network, based on the conditional outputs and demand forecasts from the market studies, and assess those options against funders' appraisal criteria in each of Network Rail's devolved Routes

- Cross-Boundary Analysis, which will consider options for Freight and Passenger services that run across multiple routes to enable Route Studies to make consistent assumptions in respect of these services.

The Market Studies, Route Studies and Cross-Boundary Analysis are described in further detail in **Sections 1.4**, **1.5** and **1.6** below.

The Long Term Planning Process (and in particular the Route Studies) will provide a key part of the evidence base for future updates of the Network and Route Specifications which bring together all the medium and long term plans for the development of a route, drawing on sources including RUSs, renewal plans, development of major projects and resignalling programmes.

In addition, the existing Network RUS process will continue to look at network-wide issues, for example, electrification. Further information on the Long Term Planning Process, the current Network and Route Specifications and the Network RUS can be found on the Network Rail website at **www.networkrail.co.uk**.

1.4 Market Studies

There are four Market Studies: Long Distance, London and South East, Regional Urban, and Freight.

The three passenger market studies have obvious connections to the three 'sectors' into which passenger train services are often divided, and will consider a particular passenger market, rather than a particular set of train services.

This Freight Market Study considers the rail freight market in Great Britain such that information on future freight demand is available alongside the passenger market studies on a consistent basis, and for the same forecast future years.

The aim of the market studies is to provide demand forecasts, and conditional outputs, that are consistent across the Route Studies. The market studies will not consider in detail markets that are relevant for the planning of train services or infrastructure within a single Route Study area and the aspirations for such markets (e.g. passenger services operating wholly within Scotland or Wales) will be considered in more detail in the relevant Route Study. The conditional outputs will be conditional on both affordability and a value for money business case being determined in subsequent Route Studies.

The Freight Market Study looks at the overall freight market in Great Britain and has been developed in close collaboration with rail freight operators. It has produced demand forecasts over a 10, 20 and 30 year planning horizon, looking at the key rail freight markets which will then enable the freight market to be considered in the same planning timescales, and at the same level of detail, as the passenger market. The study articulates the preferred routeing of services and the implied requirements in terms of network capacity and capability. Scenario planning has been used to reflect market uncertainties in specific sectors, principally intermodal.

1.5 Route Studies

There will generally be one Route Study for each of Network Rail's nine devolved routes. In a few cases a devolved Route may be covered by more than one Route Study, where part of the Route is largely self-contained.

A Route Study will use the information developed for all four of the Market Studies and assess options for the long term use and development of the network. Its starting point will be to determine whether the conditional outputs from the relevant Market Studies can be accommodated on the existing network, with committed enhancements. It will then develop train service options, corresponding to different uses of the network (and hence to different trade-offs between stakeholders' strategic goals). A Route Study will first look at options for making use of the existing network, and only then at options involving infrastructure investment. Options will be assessed against funders' decision-making criteria. This will include quantitative appraisal as in the previous RUS process. It will also, where appropriate, include a wider assessment against factors such as strategic fit, wider economic impacts and affordability.

The output from a Route Study will be evidence based choices which will be available to Network Rail and industry funders to determine the long term use, and development, of the network.

1.6 Cross-boundary analysis

Services that run across more than one Route Study area will be considered in a separate 'cross-boundary' workstream. This will develop and assess options for cross-boundary services (passenger and freight), in a similar way to the Route Studies. The output from this workstream will be a set of common assumptions that Route Studies should adopt regarding Cross-Boundary services. Assumptions might include the frequency and calling patterns of passenger services, and the frequency and operating characteristics (e.g. gauge, speed, tonnage) of freight services.

The workstream may also specify options for cross-boundary services to be examined in more detail in Route Studies, in order to better understand the trade-offs between cross-boundary and other services.

The assumptions regarding cross-boundary services may be revised from time to time based on the analysis in Route Studies.

1.7 Long Term Planning Process outputs

The Long Term Planning Process occupies a particular place in the planning activity of the rail industry. The choices presented and the evidence of relationships and dependencies revealed in the work across all elements of the process form an input into decisions made by industry funders and suppliers on issues such as franchise specifications and investment plans. In particular, the Long Term Planning Process will form an essential evidence base for the development of the High Level Output Specification for Control Period 6 (2019 – 2024).

1.8 Long Term Planning Process governance arrangements

The Long Term Planning Process is designed to be as inclusive as possible with contributions encouraged both from the rail industry and wider stakeholders. Overall governance responsibility for the process rests with Rail Industry Planning Group (RIPG) which meets quarterly and whose membership comprises:

- Association of Train Operating Companies (ATOC)
- Department for Transport
- Freight Operators
- London Travel Watch
- Network Rail
- Office of Rail Regulation
- Passenger Focus
- Passenger Transport Executive Group
- Rail Freight Group
- Rail Freight Operators Association
- Railway Industry Association
- Rolling Stock Companies
- Transport for London
- Transport Scotland
- Welsh Government.

A Working Group provides high level support for developing the three key output deliverables detailed in Section 1.3, a mandate to discuss these deliverables on behalf of the rail industry with other stakeholders, and a review of the ongoing work to develop them. The Freight Market Study Working Group is a sub group of the Strategic Freight Network Steering Group and comprises, ATOC, Colas Rail, DB Schenker Rail (UK), Department for Transport, Direct Rail Services, GB Railfreight, Freightliner, Rail Freight Group, Freight Transport Association, Rail Freight Operators Association, Network Rail, Transport Scotland, Welsh Government, and the Office of Rail Regulation (ORR) as an observer.

A series of smaller locally devolved groups have been convened to provide location specific spatial and economic context and evidence of planned and existing studies to enable the production of study output deliverables that are appropriate for both local circumstances and the national rail market sectors. These groups have principally discussed the passenger market studies. However, any freight comments raised have been fed back to the Freight Market Study.

Additionally, a number of one to one bi-lateral meetings have been held with stakeholders throughout the duration of the Freight

Market Study to guide and assist the development of the work through to this document.

1.9 Document Structure

This study is structured as follows:

- This chapter, Chapter 1, is a summary of the LTPP process and where the Freight Market Study fits within it
- Chapter 2 provides a description of the approach to the work, the evidence collected, research and consultation undertaken, the set goals, forecasts and outputs and next steps
- Chapter 3 summarises developments in the freight market, including trends, plans developed as part of the development of the Freight RUS and Strategic Freight Network as well as plans to enhance the network in Control Period 5 (2014 – 2019)
- Chapter 4 includes the assumptions, methodology, and market sector forecasts, including scenarios used in a number of market sectors
- Chapter 5 details the routeing of freight services
- Chapter 6 describes the consultation process for the Freight Market Study Draft for Consultation, summarises responses received to that consultation, provides a qualitative commentary of new and potential markets and details the next steps.

In addition, Appendix 1 provides a technical note to further explain the methodology used to derive the forecasts, whilst Appendix 2 provides a technical note to further explain the methodology used to derive the routeing and paths per hour calculations.

02 Study Approach

Introduction

This chapter provides a description of the approach to the work, the evidence collected, research and consultation undertaken, and sets out the goals, forecasts and outputs.

The Freight Market Study is required so the needs of the freight market in the future are understood, such that potential demands on the network can be planned for in the Long Term Planning Process (LTPP). To do this, up to date forecasts for the freight market sector are required for the same timescale and future forecasting years that are being developed for the passenger market studies. The process is flexible enough to take into account the requirements of the franchised passenger train operators, and the needs of the private sector freight operators, whose requirements can be very different to those of the passenger sector.

The Freight Market Study enables the overall demand for freight movements in each of the key market sectors over the 30-year timescales of the LTPP to be considered. The approach is designed to produce the three key deliverables outlined in Chapter 1, namely:

- identification of the long term strategic goals for the market sector, based on the aspirations of current and likely future rail industry funders
- production of long term demand scenarios for each of the key market sectors
- identification of conditional outputs for the specification of train services in the long term which will achieve the strategic goals for each market sector, given future circumstances identified in the demand scenarios.

These outputs are conditional upon subsequent value for money and affordability assessments, to be undertaken later in the Long Term Planning Process.

The Freight Market Study takes a strategic view of the potential development of key freight markets, and has produced revised demand forecasts for 10, 20 and 30 years into the future, scenarios capture key uncertainties in the market. The study also seeks to understand capability requirements such as train lengths and gauge, to inform infrastructure development upon which the demand is forecast to be needed to be accommodated, for input into later stages of the Long Term Planning Process.

2.1 Evidence collection

To inform this Freight Market Study, recent analysis of the UK rail freight sector was reviewed.

The forecasting of freight demand is complex, and can often involve broad global and national trends in the economy, where costs of transport on the national rail network may not be the primary driver of industrial decision making. Demand for freight movements can be dependent upon a small number of organisations whose decisions involve commercially confidential market specific information, and who may not be willing to share that information with the rail industry. Where organisations have been able to submit a response to the Freight Market Study Draft for Consultation, this has been used to inform the study. Their contributions are welcomed and have significantly strengthened this study. Unlike passenger forecasting, which can be informed by industry led documents such as the Passenger Demand Forecasting Handbook, for freight, equivalent rail industry information is not available. Research was therefore commissioned from consultants MDS Transmodal (MDST) to inform the work. The modelling methodology, assumptions, scenarios, and forecasts are described in Chapter 4.

2.2 Consultation undertaken

Consultation on the approach to take to deliver the Freight Market Study has principally been through discussion within the Freight Market Study Working Group, bi-lateral discussions within that group, and with a number of other organisations interested in the development of the work. Freight issues raised by the 'regional' fora have also been fed back into the work as required.

Discussions have also been held with a number of customers of the rail freight operators.

As noted in Section 2.1 the consultation period has provided an opportunity for all interested parties to feed into the work and these contributions have helped to shape the study. Further details of consultation responses are provided in Chapter 6.

03 Developments in Rail Freight Policy and Market

Introduction

This chapter summarises developments in policy for rail freight, including an outline of the Freight RUS and development of the 'Strategic Freight Network' concept. It also provides an overview of trends in rail freight market sectors over recent years.

A maritime 9'6" container being hauled along the West Coast Main Line.

3.1 Freight RUS

The Freight Route Utilisation Strategy (RUS) was established in 2007[1] , shortly before the current economic downturn commenced in 2008. It identified a strategy for growth and change for rail freight on the network.

The Freight RUS looked across the whole of Great Britain to explore the demand for freight from a base year of 2004-05 up to 2014-15. It forecast growth of between 26 per cent and 28 per cent in freight tonnes lifted over this period, equivalent to annual growth of between 2.3 per cent and 2.5 per cent.

The strategy looked at all rail freight sectors and predicted the highest growth (in percentage terms) in the intermodal, construction and automotive sectors. It included an assessment of differing scenarios which may affect the freight market.

The document recommended a number of interventions including gauge enhancements, diversionary routes and key changes which may have led to step changes, required beyond the forecast timescale of the Freight RUS. The Freight RUS forecast timescale has now nearly elapsed, and a number of the schemes recommended have been taken forward.

3.2 Strategic Freight Network

The 2007 High Level Output Specification[2] committed £200 million to take forward the development of the Strategic Freight Network (SFN) in Control Period 4 (2009 – 2014) The SFN built on preceding industry discussions, including the Freight RUS, to *'optimise the freight performance of our intensively utilised mixed-traffic rail network, allowing the efficient operation of more, longer and selectively larger freight trains'*.

It noted in particular that interventions would be required to address the following four points:

- optimise freight trunk routeings to minimise passenger/freight conflicts
- make the network available 24 hours a day, all year round
- eliminate pinch points, and
- upgrade network capability.

It also noted that SFN investment over Control Period 4 (2009 -2014) has been particularly focused on loading gauge enhancement to W10/W12[3] and train lengthening.

The industry has taken forward schemes prioritised for funding from the Strategic Freight Network fund, and assessed them against nine objectives, one or more of which needs to be supported:

1. longer and heavier trains
2. efficient operating characteristics
3. 7-day and 24-hour capability
4. W12 loading gauge
5. UIC GB+ (or 'European') gauge freight link
6. new freight capacity
7. electrification of freight routes
8. strategic rail freight interchanges and terminals
9. strategic freight capacity initiative.

In addition, work is underway to develop ERTMS[4] and the National Operating Strategy[5] , which are intended to continue to deliver efficiencies in operating the network.

1 Freight Route Utilisation Strategy, Network Rail, 2007.
2 'Delivering a sustainable railway' white paper, Department for Transport, 2007.

3 The physical dimensions of a railway vehicle and its load are governed by a series of height and width profiles, known as loading gauges **W10** Allows 9'6" high containers (2,500mm wide) to be carried on a standard container wagon. An increasing number of containers arriving at UK Ports are this size. **W12** Allows a 9'6 high container to be carried on a standard container wagon, including refrigerated containers up to 2,600mm wide
4 ERTMS is a way of controlling trains. It supplements and ultimately replaces traditional railway signalling.
5 The National Operating Strategy is a new way of managing, controlling and operating rail services on the network. The Strategy will integrate traffic management and control systems to improve performance.

In 2010 the Strategic Freight Network Steering Group updated the forecasts in the Freight RUS, and extended them to 2030. The forecasts, in terms of tonne kilometres moved, were published in the Initial Industry Plan for Control Period 5 and subsequently in the Strategic Rail Freight Interchange Policy Guidance[6] .

They indicated overall average growth of three per cent per annum to 2030. As with the Freight RUS forecasts, the highest growth rates were forecast for the intermodal sectors, while a decline in coal traffic was forecast.

In January 2013, Network Rail included within its Strategic Business Plan (SBP) a proposal to continue the operation of the SFN within Control Period 5 (CP5). An allocation of £206 million[7] was included in the Strategic Business Plan to fund improvements identified by the industry to continue rail freight expansion in England and Wales whilst stimulating wider economic growth and environmental benefits. In Scotland, an allocation of £31m for Strategic Freight Enhancements has been included within the Scottish Strategic Freight Investment Fund[8] . The continuation of the SFN was confirmed for England and Wales in the ORR Draft Determination in June 2013, and a funding allowance made for the freight funds in both Scotland and England and Wales. Work to finalise the funding for the railway in CP5 is continuing, and the Office of Rail Regulation is expected to publish its final determination at the end of October 2013.

3.3 Rail Interchange Policy

The importance of terminal development is clear, particularly to rail market sectors such as Domestic Intermodal, and this has continued to be recognised in the Strategic Freight Network work, noted above, and the Department for Transport's Strategic Rail Freight Interchange (SRFI) Policy Guidance[9] published in 2011, which noted that the main objectives of Government policy for Strategic Rail Freight Interchanges are to:

- reduce road congestion – to deliver goods quickly, efficiently and reliably by rail and help to reduce congestion on our roads
- reduce carbon emissions – to meet the Government's vision for a greener transport system as part of a low carbon economy
- support long-term development of efficient rail freight distribution logistics – to provide a network of SRFI (modern distribution centres linked into both the rail and trunk road system in appropriate locations to serve our major conurbations)
- support growth and create employment – through the transfer of freight from road to rail, where this is practical and economic.

The document noted that 'Government aims to meet these objectives by encouraging the development of a robust infrastructure network of Strategic Rail Freight Interchanges'.

It also stated that, 'While it is for the industry to identify potential SRFI sites to meet commercial logistics requirements, and to take forward development proposals, for the reasons summarised above, the Government supports the development of a national network of SRFIs and will seek to facilitate the achievement of this objective'. The Planning Act 2008 also set out that SRFIs over 60 hectares in size would fall within the definition of a Nationally Significant Infrastructure Project, a measure intended to give some comfort to developers about how their schemes would be received.

The Department for Transport plans to enshrine its SRFI Policy Guidance in the proposed National Networks National Policy Statement which it announced as part of its Action for Roads statement in July 2013.

3.4 Changes in the rail freight market in Great Britain

Over the last six years, there have been a number of developments in the Great Britain rail freight market which have influenced how freight is moved over the rail network. The demand for the movement of goods is a derived demand and changes in the amount of freight moved on the Great Britain rail network reflect the needs of end users in industry, the demands of consumers, and energy policy.

Gauge enhancement works on the Felixstowe to Nuneaton route.

6 Strategic Rail Freight Interchange Policy Guidance, Department for Transport, November 2011

7 Page 47, Strategic Business Plan for England and Wales, January 2013 Network Rail.

8 Page 49, Strategic Business Plan for Scotland for CP5, January 2013, Network Rail

9 Strategic Rail Freight Interchange Policy Guidance, Department for Transport, November 2011.

A new Freightliner 'Powerhaul' locomotive.

Quantitative changes in the freight market are covered later in this chapter; however there have been some significant developments which have affected the carriage of freight in Great Britain which are briefly outlined below.

3.4.1 Structural change in the rail market

Recent years have seen a continuation of structural change in the rail freight market which first became evident just over a decade ago. Great Britain's manufacturing industry has been in decline – in common with many other Western nations – and Great Britain has become an importing economy. This has affected rail freight in two ways:

- traditional bulk markets for rail such as domestically based coal and steel production have diminished substantially
- the import of goods through major ports, particularly involving shipment from the Far East, has increased greatly and the handling of these goods has been dominated by growth in the trend towards containerisation.

The net effect of these changes in production, consumption and logistics has been that deep sea containerised (that is, intermodal) freight, mainly consisting of consumer goods, has become the single largest commodity conveyed on rail. Domestic flows of consumer goods to and from major terminals have contributed to the predominance of intermodal rail freight.

For rail to make this structural change it had to convert itself from a mode carrying largely low value goods to a mode serving a market increasingly influenced by fast moving consumer goods (FMCG). In order to penetrate the FMCG market, rail has had to seek lower margin business in strong competition with road hauliers.

This has required step changes to productivity and service standards – which rail has negotiated successfully, gaining market share against road.

3.4.2 Terminal and end user developments

Over the six years since the Freight RUS was published, there have been a number of terminal and end user developments. In the intermodal sector, these include:

- approval for the London Gateway port and logistics park in 2007 with construction extending through this period with opening planned to take place by the end of 2013
- connection of the Barking rail freight terminal directly to the High Speed One route from the Channel Tunnel enabling the terminal to receive traffic in European gauge wagons, direct from the continent
- further expansion at the existing Daventry International Rail Freight Terminal, with plans for a third phase of development currently in the planning process, and
- opening of the Felixstowe North rail terminal.

Continuing change in the industrial make up of Great Britain can also generate brownfield site developments which have subsequently been used for terminal developments.

In other market sectors, there have been some significant end user developments which have affected rail freight flows. These include the mothballing in 2010 and subsequent reopening in early 2012 of the steelworks at Redcar, and the closure of the aluminium smelter at Lynemouth.

3.4.3 Operator developments

The largest four rail freight operators are DB Schenker Rail (UK) (previously EWS), Direct Rail Services (DRS), Freightliner and GB Railfreight. There have been some changes since 2007 with the appearance of new operators including Colas Rail and Devon & Cornwall Railways. Advenza and Fastline Freight have ceased to operate.

Operators have continued to respond to developments in the freight market, including the introduction of new wagons to cater for new flows, such as wagons designed to handle biomass traffic, and new diesel locomotives to haul longer trains, such as the Class 70 'Powerhaul' locomotives for Freightliner, as well as DRS Class 68 and electric/diesel Class 88 locomotives.

Each of the developments in this sector has had an influence on the demand for rail freight movements in Great Britain, and in turn, on how that demand is accommodated on the rail network.

The remainder of this chapter details how the freight market sectors have changed over recent years.

3.5 Trends in rail freight volumes, 1980 - 2012

To set the forecasts of rail freight demand in context, it is informative to look back over 30 years, to understand how the rail freight market has changed over a longer period than the more recent developments set out earlier in this chapter.

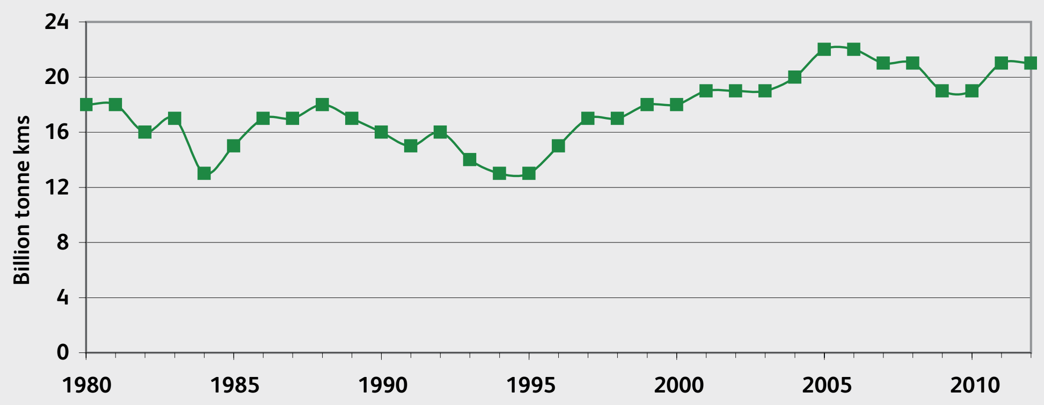
Figures 3.1 and 3.2 summarise trends in rail freight volumes in Great Britain, measured in tonne kilometres moved and tonnes lifted since 1980[10].

Figure 3.1 shows total tonnes moved in tonne kilometres. This gives the best indication of total rail traffic for network planning purposes because (unlike tonnes lifted) it takes account of haul length, which varies significantly between commodities and sectors.

Average haul length is over 300 kilometres for intermodal traffic, but less than 150 kilometres for coal to power stations.

Figure 3.1 shows that tonne kilometres have increased since the mid-1990s and were about 21 billion tonne kilometres in 2012, excluding Network Rail engineering traffic[11], or around 23 billion tonne kilometres including this traffic. The increase since the mid-1990s has been about 2.5 per cent per annum[12].

Figure 3.1 – Total tonne kilometres moved[13]



10 All tonnage data in this report refers to weight of product only: they exclude weight of locomotive and wagons. Years refer to financial years unless stated e.g. 2012 refers to 2012/13.

11 Network Rail engineering traffic is discussed in detail in Chapter 4.

12 This figure is the annual growth between the average of 1994, 1995 and 1996 and the average of 2010, 2011 and 2012. It excludes Network Rail engineering traffic.

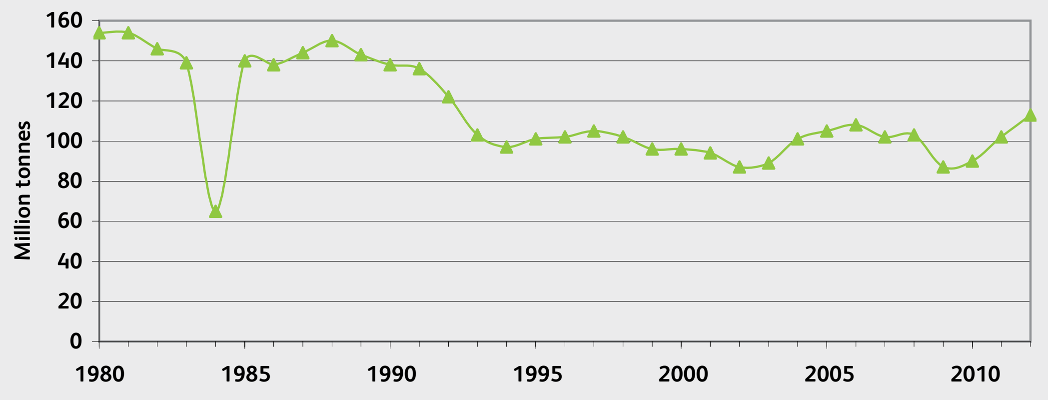
13 Source: DfT (Transport Statistics GB) and ORR (National Rail Trends).

Figure 3.2 shows that total tonnes lifted by rail have been fairly stable since the mid-1990s, at around 100 million tonnes per annum. This excludes Network Rail engineering traffic. If this traffic is included, then the total for 2012 was approximately 120 million tonnes lifted [14].

Figures 3.1 and 3.2 indicate that a turning point for the industry was the mid-1990s, with increases in the tonnes moved and stabilisation in the tonnes lifted recorded since then, reflecting the successful privatisation of the rail freight industry in early 1996.

The data also show that rail freight has performed well during the current recession, with both tonne kilometres and tonnes increasing between 2009 and 2012. Other points to note are the temporary decline in traffic in 1984 due to the coal miners' strike and the longer-term decline in coal demand in the 1990s due to a fall in coal volumes associated with electricity generators, 'dash for gas'.

Figure 3.2 – Total tonnes lifted[14]



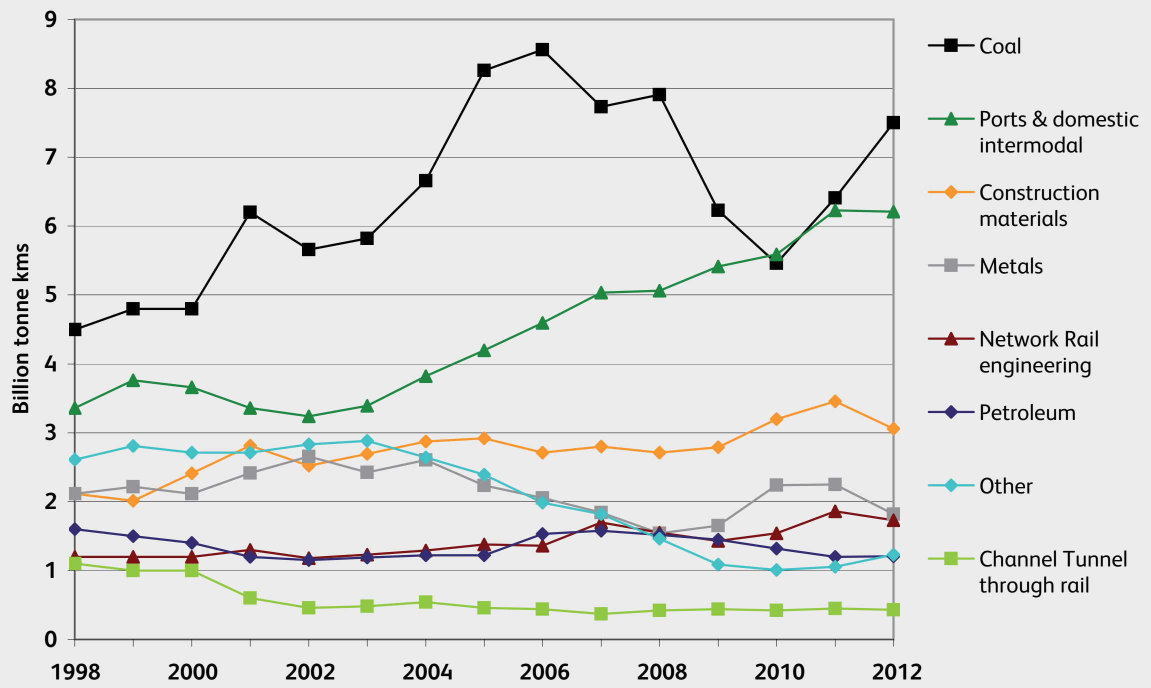
14 Source: DfT (Transport Statistics GB) and ORR (National Rail Trends).

Figures 3.3 and 3.4 show the total freight market, by sector.

Figure 3.3 shows that, in terms of tonne kilometres, the largest source of growth has been the intermodal sector. The tonne kilometre data does not separate intermodal services to and from ports, from domestic intermodal. [15]

However the sector (excluding Channel Tunnel through rail intermodal traffic) has increased by an average of seven per cent per annum over the decade to 2012. It has performed well during the recent recession, maintaining volumes and gaining market share.

Figure 3.3 – Tonne kilometres moved by sector[15]



15 Source ORR (National Rail Trends) and DfT (Transport Statistics GB). The figure uses the same sectors as those used in Chapter 4, where possible. Coal refers to both ESI and non-ESI coal. Other includes ore, industrial minerals, domestic waste, biomass, chemicals and automotive.

There are differences between the way the ORR/DfT statistics describe the sectors and the sector categories in Chapter 4: for example, the DfT/ORR refer to the ports and domestic intermodal sector as 'domestic intermodal'. This report uses the sector categories in Chapter 4. The domestic intermodal data in the figure excludes empty containers which carry bulk commodities in the loaded direction – see Appendix 1 for details.

In 2012 coal was the largest sector in terms of tonne kilometres, followed by ports and domestic intermodal and by construction. Coal is much less dominant when the market is measured in terms of tonne kilometres than tonnes (see Figure 3.4) because the average length of haul of a coal train is shorter than for other sectors. Longer distance movement of coal from Scotland into England peaked in 2007 but has since reduced by 30 to 40 per cent as more shipping capacity became available in the Humber estuary, which has the advantage of being much closer to the Aire and Trent Valley power stations.

The fact that intermodal tonne kilometres are now at a similar level to coal is remarkable given that intermodal goods are generally of a much lower density[16]. Other sectors which have grown in terms of tonne kilometres are construction and Network Rail engineering. Both these sectors have grown since 2004 even though total tonnage lifted fell slightly during this period, as shown by Figure 3.4. This suggests that average haul length has increased for these sectors during this period.

There have been declines in the metals sector and the 'other' sectors have declined since 2004[17] , although metals traffic increased in 2010.

Channel Tunnel through rail traffic fell sharply prior to 2001, but has been more stable in recent years. The decline in 2001 was due to security problems which disrupted traffic. Volumes have struggled to recover since then and are yet to attain pre-security crisis levels.

Figure 3.4 shows tonnes lifted by sector in 2004 and 2011[18]. Between 2004 and 2011 both ports and Channel Tunnel intermodal and domestic intermodal have shown significant growth, even though total freight traffic was stable over this period (see Figure 3.2).

Ports and Channel Tunnel intermodal traffic has grown at about four per cent per annum since 2004. Domestic intermodal traffic has grown by nine percent per annum over this period. By 2011 total intermodal traffic, at over 18 million tonnes, was at a similar level to construction tonnage, and was only exceeded by coal traffic (44 million tonnes). Within the intermodal total, ports intermodal traffic predominates, at 15 million tonnes compared with less than three million tonnes for domestic intermodal traffic and less than one million tonnes for Channel Tunnel intermodal. Coal traffic increased in 2012 to 52 million tonnes, from 44 million tonnes for 2011 shown in Figure 4.3.

The main sectors which declined over the 2004 to 2011 period were metals, ore, domestic waste and chemicals (ore, domestic waste and chemicals are shown in Figure 3.4 under 'other').

Figure 3.4 also shows the importance of Network Rail engineering. Network Rail engineering tonnages were almost seven million tonnes in 2011.

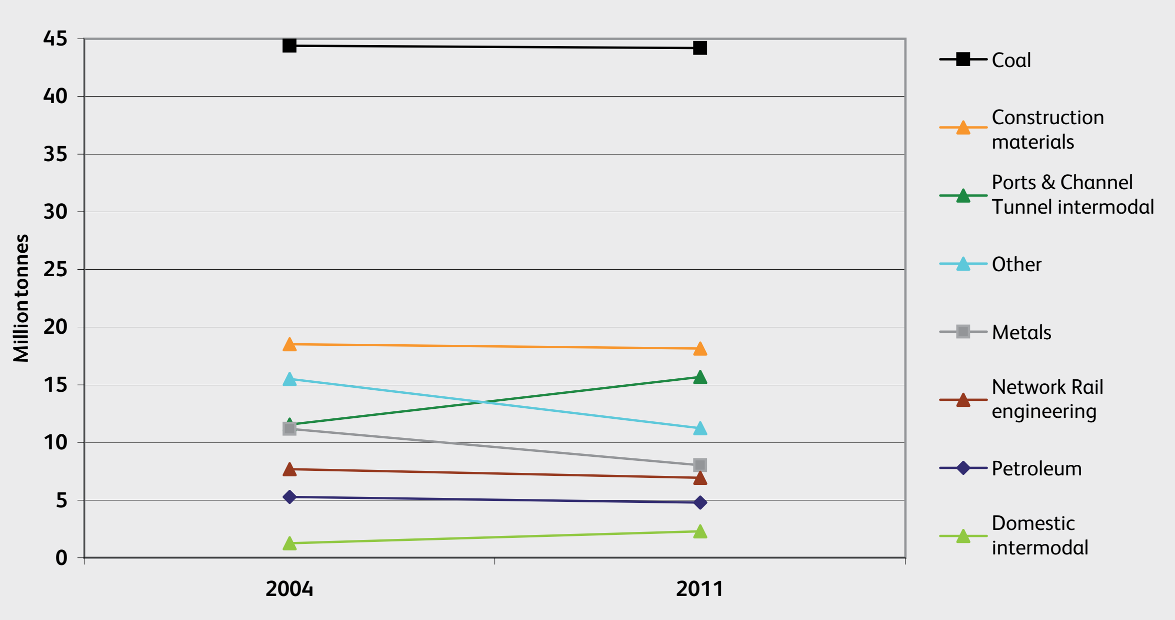
16 This is reflected in the lower average load of intermodal trains relative to coal trains, as discussed in Chapter 5.

17 The 'other' sectors include ore, industrial minerals, domestic waste, biomass, chemicals and automotive. Tonne kilometre data prior to 2011 are not available for each sector but tonnes data are available for 2004, as discussed below.

18 Comparable data are not available for 2012 except for coal.

19

Figure 3.4 – Tonnes lifted by sector [19]



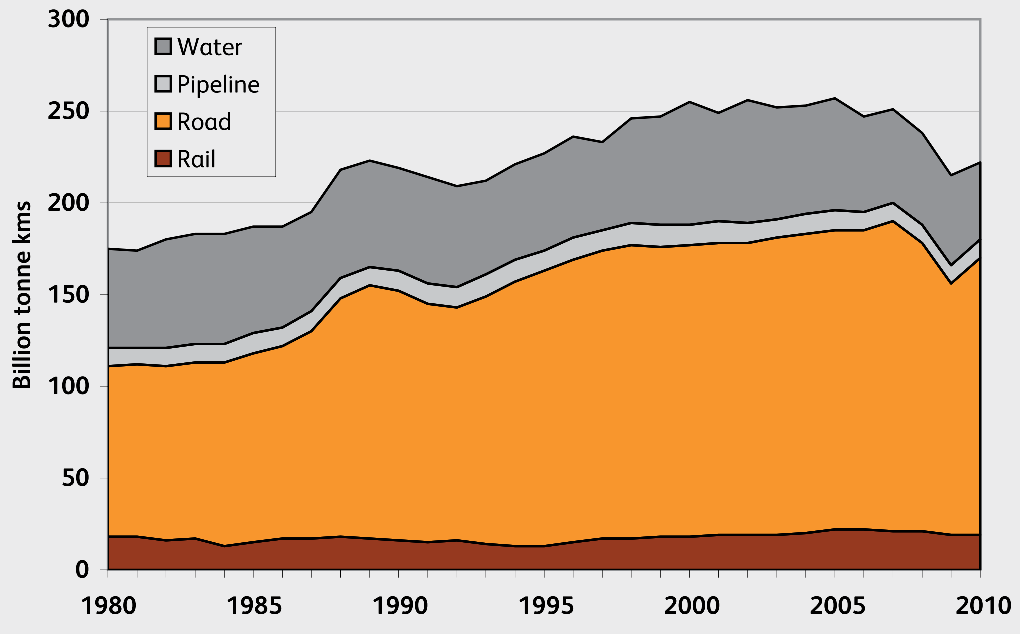
19 The figure is based on MDST's forecasting report, dated April 2013 – see **Appendix 1** for details. The figure uses the same sectors as those used in **Chapter 4**. Coal refers to both ESI and non-ESI coal. Other includes ore, industrial minerals, domestic waste, biomass, chemicals and automotive. The domestic intermodal data excludes empty containers carrying bulk commodities on the loaded leg – see **Appendix 1** for details.

The trends in rail freight should be seen in the context of trends in the freight market as a whole. Figure 3.5 shows that, in terms of tonne kilometres, road dominates the domestic freight market in Great Britain, followed by water (mainly coastal shipping), rail and pipeline. Over the last thirty years road transport has increased significantly, while rail transport has increased slightly.

20

Since the mid 1990s, there has been growth in rail freight, as discussed above, and in road freight, at least until 2007. The recession accounts for the fall in road transport since 2007. In terms of market share, the data indicates that rail's share of the road and rail market[21] fell between the early 1980s and the mid 1990s. Since 1995 rail has increased its market share, from about eight per cent to 11 per cent.

Figure 3.5 – Total domestic freight transport by mode [20]



20 Source: DfT Transport Statistics GB 2012. Table 401

21 The share of the road and rail market only is assessed because rail is generally competing with road rather than pipelines or coastal shipping

3.6 Recent trends in freight train numbers and productivity

Figure 3.6 shows that the number of freight train services run has fallen since 2001. It also shows that the number of freight train kilometres has fallen since 2005, but less steeply than freight trains run. This implies that the average haul length per train has increased in recent years, which is consistent with the longer term trends observed above.[22]

The reduction in train kilometres between 2005 and 2011 occurred despite the fact that tonne kilometres was almost unchanged over this period (although it fell in 2009 and 2010 and then increased), as shown in Figure 3.1.

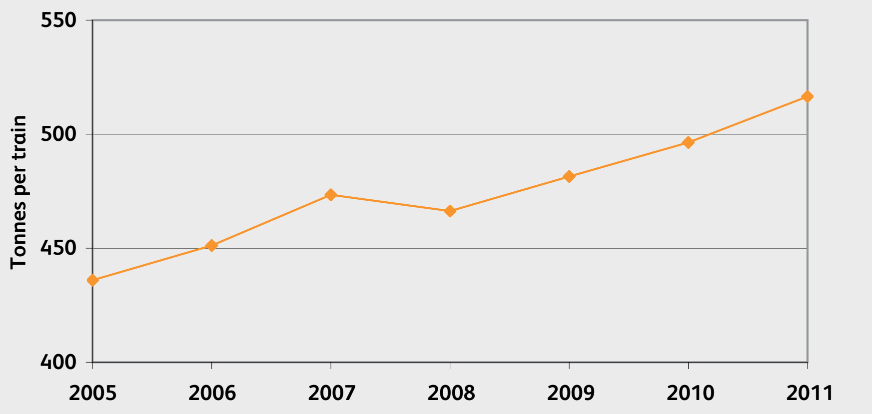
Figure 3.6 – Freight trains run and total train kilometres [22]

Investment in new equipment has improved the productivity of rail freight.

22 Both data series exclude Network Rail engineering flows. Train kilometre data are not available prior to 2005.

Combining these data series, **Figure 3.7** shows that average tonnes per train have increased by about 19 per cent since 2005. This indicates that rail freight productivity has significantly improved since 2005.[23]

Figure 3.7 – Average tonnes per train [23]



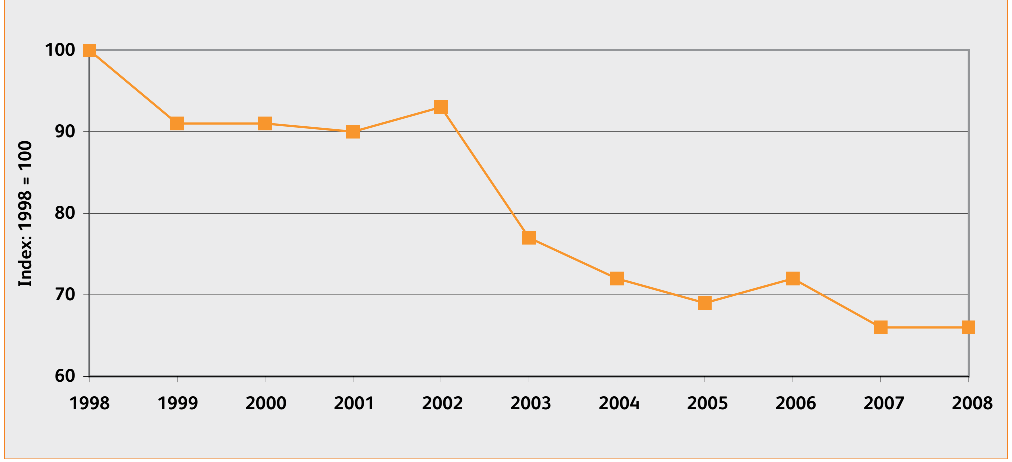
23 Both data series exclude Network Rail engineering flows.

Another indicator of rail productivity is the labour used. **Figure 3.8** shows that freight operating company staff numbers have fallen relative to train kilometres since 1998.

The evidence suggests that road haulage productivity and competitiveness has also improved in recent years. For example between 2003 and 2010, employment of Heavy Goods Vehicle (HGV) drivers fell by 11 per cent, while HGV goods moved fell by eight per cent.

An indication of the sector's competitiveness is that between 2005 and 2011, road haulage rates increased by 18 per cent, less than the Retail Prices Index, which rose 26 per cent, and considerably less than HGV operating costs, which rose by 40 per cent[24] .

Figure 3.8 – Freight operating company staff per freight train kilometre (indexed with 1998 base) [25]



24 Source: FTA Logistics Report 2012 (graph 1.7 and 1.15) and DfT (Transport Statistics GB Table 0116).

25 Source: Rail Value for Money Study: Realising the potential of GB Rail Freight (the McNulty report), DfT and ORR, May 2011 (Figure 2.4, summary report)

04 Forecasts

Introduction

The forecasts contained within this Freight Market Study reflect the expert knowledge of the Freight Market Study Working Group.

Intermodal on WCML .

4.1 Introduction

The forecasts contained within this Freight Market Study reflect the expert knowledge of the Freight Market Study Working Group and are based on MDS Transmodal's Great Britain Freight Model (GBFM[1]).

For each sector, information is shown for 2011[2] with forecasts for three future years, 2023, 2033 and 2043[3] . For the purposes of the Long Term Planning Process, forecasts for all three future years are required. Forecasts are presented for all three years, but for some of the analysis, for example the market share analysis and the scenarios, the report focuses on 2033, to illustrate trends over the forecast period.

4.2 Assumptions and methodology used for forecasts

The forecasts are presented for the following commodity sectors[4]

- intermodal
- electricity supply industry (ESI) coal
- biomass
- construction materials
- metals
- petroleum
- industrial minerals
- chemicals
- automotive
- ore
- domestic waste
- non-ESI coal and
- Network Rail engineering.

The forecasts presented for each sector (and in total) are our "central case" forecasts, which represent our best estimate of the out-turns for each forecast year. In this report all the forecasts refer to the central case unless otherwise stated. For the intermodal, biomass and Channel Tunnel sectors[5], higher and lower scenarios are presented, in addition to these central case forecasts, in addition to these central case forecasts.

The following general assumptions were used to develop the forecasts, under the central case; sector specific assumptions, and scenarios, are considered later in the chapter:

- freight demand is considered without addressing the ability of the rail network to cater for it, as outlined in Chapter 1. Capacity constraints will be considered later in the Long Term Planning Process (LTPP), in the Cross-Boundary Analysis and Route Studies. The approach is designed to understand market demands first, and then how the rail industry might best be able to cater for that demand.
- economic growth is returning to the UK and to the global economy, following the recent recession. This is a key assumption, particularly for the ports intermodal sector, which is linked to trade volumes, and to the domestic intermodal sector, which is linked to domestic economic activity. For bulk sectors, such as metals, industrial minerals and ore, the return to economic growth is one of the factors that enables rail freight volumes to stabilise or increase, following recent declines.
- increases in labour and fuel costs are shown in Table 4.1. Overall, the effect of these changes is to improve rail's competitiveness relative to road, because fuel and drivers' wages are a lower proportion of costs for rail, than for road.
- no change in rail productivity relative to road productivity during the forecast period. This is discussed below:

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1 For further information see Appendix 1.
2 Data for 2011 and previous years where relevant, are from ORR (National Rail Trends), DfT (Transport Statistics GB) and MDST.
3 Note that for intermediate years, the straight lines in the graphs between forecast years should not be taken as implying this growth profile between the relevant years
4 Commodity sectors are based on Network Rail classifications.

5 The Channel Tunnel sector reflects all commodities using the Channel Tunnel on through rail services – see Section 4.15.

Table 4.1 – Forecast increases in fuel and labour costs

Forecast increases in real terms relative to base year (year to September 2012):	Fuel	Drivers' wages
2023 forecast	+13%	+23%
2033 forecast	+21%	+48%
2043 forecast	+24%	+83%
Notes: Data are based on the DfT's WebTAG guidance.		

- the forecasts take account of changes to track access charges for freight operators which will be introduced during Control Period 5 (2014 to 2019) as part of the current Periodic Review. The adjustments are discussed in Appendix 1. The forecasts do not assume any further changes (in real terms) in access charges after CP5.
- a distance-based road charging system for road freight is not introduced during the forecast period.

4.2.1 Rail and road productivity assumptions

As discussed in Chapter 3, there is evidence that in recent years both rail and road productivity have been improving. Looking to the future, we would expect to see further improvements in both sectors, which might include:

- more goods moved on each train, through longer and heavier trains (rail). Longer and heavier trains are being promoted by planned Strategic Freight Network investments
- more goods in each lorry through longer semi trailers (road). This would require a change of law following the current pilot study[6]
- better utilisation through more efficient logistics movements overall (rail and road)
- increased operational hours (rail)
- better fuel consumption, through engine efficiency gains (rail and road)
- more use of alternative fuels (road)
- electrification (rail). Rail productivity could improve as a result of further electrification of the network during the forecast period, if that results in a move away from the use of diesel traction. However, no explicit assumptions have been made about further electrification in this document. The Electrification strategy is currently being refreshed as part of the Network RUS workstream of the LTPP
- better asset utilisation (both road and rail, but principally rail).

Taking all these factors into account, the central case forecasts assume, as a conservative assumption, that rail productivity will not improve relative to road productivity during the forecast period. However the study recognises that there is uncertainty about this. To reflect this uncertainty, a scenario is presented which assumes improvements in rail productivity relative to road productivity – see below.

Since the central forecasts assume that both rail and road productivity improves during the forecast period, the study assumes increases in rail productivity (in the form of average tonnes per train and average operational days per week) when the forecasts in terms of tonnages are converted into numbers of trains and paths (timetable slots) – see Chapter 5 for further details.

6 https://www.gov.uk/government/publications/longer-semi-trailers-how-to-take-part-in-the-trial

Containers being loaded at the Birmingham International Freight Terminal .

4.3 Intermodal

This sector covers three sub-sectors:

- Ports intermodal : container traffic to and from the ports
- Channel Tunnel intermodal: containers on through rail freight services using the Channel Tunnel.
- Domestic intermodal: other container traffic, including traffic between inland terminals.

Much of the ports intermodal traffic consists of deep sea containers with a high proportion originating in the Far East – from the Pacific Rim. The rail sector in Britain faces the majority of its competition from other modes (i.e. road and coastal shipping) at the port of entry.

The Channel Tunnel intermodal market involves intra-European movement of freight, much of which takes place in curtain sided swap bodies rather than steel containers. Rail faces very strong competition from lorries using roll-on roll-off ferry services or unaccompanied trailer movements on short sea ferries. The choice of mode is affected by end-to-end journey decisions and rail tends to compete more successfully for longer distance business (e.g. from Eastern Europe and Spain) than with shorter distance freight from France, the Low Countries and Germany.

The domestic intermodal market includes traffic between inland terminals. The main flows are currently Anglo-Scottish flows between the East Midlands and central Scotland. New flows are expected to develop as new rail-connected warehousing sites are built. Rail faces very strong competition from lorries in this sub-sector and rail currently accounts for a very small share of the market.

4.3.1 Intermodal assumptions

This section addresses the assumptions used for the central case forecasts for intermodal. The next section, Section 4.3.2, presents these forecasts and this is followed by Section 4.3.3, which discusses the intermodal scenarios.

For the central case intermodal forecasts, the following sector-specific assumptions apply, in addition to the general assumptions outlined in Section 4.2:

For ports intermodal:

- deep sea[7] containerised cargo into Britain is forecast to increase by 2.7 per cent per annum to 2023, by two per cent between 2023 to 2033 and by 1.7 per cent per annum between 2033 and 2043[8]. The forecasts implicitly assume that economic growth returns but that trade growth rates do not return to pre-recession rates: the average growth rate (in deep sea containerised cargo) between 2001 and 2007 was 6.4 per cent per annum[9]. The high growth rates noted prior to 2008 partly reflect the transfer of manufacturing capacity from the UK to the Far East, although the slow down in growth recognises that there are limits to this change. Deep sea container port capacity is assumed to grow in line with this forecast demand, and is sufficient to cater for that demand. The ports intermodal forecasts focus on deep sea cargo because rail traffic related to short sea cargo is expected to continue to be much lower in volume than deep sea. The relevant short sea ships, in general, serve a more regional market, with shorter distances between the port and the origin/destination, which are less suited to rail, apart from, in some cases, to Scotland. Although the rail market related to short sea cargo is limited, the ports intermodal forecasts include rail traffic related to this cargo.
- expansion of rail-connected warehousing sites - see domestic intermodal assumptions.

7 Deep Sea shipping is defined as traffic between the UK and countries outside Europe and the Mediterranean.

8 The forecasts and historic trends refer to total units.

9 Source: DfT Maritime statistics. Table 2.5.

For Channel Tunnel intermodal:

- a £20 per container reduction in costs for Channel Tunnel through rail intermodal traffic, relative to other modes, from 2023. This reflects the following factors: the fuel and wage growth assumptions (see **Section 4.2**), the introduction of the French eco tax (from January 2014), increased fuel costs for ships following the introduction of a low sulphur zone (from 2015) and the DfT's proposed new charging scheme for HGVs (from April 2014). Although this assumption is expressed as a reduction in costs per container, an equivalent reduction is applied to bulk commodities using the Channel Tunnel
- short sea containerised cargo into Britain is forecast to increase by 1.2 per cent per annum to 2023, by 1.9 per cent between 2023 to 2033 and by 1.6 per cent per annum between 2033 and 2043[10]. As with the deep sea forecast, this represents a slowing down of growth relative to pre-recession levels: between 2001 and 2007 growth was 2.6 per cent per annum[11]. The growth rates are lower than the deep sea forecasts until 2023; after this year the forecasts are almost the same
- expansion of rail-connected warehousing sites - see domestic intermodal assumptions.

For domestic intermodal:

- Rail-connected warehousing sites will expand from the current area of approximately 1.6 million square metres to approximately 5.9 million by 2023, 9.6 million by 2033 and 13.3 million by 2043. This reflects both growth of existing sites and the development of new sites. There are significant uncertainties over which of the existing sites will expand, where the new developments will take place and about the overall growth in capacity. The assumed overall annual growth in capacity is similar to the rate observed in recent years, which is consistent with the assumption that about 35 per cent to 40 per cent of new large warehousing developments will be rail connected. These growth assumptions indicate that the study is taking a positive view of the ability of the market, including the planning system, to provide new sites

This reflects the government's commitment to their development, as set out in the Strategic Rail Freight Interchange (SRFI) policy guidance. To reflect uncertainty about the overall growth in capacity a scenario is presented which assumes lower growth in capacity – see below.

10 The forecasts and historic trends refer to total units.

11 Source: DfT Maritime Statistics. Table 2.5.

4.3.2 Intermodal forecasts

Figure 4.1 shows the forecasts for ports, Channel Tunnel, domestic and total intermodal in terms of tonne kilometres moved.

Tables 4.2, 4.3, 4.4 and 4.5 summarise the forecasts for each sub-sector in turn and for the sector as a whole.

Figure 4.1 – Intermodal forecasts: tonne kilometres moved (with 2011 actual data)

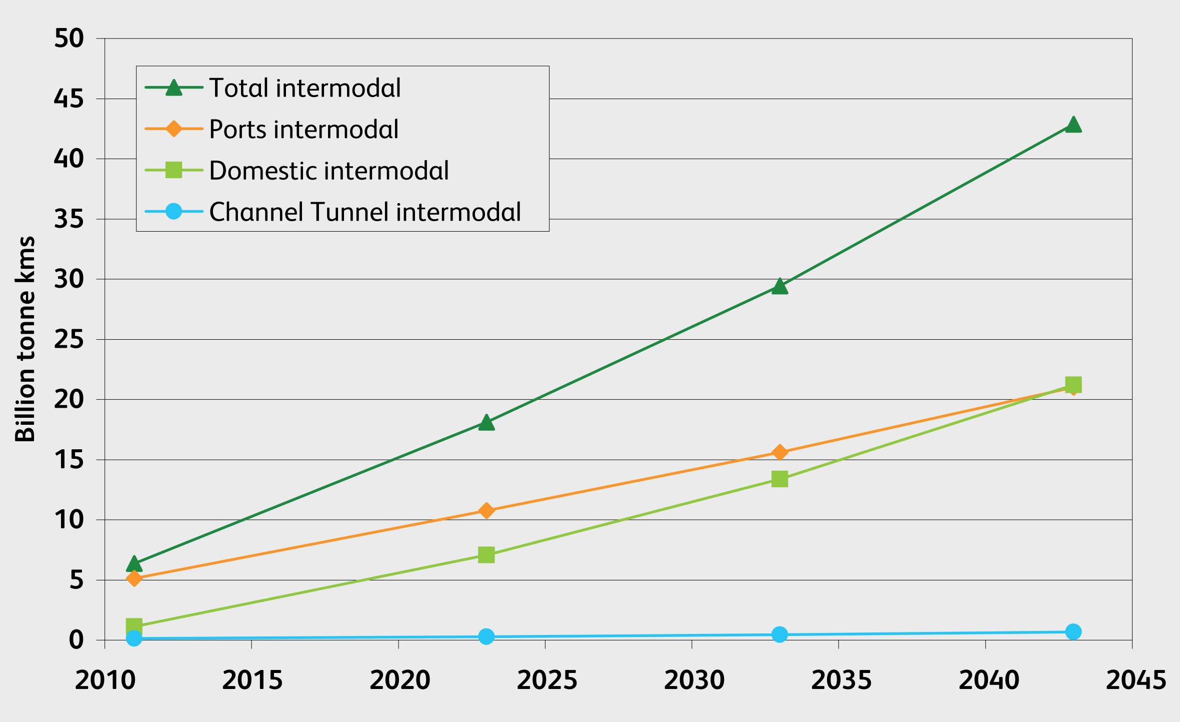


Table 4.2 indicates that the ports intermodal sub-sector is forecast to have annual growth to 2043 of 4.5 per cent in terms of tonne kilometres and 4.9 per cent in terms of tonnes. Tonne kilometre growth is slightly lower than tonnage growth due to a reduction in average haul length, reflecting improved rail competitiveness for shorter distance journeys.

The forecast growth, in terms of both tonne kilometres and tonnes, reflects continued trade growth, favourable economic factors for rail, particularly the fuel and wage growth assumptions, and the growth of rail –connected warehousing sites.

Table 4.2 – Ports intermodal forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	10.7	N/A	N/A
2011 (actual)	15.1	5.1	338
2023 (forecast)	32.7	10.8	329
2033 (forecast)	49.5	15.6	315
2043 (forecast)	69.4	21.0	303
Compound annual growth rates:			
2004 to 2011 (actuals)	5.1%	N/A	N/A
2011 to 2023 (forecast)	6.6%	6.4%	-0.2%
2011 to 2033 (forecast)	5.5%	5.2%	-0.3%
2011 to 2043 (forecast)	4.9%	4.5%	-0.3%

Table 4.3 shows that the Channel Tunnel intermodal sub-sector is forecast to have slightly higher growth than the ports sector, but this growth is from a much lower base. The growth reflects continued trade growth and favourable economic factors for rail which are reflected in the £20 per container cost reduction assumption.

Table 4.3 – Channel Tunnel intermodal forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	0.9	N/A	N/A
2011 (actual)	0.6	0.1	238
2023 (forecast)	1.3	0.3	213
2033 (forecast)	2.2	0.5	205
2043 (forecast)	3.4	0.7	200
Compound annual growth rates:			
2004 to 2011 (actuals)	-5.8%	N/A	N/A
2011 to 2023 (forecast)	7.3%	6.3%	-0.9%
2011 to 2033 (forecast)	6.4%	5.6%	-0.7%
2011 to 2043 (forecast)	5.7%	5.1%	-0.5%

Table 4.4 shows that domestic intermodal sub-sector is forecast to have significantly higher growth than the ports and Channel Tunnel sub-sectors, with tonne kilometres increasing at 9.6 percent per annum to 2043 and tonnes increasing at 10.9 per cent. This growth is from a much lower base than the ports intermodal sector, but by 2043 the domestic intermodal market is forecast to be comparable to the ports intermodal market, both reaching 21 billion tonne kilometres – see Figure 4.1. The domestic intermodal growth reflects favourable economic factors for rail, particularly the fuel and wage growth assumptions, and the growth of rail connected warehousing sites.

Table 4.4 – Domestic intermodal forecasts (with 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	1.3	N/A	N/A
2011 (actual)	2.3	1.1	492
2023 (forecast)	16.6	7.1	424
2033 (forecast)	35.1	13.4	381
2043 (forecast)	61.5	21.2	345
Compound annual growth rates			
2004 to 2011 (actuals)	8.8%	N/A	N/A
2011 to 2023 (forecast)	18.0%	16.6%	-1.2%
2011 to 2033 (forecast)	13.2%	11.9%	-1.2%
2011 to 2043 (forecast)	10.9%	9.6%	-1.1%

Notes: These figures exclude empty containers which are used for bulk commodities on the loaded leg. They therefore represent domestic intermodal traffic related to fast moving consumer goods (FMCGs) only. See Appendix 1 for details.

Table 4.5 shows the forecasts for the intermodal sector as a whole. Both tonnes and tonne kilometres are forecast to grow at about 6 percent per annum to 2043. The overall market grows from 6 billion tonne kilometres to 43 billion tonnes – a seven fold increase. Table 4.6 shows the market share implications of the ports intermodal forecasts. Rail's share of the road and rail market is forecast to increase from 19 per cent to 46 per cent by 2033, in terms of tonnes, and from 37 per cent to 63 per cent in terms of tonne kilometres. Rail's market share is higher in terms of tonne kilometres due to rail being more competitive in the longer distance markets.

Table 4.5 – Total intermodal forecasts (with 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	12.8	N/A	N/A
2011 (actual)	18.0	6.4	355
2023 (forecast)	50.7	18.1	357
2033 (forecast)	86.9	29.4	339
2043 (forecast)	134.3	42.9	319
Compound annual growth rates			
2004 to 2011 (actuals)	4.9%	N/A	N/A
2011 to 2023 (forecast)	9.0%	9.1%	0.1%
2011 to 2033 (forecast)	7.4%	7.2%	-0.2%
2011 to 2043 (forecast)	6.5%	6.1%	-0.3%

Table 4.6 – Ports intermodal market share forecasts (with 2011 actual data)

	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	19%	37%
2033 (forecast)	46%	63%

Notes: Data refer to imports at major container ports only; Channel Tunnel flows are excluded. Major container ports are defined as ports which currently have or are forecast to have significant intermodal rail traffics. These are: Bathside Bay, Bristol, Felixstowe, Grangemouth, Liverpool, London Gateway, Thamesport, Teesport,Tilbury and Southampton. The 2033 forecasts are shown for illustration. The market shares are approximations only.

Table 4.7 shows the market share implications of the domestic intermodal forecasts. Rail's market share of the domestic non-bulk road and rail market is currently less than one percent in terms of tonnes, but this is forecast to increase to 4 per cent by 2033 in terms of tonnes. The current and forecast market shares are significantly higher in terms of tonne kilometres, reflecting rail's greater competiveness for longer-distance hauls. Despite the very strong growth forecast for the domestic intermodal sector, rail's market share is forecast to be below 15 per cent in terms of tonne kilometres by 2033.

4.3.3 Intermodal scenarios

The Working Group agreed that the Freight Market Study would use scenarios for growth in intermodal traffic. These scenarios are based around a number of alternative assumptions on the relative competitive position between road and rail and around assumptions upon the ability of the market and the planning system to deliver proposed intermodal terminals in the future. For example, while the central case forecasts assume certain increases in rail-connected warehousing sites, the scenarios consider the impact of lower growth in these sites.

In the Route Studies these growth scenarios will be used along with the forecast increase in passenger traffic (where appropriate) to test the value for money of proposed interventions, This will then go on to inform choices for funders for Control Period 6 and beyond.

Planning to 2043 is challenging and in this period some terminal proposals will be constructed, some may not proceed and others, currently unknown, may be proposed. It is the intention of the LTPP that the process is flexible enough to take this into account and it may be the case that if there is substantial change in the number or size of proposed terminals then the scenarios may need to be reviewed in the future.

To reflect the uncertainties about the assumptions, higher and lower scenarios are presented to reflect some alternative assumptions. The higher scenario reflects the following differences from the assumptions used for the central case forecasts, as described above:

- rail productivity improves relative to road productivity over the appraisal period, for all intermodal traffic. This assumes that both average train length and the average number of operational days per week increase by 20 per cent from 2023 onwards, and that there is no change in road productivity over this period. The difference from the central case is that this scenario assumes no change in road productivity, while the central case assumes an improvement in road productivity in line with improvements in rail productivity
- a reduction of £5, in the rail handling charge per container lift, for both ports and inland terminals from 2023. This is assumed to reflect economies of scale and increased competition, and that some ports are developing new more efficient rail terminals, which will not benefit container transfers to HGVs
- a £50 per container reduction in costs for Channel Tunnel through rail intermodal traffic, relative to other modes, from 2023. This reflects the impact of a £30 reduction in Channel Tunnel charges as well as the factors behind the £20 cost reduction assumed for the forecasts[12]. As with the central case forecast, under this scenario the cost reduction was applied to bulk commodities on an equivalent basis, as well as to containers.

Table 4.7 – Domestic intermodal market share forecasts (with 2011 actual data)

	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	0.4%	2%
2033 (forecast)	4%	12%
Notes: The 2033 forecasts are shown for illustration. The market shares are approximations only.		

12 The reduction in Channel Tunnel charges is included in this scenario for illustration only and does not represent an assumption of the Working Group.

The lower scenario reflects the following difference from the forecast assumptions described above:

Rail-connected warehousing sites will expand by less than half the rate assumed in the central case i.e. by 2033 the total area of rail-connected warehousing sites is 4.8 million square metres rather than 9.6 million (compared with the current level of about 1.65 million). This reflects a less positive view of the ability of the market, including the planning system, to deliver new sites, with growth broadly restricted to sites which currently have planning consent.

The results of the scenarios for 2033 are shown in **Figure 4.2** and **Table 4.8**. **Figure 4.2** shows the results relative to the central case forecasts for the intermodal sector as a whole. **Table 4.8** indicates that under the higher scenario annual growth increases from about seven per cent under the central case forecast to eight per cent, in terms of tonne kilometres. This reflects significantly higher growth in all three sub-sectors. Under the lower scenario, annual growth falls to six per cent. The reduction mainly reflects lower domestic intermodal growth. The results are shown in more detail, by sub-sector, in **Appendix 1**.

Figure 4.2 – Intermodal higher and lower scenarios and central case forecasts: tonne kilometres moved in 2033 (with 2011 actual data)

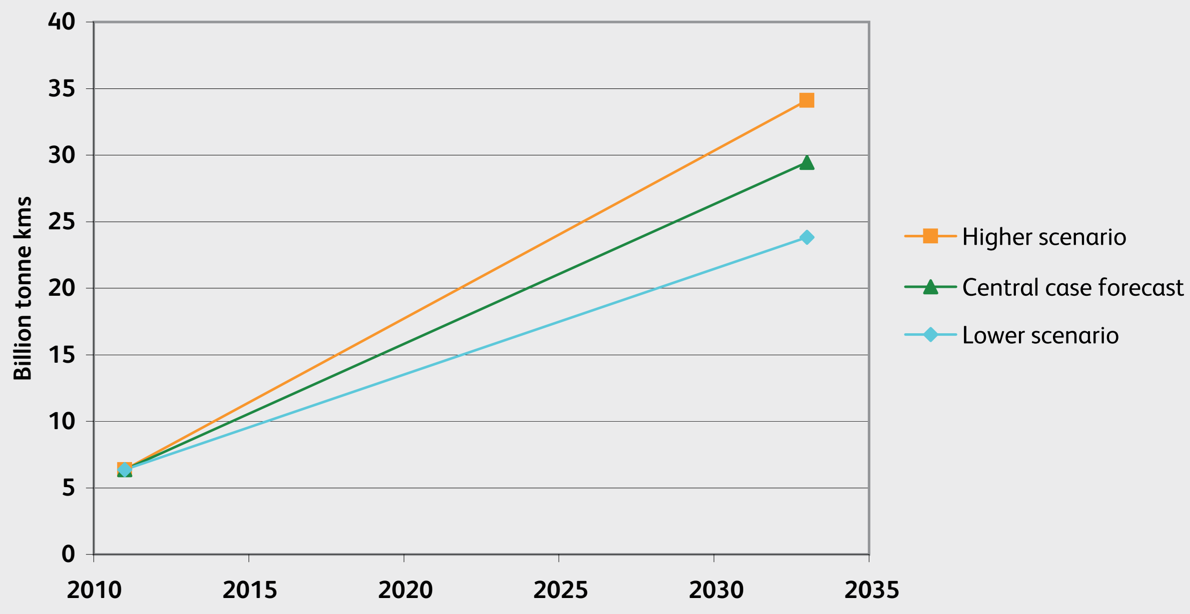


Table 4.8 – Total intermodal scenarios for 2033 (with 2011 actual data)						
	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	18.0	6.4	355	18.0	6.4	355
2033 (forecast)	105.7	34.1	323	70.0	23.8	341
Compound annual growth rates:						
2011 to 2033 (forecast)	8.4%	7.9%	-0.4%	6.4%	6.2%	-0.2%
Notes: For further details see Appendix 1.						

A DB Schenker train carrying coal for electricity generation.

4.4 Electricity Supply Industry Coal and Biomass

This section addresses both Electricity Supply Industry (ESI) coal (i.e. coal used for electricity generation) and biomass used for electricity generation, as for the purposes of rail industry forecasting, there is a clear synergy between the two, both being inputs to electricity generation at inland power stations.

Rail has supported the electricity generation market for many years, moving significant volumes of bulk coal for burning in power stations. This business was transformed in the 1960s by the introduction of efficient 'merry-go-round' train services which increased coal train payloads and speeded up loading and discharge activities which greatly improved resource productivity. The trend towards greater productivity has continued in the modern era with the introduction of yet higher payload wagons and the operation of longer, heavier trains. Rail's bulk payload productivity means that it will continue to dominate the market for coal movement so long as demand to burn the fuel persists.

In recent years the coal market on rail has fluctuated due to:

- the relative price of other fuels used for power generation – especially gas since the 1990s
- Changing supply points. The deep coal mine industry in Britain began to decline fairly rapidly from the early 1990s with imported coal the main substitute. However, for a period (between approximately 2000 and 2007) there was a surge in opencast Scottish coal being transported over long distances into England prior to Humber port and rail capacity being improved in order to cater for demand closer to the point of consumption.

Between 2011 and 2013 coal has experienced a relative resurgence as a result of its price advantage over gas. The rapid growth in "fracking" has produced an abundance of cheap shale gas in North America and led to a rapid switch away from the use of coal to generate electricity. This has in turn flooded the world market with American domestically produced coal at low prices. In 2012 (calendar year) UK coal burn (mainly supplied by rail) was just over 50 million tonnes, an increase of 33 per cent[13] relative to the previous year, whilst use of gas fell 34 per cent . Domestic (mainly opencast) coal supplied 16 million tonnes with the remainder imported. However, there are compelling reasons to believe that these volumes of coal demand will not be sustained and are due to fall rapidly.

Coal remains the world's most abundant fuel and is relatively cheap as a result. However, the energy generation market is increasingly being influenced by EU and Government policy rather than market forces. Coal burning is a major generator of carbon dioxide (CO2) and as a result reduction in its use in the electricity industry has become firm public policy in order to seek to mitigate the impact of climate change.

13 Source: Department of Energy and Climate Change. Fuel used by major power producers.

The EU and the UK Government are introducing a sophisticated framework of legislation to incentivise the electricity industry to move away from coal, towards renewable and nuclear generation over the long term, though in the medium term there will also be an increase in the use of gas.

The principal (but by no means only) measures involved in reducing demand for coal are:

- operating cost disincentive – the Carbon Floor Price ('carbon tax') applied to coal
- capital cost disincentive – the EU Industrial Emissions Directive which requires heavy investment in nitrogen emission cleansing plant if coal is to continue to be burned.

The principal measure involved in promoting renewable electricity generation (which includes biomass) is Government support via Renewables Obligations and "Contracts for Differences. In order to provide certainty for investors these provide a financial framework which is guaranteed until 2027.

This framework of legislation is shaping the future electricity market. The Government's (DECC) forecasts for the sources of electricity generation – as discussed below – reflect the Government's intentions. The forecasts for coal and biomass are therefore different from the forecasts for most other sectors, since the markets for these sectors mainly reflect the Government's intentions for electricity generation, rather than market forces.

Following publication of the Freight Market Study Draft for Consultation in April 2013 some consultees expressed an alternative view of the energy sector. They thought that the decline in use of coal for electricity generation may not be as pronounced or rapid as that forecast by DECC. Government's intentions for carbon reduction by the energy sector were acknowledged but it was observed that the real terms increase in electricity bills necessary to pay for the cost of switching to lower carbon generating may not prove politically sustainable in view of the impact on individual households and the cost to businesses whose overseas competitors may enjoy lower cost energy. Nevertheless and notwithstanding the articulation of this alternative scenario, it was felt that the base case for the sector needed to reflect a continuation of current Government policy.

4.4.1 ESI Coal and Biomass assumptions

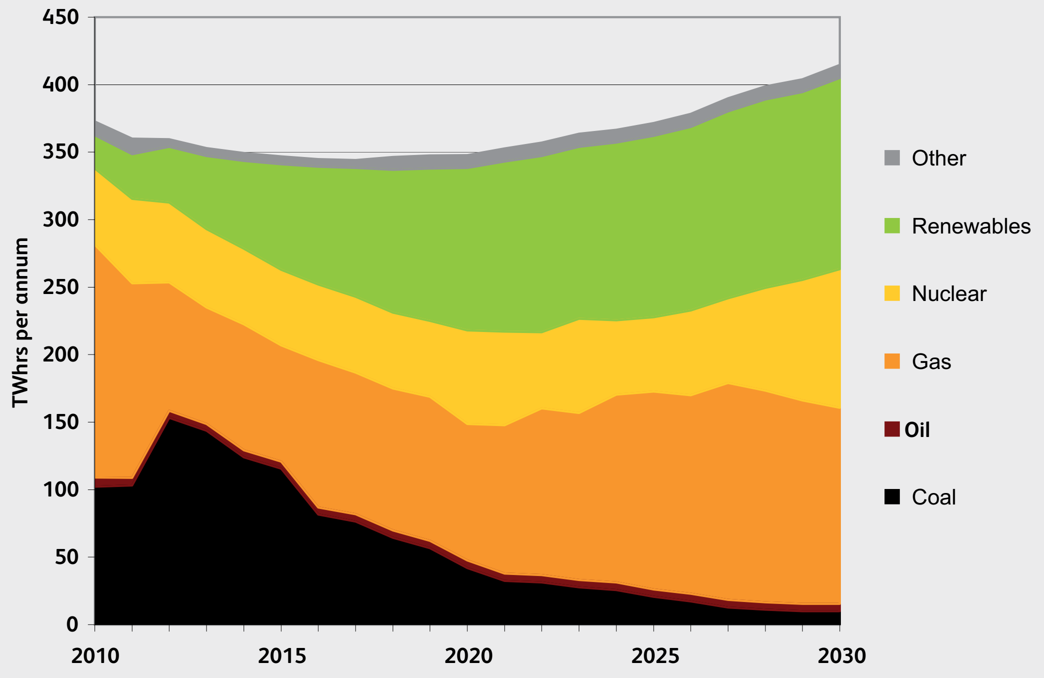
This section addresses the assumptions used for the central case forecasts for the ESI coal and biomass sectors. The next section, Section 4.4.2, presents the forecasts for these sectors and this is followed by Section 4.4.3 which discusses the biomass scenarios.

The ESI coal central case forecasts use Department of Energy and Climate Change (DECC) projections of energy use, which were published in October 2012[14]. Figure 4.3 shows actual electricity supply by fuel in 2010 and 2011 and projections from 2012 to 2030 (calendar years). It shows a projected decline in coal and a rise in gas, renewables and nuclear, between 2011 and 2030.

The projected fall in coal, relative to a 2011 base, is 74 per cent by 2023 (financial year) and 90 per cent by 2030. The graph also shows that, as at October 2012, a sharp increase in coal was projected for 2012; this has occurred as discussed above.

The forecasts on coal carried by rail assume the reductions in coal based generation shown above relative to 2011 and apply them to coal rail tonnages in the 2011 calendar year (40.4 million tonnes[15]) to obtain the coal tonnes forecast for 2023 – see Table 4.9. The 2030 figure was calculated in the same way and was assumed to apply to both 2033 and 2043 as no change was forecast after 2030, since the DECC projections do not extend beyond 2030.[16]

Figure 4.3 – Projections for electricity supply by fuel[16]



14 Updated Energy and Emission Projections, DECC, October 2012

15 Note that Table 4.9 refers to 2011/12 financial year.

16 Updated Energy and Emission Projections, DECC, October 2012 Central Scenario. Figure 6.3 and annex E, fuel for all generators.

Three coal-fired power stations closed or ceased to use coal in 2013; these were Cockenzie, Didcot and Ironbridge. The forecast tonnages were distributed to the remaining rail fed power stations by scaling down their existing coal traffics[17]. It would appear to be likely that more of the remaining power stations will close or switch to biomass, but not all individual decisions are clear at this stage.

There is considerable uncertainty around the future use of biomass to fuel power stations. This will be considered separately as commitments in the Biomass market become evident. Pro-tem, it is necessary to make working assumptions for the forecasting work.

The working assumption is that the remaining power stations will switch around 30 per cent of their generating capacity to biomass by 2023. Biomass produces lower energy output per tonne, so for any power station to retain its generating capacity it will have to increase the tonnes of fuel it receives[18]. It may be that a few of the remaining power stations will switch 50 per cent or fully to biomass, a few will remain with coal and others may close, but it is too early to say what will happen on a case by case basis. It is also assumed that 80 per cent of incoming biomass would be transported by rail.

Taking all these factors into account, the forecast biomass by rail tonnage is 35 per cent of the coal tonnage currently arriving at power stations. In 2011 the calendar year actual coal tonnage by rail was 40.4 million tonnes, 35 per cent of this tonnage results in 14.1 million tonnes of biomass forecast for 2023 as shown in Table 4.9. It is also assumed that this also applies to 2033 and 2043.

The figure of 14 million tonnes is consistent with plans which have been announced by the power stations[19] and the study's interpretation of Government policy – as discussed above. The scenarios presented below reflect the uncertainties involved.

The Government's Renewables Obligation policy is favouring full conversion of individual generating units, since full conversion will have a higher level of support than co-firing of units[20].

It would appear likely that stand-alone biomass plants at new sites will not have a significant impact on rail flows. If they are on the coast, they are not likely to be rail fed, and if they are inland they are likely to be smaller scale and sourced by road.

It is assumed that when power stations convert to biomass, the origin of the fuel flows (previously coal and now biomass) remain similar on a national overall basis, though there is likely to be some switching of import options by individual generators as they determine their supply chains.

Rail is assumed to maintain its 95 per cent market share of coal supply to inland power stations.

The forecasts were developed before the ORR announced changes to track access charges for ESI coal and biomass which will be introduced in CP5 (see Section 4.2). These changes will include a freight specific charge for ESI coal. The forecasts have not been adjusted in the light of these changes on the basis that the ESI coal and biomass forecasts are determined by government policy rather than changes to access charges. The access charge changes are discussed in Appendix 1.

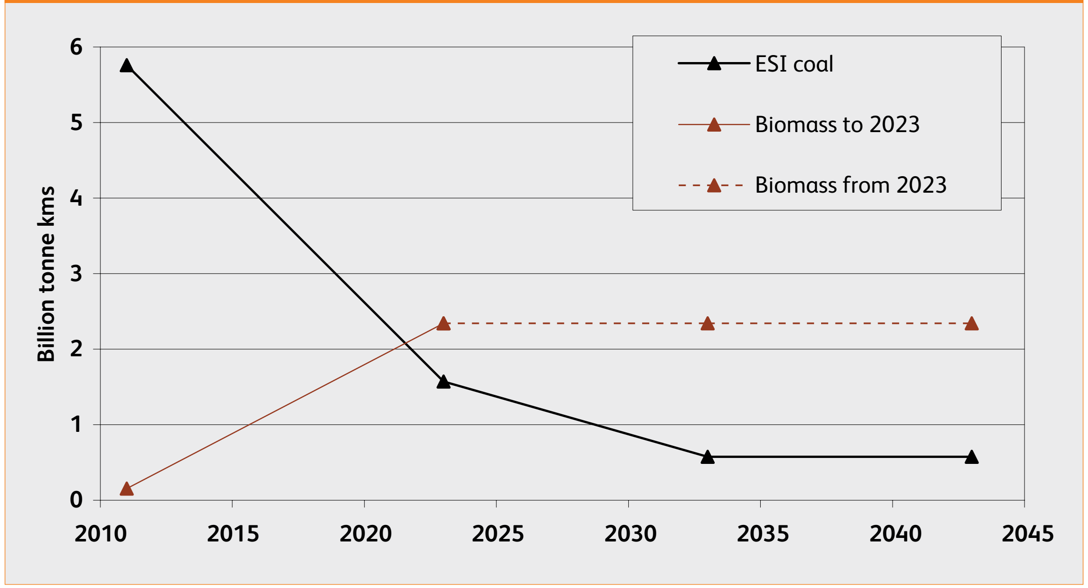
17 The remaining coal-fired power stations are Drax, West Burton, Cottam, Fiddlers Ferry, Eggborough, Ratcliffe, Ferrybridge, Longannet, Aberthaw, Rugeley, Lynemouth, Fifoots and Wilton.
18 The caloric value of biomass is lower than for coal (17 kJ per kg compared with 25 kJ). Source: GBRf. This means that 47 per cent more biomass (in tonnes) is required for a given energy output.
19 Noting that in some cases, plans may change and are not yet confirmed.

20 See Government response to consultation on proposals for the level of banded support under the Renewables Obligation for the period 2013-17 and the Renewables Obligation Order 2012, DECC (July 2012).

4.4.2 ESI Coal and Biomass forecasts

The central case forecasts are shown in Figure 4.4 and Table 4.9. Figure 4.4 shows the forecast decline in coal and increase in biomass, in terms of tonne kilometres.

Figure 4.4 – ESI coal and biomass forecasts: tonne kilometres moved (with 2011 actual data)



Biomass is a growing traffic for rail.

The Freight Market Study recognises the uncertainties involved in the biomass market sector. Given the assumptions set out above, a central case estimate of 14 million tonnes in 2023 is used for the purposes of this study: this is shown in Table 4.9 but higher and lower scenarios are also presented – see Section 4.4.3.

Beyond the 2023 forecast year (and more specifically after 2027 when the current financial guarantees expire, as discussed above) the uncertainties are greater still, since other fuel sources may provide greater environmental benefits relative to biomass and the asset life of the new biomass units is unclear. For these reasons Figure 4.4 shows the biomass forecasts after 2023 with a dotted line.

Table 4.9 shows that the forecasts assume little change in average haul length over the forecast period, a result of the assumption that the origin and destination of coal and biomass flows remain broadly unchanged.

Table 4.9 – ESI coal and biomass forecasts (with 2004 and 2011 actual data)

	ESI coal: million tonnes lifted	ESI coal: billion tonne kms moved	ESI coal: average length of haul (km)	Biomass: million tonnes lifted	Biomass: billion tonne kms moved	Biomass: average length of haul (km)
2004 (actual)	40.7	N/A	N/A	N/A	N/A	N/A
2011 (actual)	41.1	5.76	140	0.8	0.15	188
2023 (forecast)	10.6	1.57	147	14.1	2.34	166
2033 (forecast)	3.9	0.58	148	14.1	2.34	166
2043 (forecast)	3.9	0.58	148	14.1	2.34	166
Compound annual growth rates						
2004 to 2011 (actuals)	0.2%	N/A	N/A	N/A	N/A	N/A
2011 to 2023 (forecast)	-10.6%	-10.3%	0.4%	26.8%	25.5%	-1.0%
2011 to 2033 (forecast)	-10.1%	-9.9%	0.2%	13.8%	13.2%	-0.6%
2011 to 2043 (forecast)	-7.1%	-6.9%	0.2%	9.3%	8.9%	-0.4%

4.4.3 Biomass scenarios

Biomass scenarios are shown in Figure 4.5 and Table 4.10 below. The scenarios reflect a range of possible biomass outcomes by 2023, based on discussions with stakeholders.

The higher scenario is 25 million tonnes, and the lower scenario is 10 million tonnes; both are converted to tonne kilometres. The biomass market is developing rapidly and the forecasts will be revisited during the LTPP to refine the planning scenarios used by the Route Studies.

Figure 4.5 – Biomass higher and lower scenarios and central case forecasts: tonne kilometres moved in 2023 (with 2011 actual data)

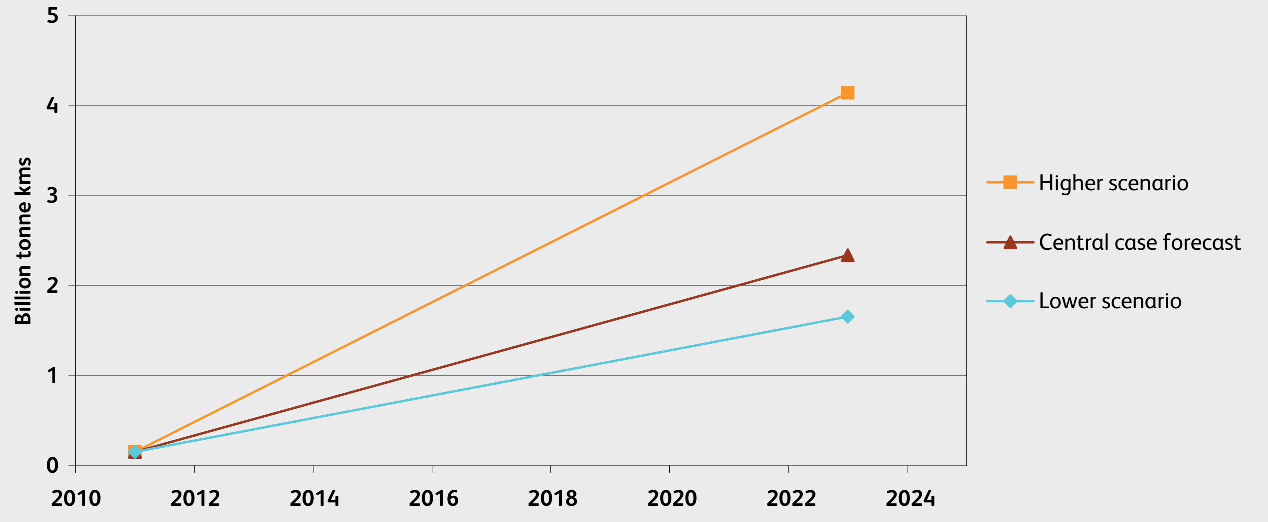


Table 4.10: – Biomass scenarios for 2023 (with 2011 actual data)

	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	0.8	0.2	188	0.8	0.2	188
2023 (forecast)	25.0	4.1	166	10.0	1.7	166
Compound annual growth rates:						
2011 to 2023 (forecast)	33.0%	31.6%	-1.0%	23.2%	21.9%	-1.0%

Notes: The scenarios assume the same average haul length in 2023 as the central case forecasts.


A DB Schenker train carrying Limestone for use by industry.

4.5 Construction materials

This sector includes:

- primary aggregates
- secondary (or recycled) aggregates
- soils from construction excavation
- cement.

The most important rail flows are the primary aggregates (particularly limestone and sand / gravel) and cement.

This sector excludes construction materials used for Network Rail's own infrastructure works, which are discussed in Section 4.14.

Construction materials tend to have a relatively low value and are transported in large quantities. Hence they form a market that is well suited to rail's traditional strength in providing high productivity transport for bulk users.

However, for aggregates, transport costs form a very high proportion of the final price of the material (up to around 50 per cent) hence modal choice is very sensitive to small differences in transport costs and some rail business can be marginal.

This commercial environment has long caused the sector to take a lead in terms of innovation in rail freight and it is no coincidence that aggregates feature by far the highest productivity heavy haul rail freight operation in Britain – trains close to 5,000 tonnes gross between the Mendip quarries in Somerset and Acton in West London.

Aggregates are found abundantly throughout most of Britain but their extraction can create an intrusive industry. As a result, local quarries and gravel pits tend to exhaust their consented reserves and go out of production.

Rail increases its modal share in the construction market as a result and moves more bulk aggregate over longer distances from rail served super quarries. Long term modal share for rail is still growing in this sector over and above cyclic fluctuations in line with movements in the economy and the needs of major construction projects such as the Olympic Park, Crossrail and High Speed 2.

Aggregates on rail have also increased their geographical reach.

The following is a broad simplification but is illustrative of this trend in demand:

- 20 – 30 years ago demand was mainly in London and the South East
- 10 – 20 years ago demand had spread to other large cities such as Manchester, Leeds and Birmingham
- more recently rail terminals that receive aggregates have been developed and more are being sought in medium sized conurbations such as Exeter, Hull and Preston.

However, demand in London and South East still dominates the sector.

The nature of the materials carried on rail is also diversifying as a consequence of a decline in road building and growing demand for more specialised aggregates e.g. with higher Polished Stone Value ("PSV"). Recycled aggregates have begun to feature on rail such as clay sand from Cornwall.

The market is also undergoing considerable commercial changes currently through the Joint Venture creation of Tarmac Lafarge as a single company and the emergence of Hope Construction Products as a new customer. The impacts of these changes on rail will take some time to emerge.

There is more uncertainty in the long term. Some rail served super quarries may need to seek planning consent to extend their reserves, if they do not receive this permission, in the face of competition from imported aggregates from European coastal quarries, there may be some changes to this market in the very long term. However the degree and timing of this change are too distant for it to be factored into this study.

4.5.1 Construction materials assumptions

Alongside the general assumptions set out earlier in this chapter, the following sector specific assumptions are used:

- overall demand for construction materials is assumed to increase in line with forecast population growth (from the DfT's WebTAG Guidance), i.e. an increase of seven per cent (from the base year) by 2023, 12 per cent by 2033 and 15 per cent by 2043
- no site specific assumptions have been made on quarry expansions, openings or closures or on major new developments which will use aggregates during the forecast period. Base year origin and destination assumptions are therefore assumed to continue. The base year in this context was the year to September 2012.

4.5.2 Construction materials forecasts

The forecasts are shown in Figure 4.6 and Table 4.11.

The forecasts suggest modest growth in terms of tonne kilometres and tonnes (approximately one per cent per annum to 2043). The growth between 2011 and 2023 is lower, partly due to the impact of higher access charges for this sector – see Appendix 1.

In the very long term, from about 2040, domestic production could fall due to the expiry of consents, with a greater amount of imports as a result. The forecasts do not currently reflect this in terms of any impacts on total volumes or on changes to origins and destinations.

Figure 4.6 – Construction materials forecasts: tonne kilometres moved (with 2001 to 2011 actual data)

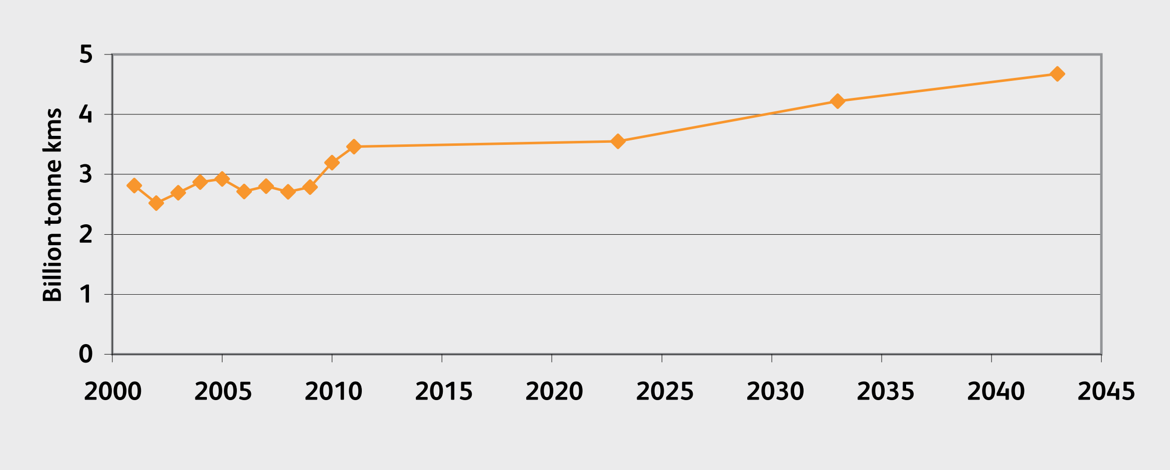


Table 4.11 – Construction materials forecasts (with 2001, 2004 and 2011 actual data)			
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2001 (actual)	N/A	2.81	N/A
2004 (actual)	18.5	2.87	155
2011 (actual)	18.2	3.46	191
2023 (forecast)	19.0	3.55	187
2033 (forecast)	22.6	4.22	187
2043 (forecast)	25.0	4.67	187
Compound annual growth rates			
2001 to 2011 (actuals)	N/A	2.1%	N/A
2004 to 2011 (actuals)	-0.3%	2.7%	3.0%
2011 to 2023 (forecast)	0.4%	0.2%	-0.2%
2011 to 2033 (forecast)	1.0%	0.9%	-0.1%
2011 to 2043 (forecast)	1.0%	0.9%	-0.1%

The approach used for the modelling work assumes existing origins and destinations are unchanged. This may not capture moves towards larger quarries nor does not it capture the potential development of coastal super quarries, or longer average hauls, if these trends continue to develop over the longer term. It also does not capture the potential development of coastal super quarries.

Table 4.12 shows the market share implications of these forecasts. Rail's market share of the total market, in terms of tonne kilometres is currently about 17 per cent and this is forecast to increase to 19 per cent by 2033.

Table 4.12 – Construction materials: market share forecasts (with 2011 actual data)		
	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual)	6%	17%
2033 (forecast)	6%	19%
Notes: The 2033 forecasts are shown for illustration. The market shares are approximations only, due to difficulties with defining the relevant road sectors.		

4.6 Metals

This sector principally involves the iron and steel markets. These markets are dominated by a small number of companies the largest of whom, Tata and SSI, operate large integrated manufacturing plants. Other large rail users such as Celsa and European Metals Recycling specialise in particular product sectors. A feature of the sectors use of rail is a tendency for transport to be integrated into the manufacturing production line. Examples include;

- steel slab made in plant A is moved to plant B to be rolled into sheet coil or long products
- recycled materials are fragmentised at plant C and moved to plant D to convert into concrete reinforcing bar.

This means that, whilst overall demand for metals is market driven, the routeing and volume of movements on rail is affected by the decisions of a limited number of manufacturers as to how and where products are made. Increasingly these production decisions are made on a global basis to determine not just the site but the country of production.

Consequently the volumes and patterns of movements of freight are difficult to predict. However, consultation with key stakeholders during the development of this work suggests that confidence is returning to the industry after the recession and that key investments are being made which will help to secure the size of the metals business on rail in Britain over the medium to long term.

4.6.1 Metals assumptions

The general assumptions presented earlier in this chapter in Section 4.2 were used to forecast this market sector. No change in the overall markets (i.e. road and rail markets) are assumed. Growth in rail volumes can be attributed to the improvements in the economics of rail used within the modelling work. An understanding of the metals sector, however, suggests that, as in many of the sectors, the use of rail is dependent upon a wide range of business decisions, of which transport costs are only a part.

4.6.2 Metals forecasts

The forecast for the metals sector are in **Figures 4.7** and **Table 4.13**.

Figure 4.7 – Metals forecasts: tonne kilometres moved (with 2001 to 2011 actual data)

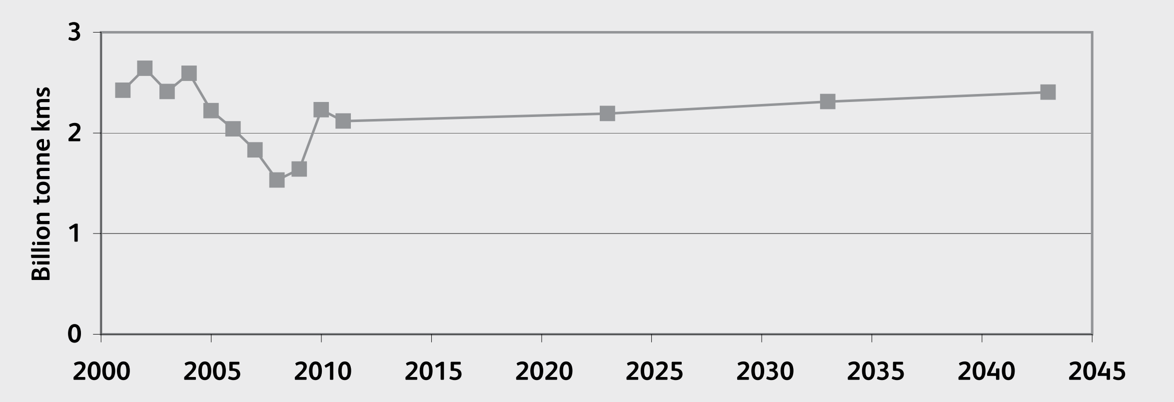


Table 4.13 – Metals forecasts (with 2001, 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2001 (actual)	N/A	2.42	N/A
2004 (actual)	11.19	2.61	234
2011 (actual)	8.03	2.12	264
2023 (forecast)	8.35	2.19	262
2033 (forecast)	8.90	2.31	260
2043 (forecast)	9.24	2.40	260
Compound annual growth rates			
2001 to 2011 (actuals)	N/A	-1.3%	N/A
2004 to 2011 (actuals)	-4.6%	-3.0%	1.7%
2011 to 2023 (forecast)	0.3%	0.3%	0.0%
2011 to 2033 (forecast)	0.5%	0.4%	-0.1%
2011 to 2043 (forecast)	0.4%	0.4%	0.0%

A set of petroleum tanks returning from a Total depot in Nottinghamshire for reloading on Humberside.

The market share forecasts are in **Table 4.14**.

Table 4.14 – Metals market share forecasts (with 2011 actual data)		
	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	20%	33%
2033 (forecast)	24%	N/A
Notes: The 2033 forecast, based on tonnes, is shown for illustration. The market shares are approximations only.		

4.7 Petroleum

The overall petroleum market is changing;

- petrol demand is falling by 4 per cent year on year as motorists switch to diesel and use more economical vehicles
- diesel demand is flat/slightly rising
- aviation demand is buoyant and rising over the long term
- Great Britain's oil refineries were built with 'cracking' technology to meet the demand for petrol. The decline in its consumption has undermined the economic viability of refineries which has led to refinery sales and closures. The petroleum market is changing to become an industry that imports refined products from the Middle East and South Asia and retails via the major supermarkets
- the major competitor to rail in this market is movement by pipeline. The operating costs of pipelines are viewed as lower than any competing mode plus they bring safety and environmental benefits. The networks have been modified with new spurs to new import storage facilities. Pipelines are particularly good at serving the bulk needs of major airports - the market experiencing most growth
- pipeline operators do not have life expiry dates for their infrastructure. The assets are seen as sustainable over the long term due to ongoing maintenance and the lifespan of pipelines could be extended by reducing pressures and flow rates.

There are eight principal pipeline networks in Britain mostly dating from the 1960s through to the 1990s. Only the Government owned system is older – construction commenced before World War 2. However, significant sections of the Government system are redundant and mothballed as they serve now closed military bases and the sections serving commercial needs have been maintained to a higher level.

As the major oil companies have exited refining and retailing in the UK, new entrants have taken their place as petroleum logistics businesses. New entrants do not have open access to the pipeline and storage network. However, they gain a commercial benefit from speedy delivery directly to forecourts since fuel duty is paid when the product leaves the import facility. This can be a significant cash flow consideration in managing supply chains but it tends to militate in favour of exploiting the immediacy of road delivery rather than bulk transport supply chains involving rail.

Future growth opportunities could arise if new storage facilities which exploited rail's commercial advantage in delivering bulk trainload volumes were developed. However, site selection is a significant issue since the fire at Buncefield in Hertfordshire and no schemes are known to be under development currently. New opportunities for rail could arise in the petroleum sector over the timeline of the forecasts but their nature and timing is too uncertain for these to be quantified at present.

4.7.1 Petroleum assumptions

The general assumptions presented earlier in this chapter in Section 4.2 have been used for this market. No change in the size of the total market (i.e. road and rail) was assumed. Growth in rail volumes can be attributed to the improvements in the economics for rail used within the modelling work. The forecasts do not take account of the possibility of additional rail traffic resulting from modal shift from pipelines. The forecasts address modal shift from road to rail. Clearly, pipelines carry a significant proportion of the total market for movement of petroleum in Great Britain.

4.7.2 Petroleum forecasts

The forecasts for the petroleum sector are in Figures 4.8 and Table 4.15. The market share forecasts are in Table 4.16.

Figure 4.8 – Petroleum forecasts: tonne kilometres moved (with 2001 to 2011 actual data)

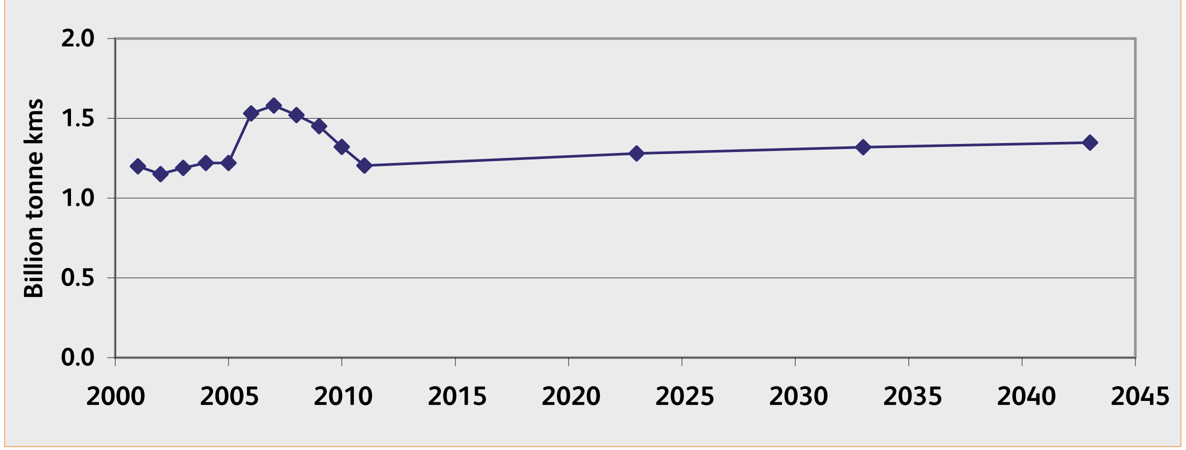


Table 4.15 – Petroleum forecasts (with 2001, 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2001 (actual)	N/A	1.20	N/A
2004 (actual)	5.3	1.22	232
2011 (actual)	4.8	1.20	251
2023 (forecast)	5.1	1.28	250
2033 (forecast)	5.4	1.32	244
2043 (forecast)	5.6	1.35	243
Compound annual growth rates			
2001 to 2011 (actuals)	N/A	0.0%	N/A
2004 to 2011 (actuals)	-1.3%	-0.2%	1.2%
2011 to 2023 (forecast)	0.6%	0.5%	0.0%
2011 to 2033 (forecast)	0.5%	0.4%	-0.1%
2011 to 2043 (forecast)	0.5%	0.4%	-0.1%

Table 4.16 – Petroleum market share forecasts (with 2011 actual data)

	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	7%	17%
2033 (forecast)	7%	N/A

Notes: The 2033 forecast, based on tonnes, is shown for illustration. The market shares shown are an overstatement since petroleum traffic in pipelines is not included in the denominator.

4.8 Chemicals

The chemicals manufacturing industry in Britain has been reducing over the long term with more products being sourced from abroad and some processors switching rail movements to coastal shipping. There has also been a trend within the chemicals industry to seek to eliminate off site transport of more hazardous materials altogether by arranging that raw materials are produced and processed on single sites.

Historically, train ferry operation between the near Continent and Britain featured a high proportion of chemicals traffic. The train ferry was discontinued when the Channel Tunnel opened and chemicals traffic on rail ceased because of stricter rules imposed on the passage of dangerous goods through the Channel Tunnel. The rail borne chemicals market is not expected to change in the light of these restrictions.

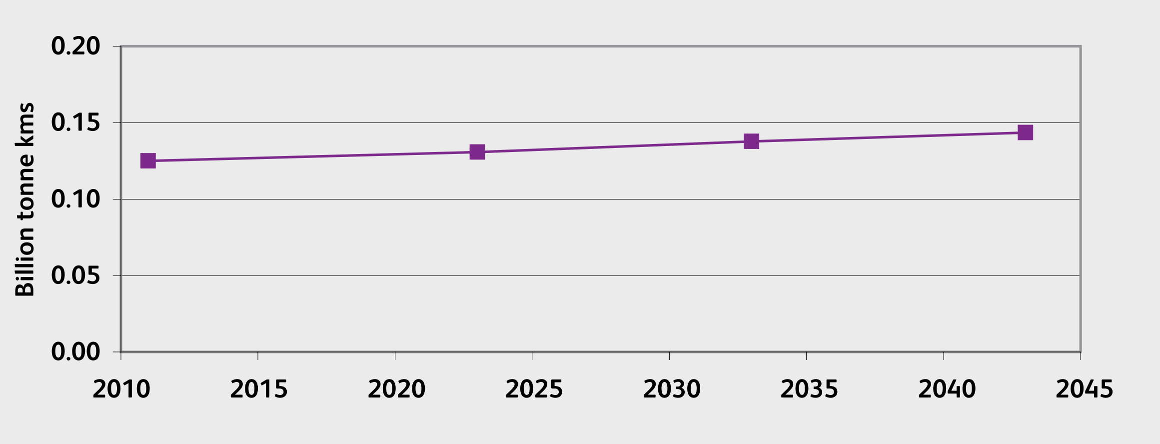
4.9.1 Chemicals assumptions

This market sector was forecast using the general assumptions presented earlier in this chapter in Section 4.2. No change in the overall markets (i.e. road and rail markets) was assumed for this sector. A certain amount of growth in rail carriage of chemicals, however, is assumed to result from improvements in the economics for rail used in the modelling work.

4.8.2 Chemicals forecasts

The forecast for the chemicals sector are in Figure 4.9, and Table 4.17. The market share forecasts are in Table 4.18.

Figure 4.9 – Chemicals forecasts: tonne kilometres moved (with 2011 actual data)



Chemicals for Industry – Movement by rail of Chemicals for use in industrial processes .

Table 4.17 – Chemicals forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	1.56	N/A	N/A
2011 (actual)	0.70	0.13	178
2023 (forecast)	0.73	0.13	178
2033 (forecast)	0.79	0.14	174
2043 (forecast)	0.83	0.14	173
Compound annual growth rates			
2004 to 2011 (actuals)	-10.7%	N/A	N/A
2011 to 2023 (forecast)	0.3%	0.4%	0.0%
2011 to 2033 (forecast)	0.5%	0.4%	-0.1%
2011 to 2043 (forecast)	0.5%	0.4%	-0.1%

Table 4.18 – Chemicals market share forecasts (with 2011 actual data)

	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	1%	1%
2033 (forecast)	1%	N/A

Notes: The 2033 forecast, based on tonnes, is shown for illustration and assumes no significant change in tonnes lifted by road. N/A denotes not available. The market shares are approximations only.

4.9 Industrial Minerals

The industrial minerals market features some niche rail market flows of regional significance such as china clay in Cornwall, alumina to the Scottish West Highlands and potash in the North East. The regional significance of such flows helps to spread the network-wide coverage of rail freight which also benefits Network Rail's infrastructure haulage needs. This sector is not expected to see changes which will have a network wide impact.

4.9.1 Industrial Minerals assumptions

This market sector is forecast using the general assumptions set out earlier in this chapter in Section 4.2. No change in the overall markets (i.e. road and rail markets) was assumed for this sector. However some growth is forecast as a result of improvements in the economics for rail used in the modelling work.

4.9.2 Industrial Minerals forecasts

The forecasts for the industrial minerals sector are in Figure 4.10, and Table 4.19. The market share forecasts are in Table 4.20.

Figure 4.10 – Industrial minerals forecasts: tonne kilometres moved (with 2011 actual data)

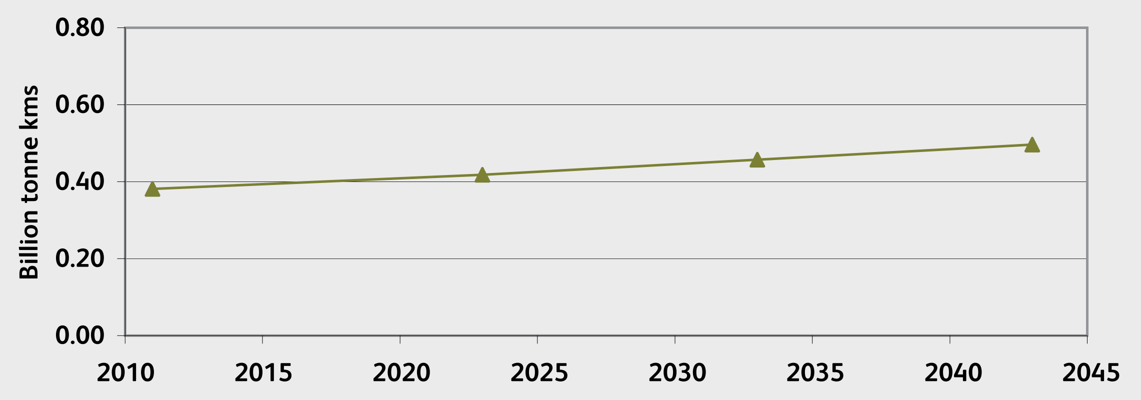


Table 4.19 – Industrial minerals forecasts (with 2004 and 2011 actual data)			
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	2.91	N/A	N/A
2011 (actual)	2.39	0.38	160
2023 (forecast)	2.59	0.42	161
2033 (forecast)	2.79	0.46	164
2043 (forecast)	2.98	0.50	167
Compound annual growth rates			
2004 to 2011 (actuals)	-2.8%	N/A	N/A
2011 to 2023 (forecast)	0.7%	0.8%	0.1%
2011 to 2033 (forecast)	0.7%	0.8%	0.1%
2011 to 2043 (forecast)	0.7%	0.8%	0.1%

Table 4.20 – Industrial minerals market share forecasts (with 2011 actual data)		
	Rail market share based on tonnes	Rail market share based on tonne kms
2011 (actual) (calendar year)	3%	10%
2033 (forecast)	4%	N/A

Notes: The 2033 forecast, based on tonnes, is shown for illustration and assumes no significant change in tonnes lifted by road. The figures shown are approximate due to differences in definitions between road and rail.

An automotive train on the West Coast Main Line.

4.10 Automotive

The automotive market is characterised by:

- the business is global
- countries both import and export flows of cars
- the ships have grown significantly in size to benefit from economies of scale
- when trans-Atlantic and Far Eastern ships arrive in European waters they make several calls in different countries to load and unload at each
- in Great Britain, this shipping pattern militates in the favour of the use of South Coast ports – particularly Southampton – that are within easy reach of other countries' ports of call, and
- feeder ships serve more northerly and smaller ports.

There are movements of cars for export by rail from the Midlands and North West to Southampton. There are also significant rail markets for finished cars served by the Ports of Bristol and Immingham.

During the course of this study further plans for the use of rail by the automotive sector have emerged. The car industry has exited from the recession healthily with plans for major investment led expansion with significant impacts on supply chains and aspirations for greater use of rail including new rail terminals. The ports sector also has automotive development plans with existing flows expected to expand and new ones likely to emerge. However, most of these plans are at an early stage of development and it has not been possible to quantify the impact on rail for this study.

4.10.1 Automotive assumptions

This market sector used the general assumptions presented earlier in this chapter in **Section 4.2**. No change in the overall markets (i.e. road and rail markets) was assumed for this sector. Growth in rail volumes can be attributed to the improvements in the economics for rail used in the modelling work. However, stronger growth will probably emerge as the industry's development and investment plans take firmer shape.

4.10.2 Automotive forecasts

The forecasts for the automotive sector are in Figure 4.11, and Table 4.21. The market share forecasts are in Table 4.22.

Figure 4.11 – Automotive forecasts tonne kilometres moved (with 2011 actual data)

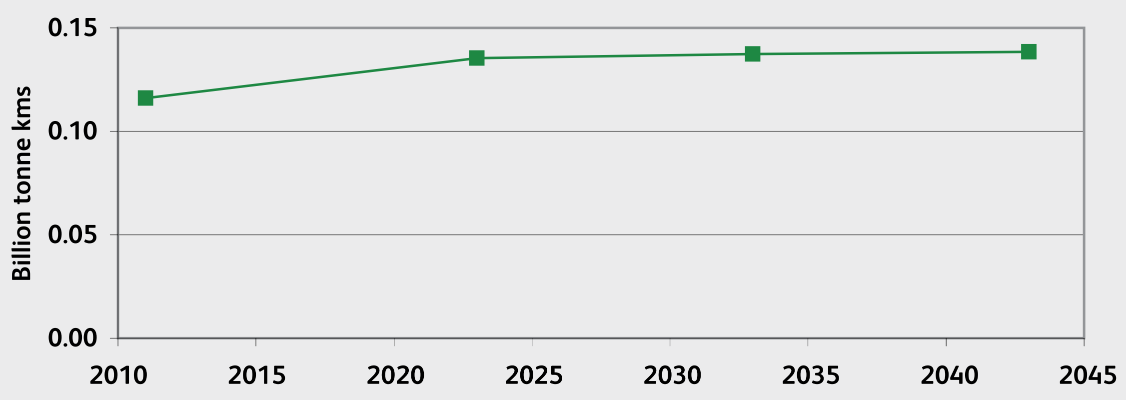


Table 4.21 – Automotive forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	0.39	N/A	N/A
2011 (actual)	0.35	0.12	334
2023 (forecast)	0.42	0.14	324
2033 (forecast)	0.42	0.14	325
2043 (forecast)	0.43	0.14	324
Compound annual growth rates			
2004 to 2011 (actuals)	-1.8%	N/A	N/A
2011 to 2023 (forecast)	1.5%	1.3%	-0.2%
2011 to 2033 (forecast)	0.9%	0.8%	-0.1%
2011 to 2043 (forecast)	0.7%	0.6%	-0.1%

Table 4.22 – Automotive market share forecasts (with 2011 actual data)

	Rail market share based on tonnes	Rail market share based on tonnes kms
2011 (actual) (calendar year)	1%	3%
2033 (forecast)	1%	N/A

Notes: The 2033 forecast, based on tonnes, is shown for illustration and assumes no significant change in tonnes lifted by road. The market shares are approximations only.

4.11 Ore

The only substantial flow of iron ore on rail in Britain passes between the Port of Immingham and Scunthorpe steel works. New flows are not expected to develop.

4.11.1 Ore assumptions

The forecasts for this sector assume no change in the overall market and no change in rail's market share, relative to the base year (the year to September 2012).

4.11.2 Ore forecasts

The forecasts for the ore sector are in Figure 4.12 and Table 4.23.

Figure 4.12 – Ore forecasts: tonne kilometres moved (with 2011 actual data)

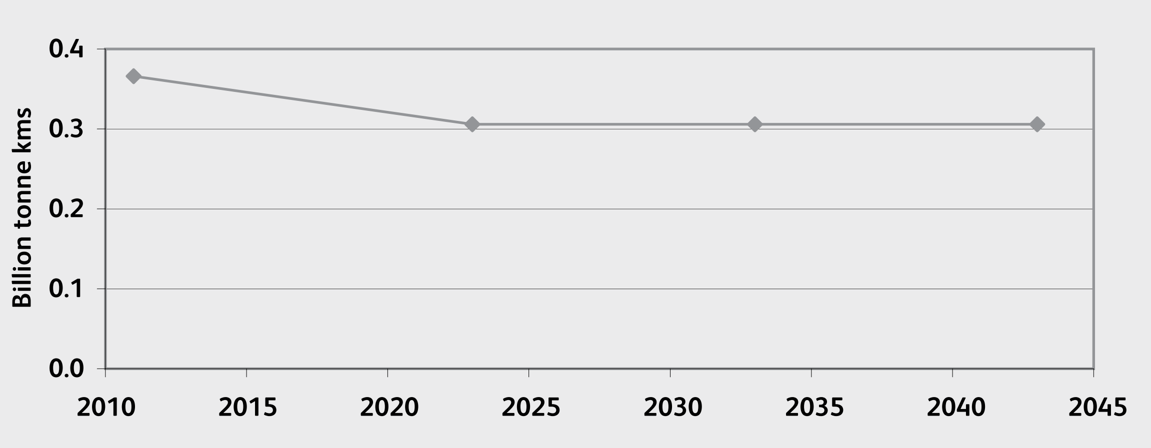


Table 4.23 – Ore forecasts (with 2004 and 2011 actual data)			
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	6.12	N/A	N/A
2011 (actual)	4.87	0.37	75
2023 (forecast)	4.13	0.31	74
2033 (forecast)	4.13	0.31	74
2043 (forecast)	4.13	0.31	74
Compound annual growth rates			
2004 to 2011 (actuals)	-3.2%	N/A	N/A
2011 to 2023 (forecast)	-1.4%	-1.5%	-0.1%
2011 to 2033 (forecast)	-0.8%	-0.8%	-0.1%
2011 to 2043 (forecast)	-0.5%	-0.6%	0.0%
Notes: The forecast decline to 2023 only reflects a decline between 2011 and the base year (year to September 2012): no other changes are forecast.			

4.12 Non Electricity Supply Industry Coal

This sector represents all coal flows apart from ESI coal, discussed earlier in this chapter. It comprises coal used by industries other than electricity generation – principally cement and steel manufacture.

The only flow of coal by rail for steel manufacture passes between the Port of Immingham and Scunthorpe steel works. New flows for steel making are not expected to develop. Changes to the market for supply of coal to cement manufacturers in Britain are also unlikely. Use of coal has declined as the industry has improved its energy efficiency significantly over time and moved substantially towards using recycled materials as fuel.

4.12.1 Non Electricity Supply Industry Coal assumptions

The forecasts for this sector assume no change in the overall market and no change in rail's market share, relative to the base year (the year to September 2012).

4.12.2 Non ESI Coal forecasts

The forecasts are in shown Figure 4.13 and Table 4.24.

Figure 4.13 – Non-ESI coal forecasts: tonne kilometres moved (with 2011 actual data)

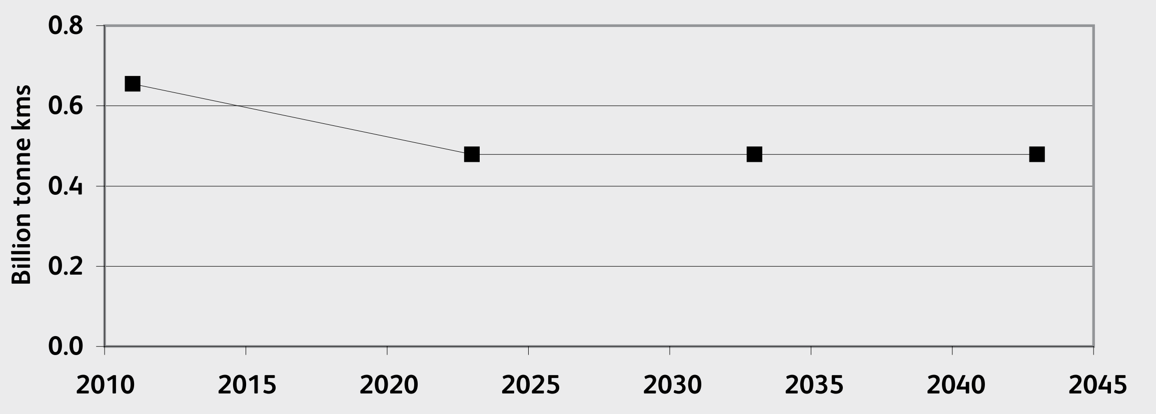


Table 4.24 – Non-ESI coal forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	3.73	N/A	N/A
2011 (actual)	3.09	0.66	212
2023 (forecast)	2.95	0.48	162
2033 (forecast)	2.95	0.48	162
2043 (forecast)	2.95	0.48	162
Compound annual growth rates			
2004 to 2011 (actuals)	-2.7%	N/A	N/A
2011 to 2023 (forecast)	-0.4%	-2.6%	-2.2%
2011 to 2033 (forecast)	-0.2%	-1.4%	-1.2%
2011 to 2043 (forecast)	-0.1%	-1.0%	-0.8%

Notes: The forecast decline to 2023 only reflects a decline between 2011 and the base year (year to September 2012): no other changes are forecast.

4.13 Domestic Waste

The bulk carriage of waste by rail started in the 1970s as local authorities sought outlets which would handle waste as landfill, remote from urban areas using the economic benefits of bulk rail transport. The industry is now moving away from landfill as this is increasingly viewed as not an environmentally sustainable solution to waste management. This method of disposal has become subject to a 'landfill tax' as an incentive towards other management solutions and some rail flows have ceased. The landfill tax currently stands at c £72 per tonne for waste disposed of in this fashion. This financial penalty is driving far reaching changes of behaviour within the waste industry and landfill is expected to diminish further.

A key future for waste management is likely to involve the development of energy from waste (EFW) plants. Although public policy expresses a preference for local management of locally produced waste, securing planning consent for new plant near urban areas is very difficult. This raises the prospect of larger EFW plants that feature economies of scale being built in remote areas where planning consent is easier to obtain and a possible resurgence for the role of rail to move waste in bulk over longer distances. It is too early in the development of this scenario to quantify the potential impact but recent commitments to build EFW plants at Severnside and Teesside involve new long term rail flows and increase the likelihood that rail can replace lost landfill business with other waste volume. A further scenario that may develop over time could involve containerised export waste moving by rail. Some EU countries have expanded their EFW infrastructure rapidly and as a result are experiencing a shortage of domestic waste to combust, causing them to source waste from abroad, including Britain.

As the available volume of domestic waste diminishes, landfill site managers are seeking alternative volumes of material to meet their planning commitments to complete their void fills, cap these and restore the land above. This is leading to new flows of material by rail to connected sites – in particular construction industry excavation soils. These volumes are more variable than the domestic waste which they replace and rail has to be more agile to capture short term flows and create new rail heads to handle them. The volumes concerned are usually classified as construction rather than waste materials and are accounted for in the forecasts in Section 4.5 of this study.

4.13.1 Domestic Waste assumptions

The forecasts for this sector assume no change in the overall market and no change in rail's market share, relative to the base year (the year to September 2012). Rail's current market share is approximately 27 per cent in terms of tonne kilometres and seven per cent in terms of tonnes.

The forecasts include changes to two destinations to reflect new energy from waste sites: the current Manchester to Scunthorpe traffics are diverted to Runcorn and the current Cricklewood to Calvert traffics are diverted to Fields Lock, Hoddesdon.

4.13.2 Domestic Waste forecasts

The forecast for domestic waste are in Figure 4.14 and Table 4.25.

Figure 4.14 – Domestic waste forecasts: tonne kilometres moved (with 2011 actual data)

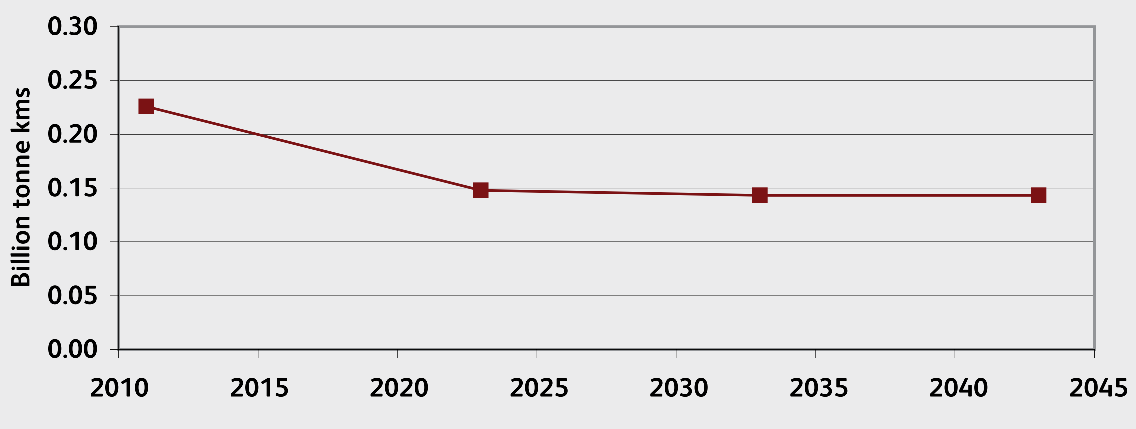


Table 4.25 – Domestic waste forecasts (with 2004 and 2011 actual data)

	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2004 (actual)	3.14	N/A	N/A
2011 (actual)	1.62	0.23	139
2023 (forecast)	1.46	0.15	102
2033 (forecast)	1.43	0.14	100
2043 (forecast)	1.43	0.14	100
Compound annual growth rates			
2004 to 2011 (actuals)	-9.0%	N/A	N/A
2011 to 2023 (forecast)	-0.9%	-3.5%	-2.6%
2011 to 2033 (forecast)	-0.6%	-2.1%	-1.5%
2011 to 2043 (forecast)	-0.4%	-1.4%	-1.0%

The Network Rail 'National Delivery Service' carries a wide range of materials serving renewals, maintenance and enhancement activity, such as these turnouts carried on special tilting wagons.

4.14 Network Rail engineering forecasts

The Network Rail engineering sector comprises the operations of Network Rail's National Delivery Service (NDS). Operations consist of:

- network services, which carry bulk ballast and sleepers between quarry/factory and Local Delivery Centres (LDCs)
- engineering train services, which transport materials from LDCs to the worksite, and transport spoil in the reverse direction
- operations to transport rail (new and refurbished) and switches & crossings from various facilities to worksites.

The operations serve renewals, maintenance and enhancement activity.

The forecasts are shown in Figures 4.15 and Table 4.26.

The position adopted for this study is that the forecasts for Network Engineering traffic should be unchanged from current levels in line with assumptions in the Network Rail Strategic Business Plan.

Figure 4.15 shows that tonne kilometres grew significantly over this period. This reflects increases in average haul length.

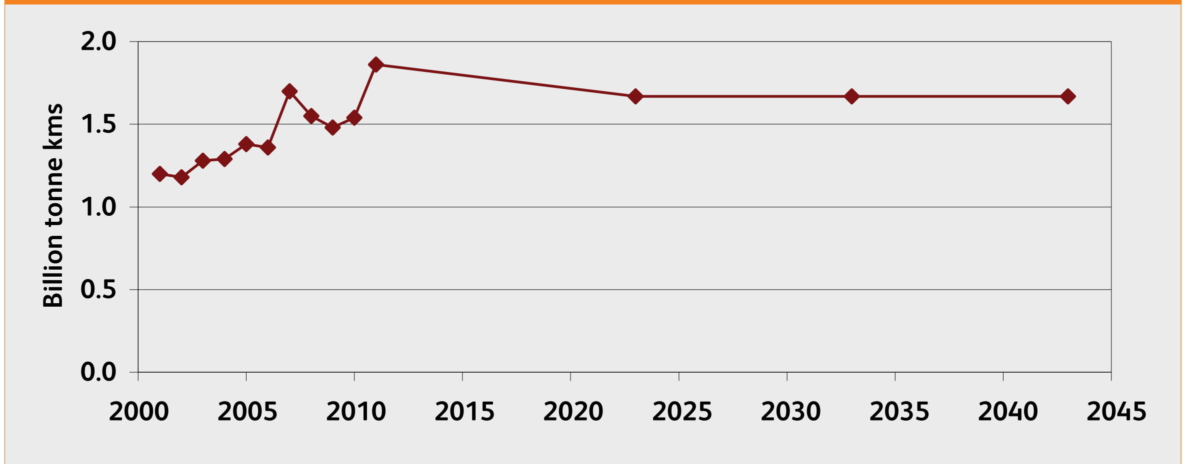
The fall in tonnage lifted shown in Table 4.26 between 2004 and 2011 is consistent with a reduction in conventional renewals activity between Control Period 3 and Control Period 4, accompanied by the development of high output renewal techniques.

However during the course of Control Period 4 some increases in activity have been observed, which are reflected in the increase in tonne kilometres between 2009 and 2011 (see Figure 4.15).

The full picture of engineering train demand in Control Period 5 is unclear at this stage. The high level of renewals volumes towards the end of Control Period 4 is expected to continue. Volumes are expected to remain high, at least in the first half of Control Period 5. Enhancement volumes are expected to rise slightly or remain level overall in Control Period 5 relative to Control Period 4, but there are expected to be increases regionally where major schemes take place (e.g. the Northern Hub around Manchester).

Overall, there may be some increase in activity in Control Period 5 relative to Control Period 4. Earthworks for High Speed 2 are expected to begin towards the end of Control Period 5 and could result in a step-change in demand going into Control Period 6.

Figure 4.15 – Network Rail engineering forecasts: tonne kilometres moved (with 2000 to 2011 actual data)[21]



21 See notes to Table 4.26.

Table 4.26 – Network Rail engineering forecasts (with 2001, 2004 and 2011 actual data)			
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2001 (actual)	N/A	1.20	N/A
2004 (actual)	7.68	1.29	168
2011 (actual)	6.94	1.86	268
2023 (forecast)	6.36	1.67	263
2033 (forecast)	6.36	1.67	263
2043 (forecast)	6.36	1.67	263
Compound annual growth rates			
2001 to 2011 (actuals)	N/A	4.5%	N/A
2004 to 2011 (actuals)	-1.4%	5.4%	6.9%
2011 to 2023 (forecast)	-0.7%	-0.9%	-0.2%
2011 to 2033 (forecast)	-0.4%	-0.5%	-0.1%
2011 to 2043 (forecast)	-0.3%	-0.3%	-0.1%

Notes: The forecasts are unchanged from year to September 2012 base (not shown). The reduction from 2011 to 2023 reflects the difference between 2011/12 actual and the year to September 2012 actual. No specific figures are available for rail market share but rail dominates this sector.

4.15 Channel Tunnel through rail

This sector refers to Channel Tunnel through rail freight traffic[22].

The main market sectors for rail freight traffic through the Channel Tunnel are currently intermodal and metals and these sectors are expected to continue to dominate.

4.15.1 Channel Tunnel through rail assumptions

This section addresses the assumptions used for the central case forecasts for the Channel Tunnel. The next section, Section 4.15.2, presents these forecasts and this is followed by Section 4.15.3, which discusses the scenarios.

The central case forecasts for the relevant sectors, such as intermodal and metals, are discussed earlier in this chapter. However the main assumption is common to all sectors: a £20 reduction in costs per container and an equivalent reduction for bulk commodities. This assumption is explained in Section 4.3, but reflects fuel and wage cost increases, the French eco-tax, increased fuel costs for ships and the DfT's new charging system for HGVs.

While the modelling behind the central case forecasts reflects these specific assumptions, other factors are also important in delivering growth. These include improving operational performance, improving information en-route and reducing border constraints. The European Union has legislated to require relevant Member States to improve performance in all these areas through the creation of international Rail Freight Corridors (RFCs). Following industry consultation in 2012 the Department for Transport determined that the UK should join a RFC – Corridor 2 – extending its scope from France through the Channel Tunnel to London in addition to its other connections through Belgium, the Netherlands, Luxembourg and Switzerland. Network Rail is working with its colleague infrastructure managers in mainland Europe on a plan to

22 This does not include Eurotunnel's HGV shuttle service between Folkestone and Coquelles in France.

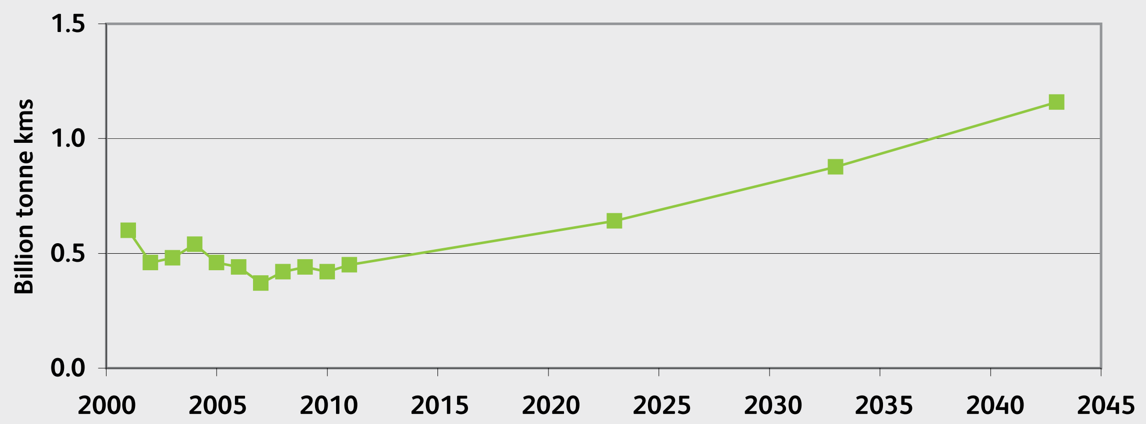
implement these measures with an expected date for transition to full participation of November 2016[23]. Corridor membership will not, in itself resolve all the barriers to international freight growth but it is designed to tackle some of the main organisational ones. In summary, a range of factors will determine growth for the Channel Tunnel rail sector, including Channel Tunnel pricing, regulation and service issues in mainland Europe. Channel Tunnel pricing issues are addressed under the scenarios – see Section 4.15.3.

4.15.2 Channel Tunnel through rail forecasts

The forecasts are shown in Figures 4.16 and Table 4.27. Market shares are shown in Table 4.28.

Strong growth, of 3.1 per cent per annum to 2043 in terms of tonne kilometres and 3.8 per cent per annum in terms of tonnes, is forecast. This mainly reflects intermodal growth, which is discussed in Section 4.3.

Figure 4.16 – Channel Tunnel through rail forecasts: tonne kilometres moved (with 2001 to 2011 actual data)



23 Regulation 913/2010 establishing the rail freight corridors has subsequently been amended to incorporate the UK into this corridor by November 2016 under European law

Table 4.27 – Channel Tunnel through rail forecasts (with 2001, 2004 and 2011 actual data)			
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2001 (actual)	2.4	0.60	245
2004 (actual)	1.9	0.54	286
2011 (actual)	1.4	0.45	322
2023 (forecast)	2.3	0.64	285
2033 (forecast)	3.3	0.88	267
2043 (forecast)	4.6	1.16	253
Compound annual growth rates			
2001 to 2011 (actuals)	-5.5%	-2.8%	2.8%
2004 to 2011 (actuals)	-4.2%	-2.6%	1.7%
2011 to 2023 (forecast)	4.1%	3.0%	-1.0%
2011 to 2033 (forecast)	4.0%	3.1%	-0.9%
2011 to 2043 (forecast)	3.8%	3.0%	-0.7%

Table 4.28 – Channel Tunnel through rail market share forecasts (with 2011 actual data)	
	Through rail market share based on tonnes
2011 (actual) (year to Sept 2012)	2%
2033 (forecast)	4%

Notes: The 2033 forecast, based on tonnes, is shown for illustration. The actuals and forecasts, based on tonne kms, are not available. The market shares are approximations only. The total market is defined as total unitised trade between Europe and Great Britain.

4.15.3 Channel Tunnel through rail scenarios

The scenarios are the same as those for intermodal - see Section 4.3.

The higher scenario assumes a £50 per container reduction in Channel Tunnel costs, compared with the £20 per container cost reduction assumed under the central case forecasts. The difference reflects the assumption that Channel Tunnel charges will fall by £20 under this scenario (no reduction in charges is assumed under the central case forecasts). As explained in Section 4.3, the cost reduction is applied to bulk commodities on an equivalent basis, as well as to containers.

The lower scenario relates to a reduction (by approximately half) in the growth of rail connected warehousing sites. This scenario only differs from the central case with respect to intermodal traffic (unlike the higher scenario which differs with respect to all traffic).

The results are shown in Figure 4.17 and Table 4.29. Channel Tunnel traffic is highly sensitive to assumptions about Channel Tunnel charges, but insensitive to assumptions about rail connected warehousing sites (for intermodal traffic).

Figure 4.17 – Channel Tunnel through rail higher and lower scenarios and central case forecasts: tonne kilometres moved in 2033 (with 2011 actual data)

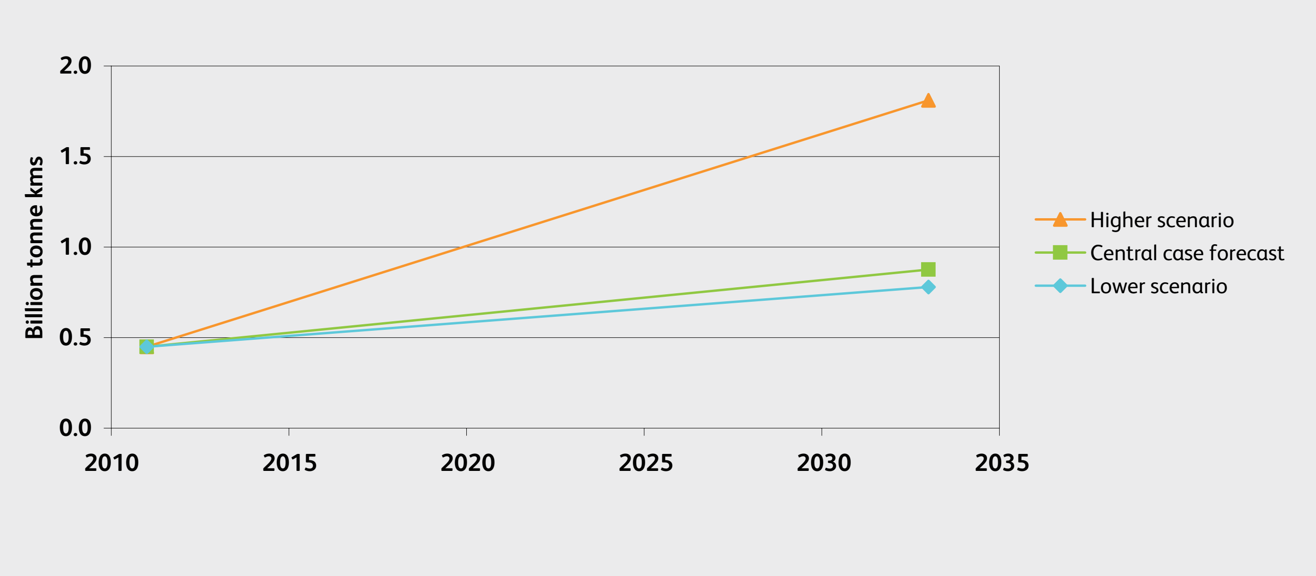


Table 4.29 – Channel Tunnel through rail scenarios for 2033 (with 2011 actual data)

	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	1.4	0.45	322	1.4	0.45	322
2033 (forecast)	7.1	1.81	255	2.8	0.78	279
Compound annual growth rates:						
2011 to 2033 (forecast)	7.7%	6.5%	-1.1%	3.2%	2.5%	-0.7%
Notes: For further details see Appendix 1						

4.16 Other market changes

An interesting test for forecasters taking a 30 year view is to look back over an equivalent period of time and consider the extent to which the nature of today's industry might have been predicted in 1983. Features of the modern industry which may well not have been expected 30 years ago include:

- a successful privatisation leading to competition and growth
- a sustained programme of heavy investment embracing both freight rolling stock and infrastructure
- enormous advances in the productivity of people and equipment
- rail service standards of 98 per cent right time arrival in the retail logistics sector – on a very much busier network
- the huge switch of markets from heavy industries towards Fast Moving Consumer Goods.

During the consultation stage of this study, outlined in Chapter 6, a number of observers commented on the likelihood that the period under review - out to 2043 - can be expected to feature further radical changes. This was seen as challenging but a good opportunity for rail freight which has proved itself to be adaptable and entrepreneurial in responding to change over the last 30 years. The potential radical developments which were raised in the course of this study may be summarised into the two categories of (i) new market opportunities and (ii) rail innovations.

New rail market opportunities which have been suggested include:

- piggyback lorry trailers
- a resurgence of city centre freight delivered via passenger stations and / or new consolidation hubs
- parcels freight as e-commerce expands
- a new industry – shale gas extraction - with heavy logistics needs
- the return of wagonload freight.

Rail innovations which have been mentioned include:

- higher speeds, faster journey times and greater electric capability attracting new retail business
- higher gauge capability – to European Continental standards
- freight using HS2
- step changes in the relative competitiveness of rail as fuel costs become ever more onerous for road
- enhanced rail productivity – maybe moving from the current 750 metre maximum train length to 1,000 or 1,500 metres as seen in some parts of mainland Europe
- "agile" rail freight - smaller, rapid, multiple-unit style operation.

In 2012 a trial was operated of a postal TGV to London St Pancras .

Whilst it has not been possible to quantify any of these proposals in order to include them in this study's forecasts, a lesson from the last 30 years' extent of change would be that to rule them out is unwise. This study will be revisited and updated over time and we look forward to seeing the extent to which these developments (or others as yet not mooted) have impacted on future forecasts.

4.17 Forecasts for all freight sectors

The total forecasts for all sectors (under the central case) are shown in Figure 4.18 (for tonne kilometres) and Figure 4.19 (for tonnes), together with the actual volumes since 1980.

Figure 4.20 (for tonne kilometres) and Figure 4.21 (for tonnes) show the forecasts by sector.

The forecasts by sector are also shown in Table 4.30 (tonne kilometres) and Table 4.31 (tonnes). In terms of total tonne kilometres moved, the forecast is for 2.9 per cent annual growth to 2043, compared to growth of about 2.5 per cent per annum since the mid-1990s (as noted in Chapter 3). This growth mainly reflects growth in the intermodal and biomass sectors, but a long term decline in coal traffic.

In terms of total tonnes lifted, the forecast is for 2.0 per cent annual growth to 2043 compared with the recent trend (as noted in Chapter 3) of broadly stable tonnage. As with the tonne kilometre forecasts, this growth mainly reflects increases in intermodal and biomass traffic. The higher forecast growth in tonne kilometres relative to tonnes reflects forecast changes in the composition of traffic, such as the reduction in coal flows and the increase in longer-distance intermodal flows.

The forecast increase in tonne kilometres is expected to result in an increase in rail's share of the road and rail freight market. As noted in Section 3.5, rail's share of this market is currently 11 per cent and this is expected to increase to around 19 per cent by 2033[24].

A Direct Rail Services intermodal service on the West Coast Main Line.

24 This is based on the assumption that tonne kilometres by road will increase at 0.8 per cent per annum on average to 2033. For this market share calculation, rail tonne kilometres exclude Network Rail engineering (for consistency with the historic data).

Figure 4.18 – Forecasts for total tonne kilometres moved (with actual data for 1980 to 2012)[25]

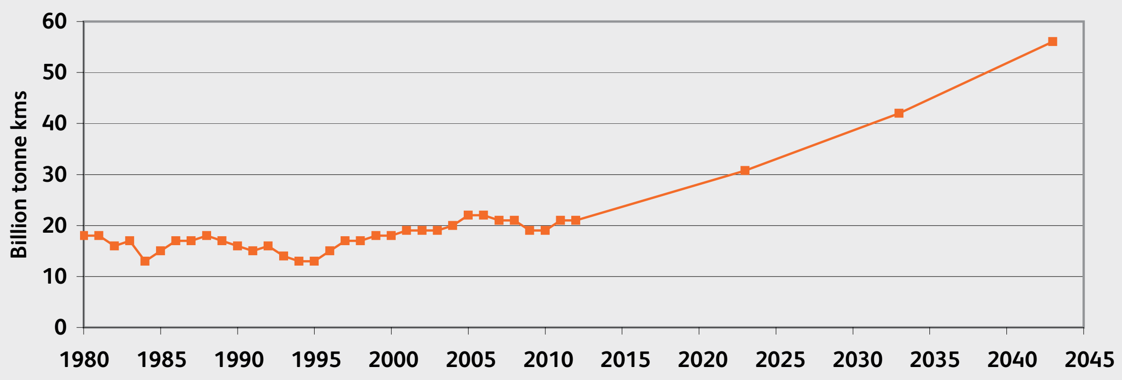
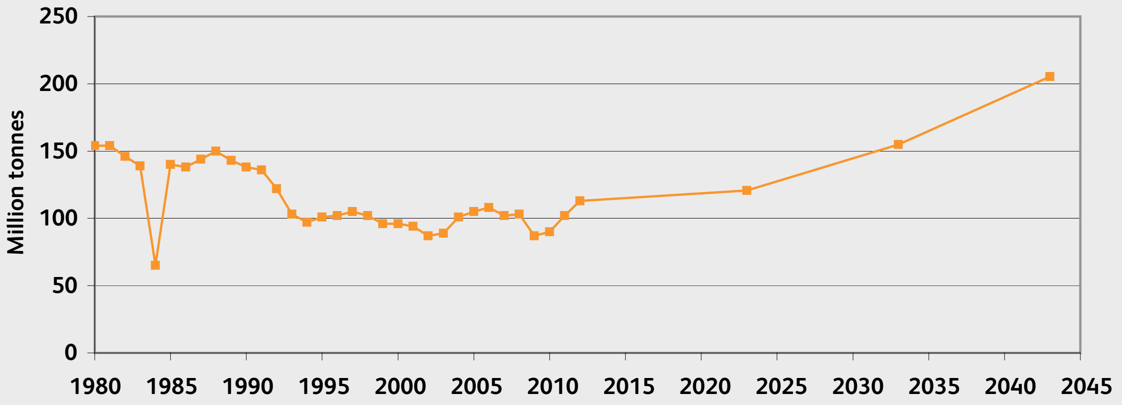


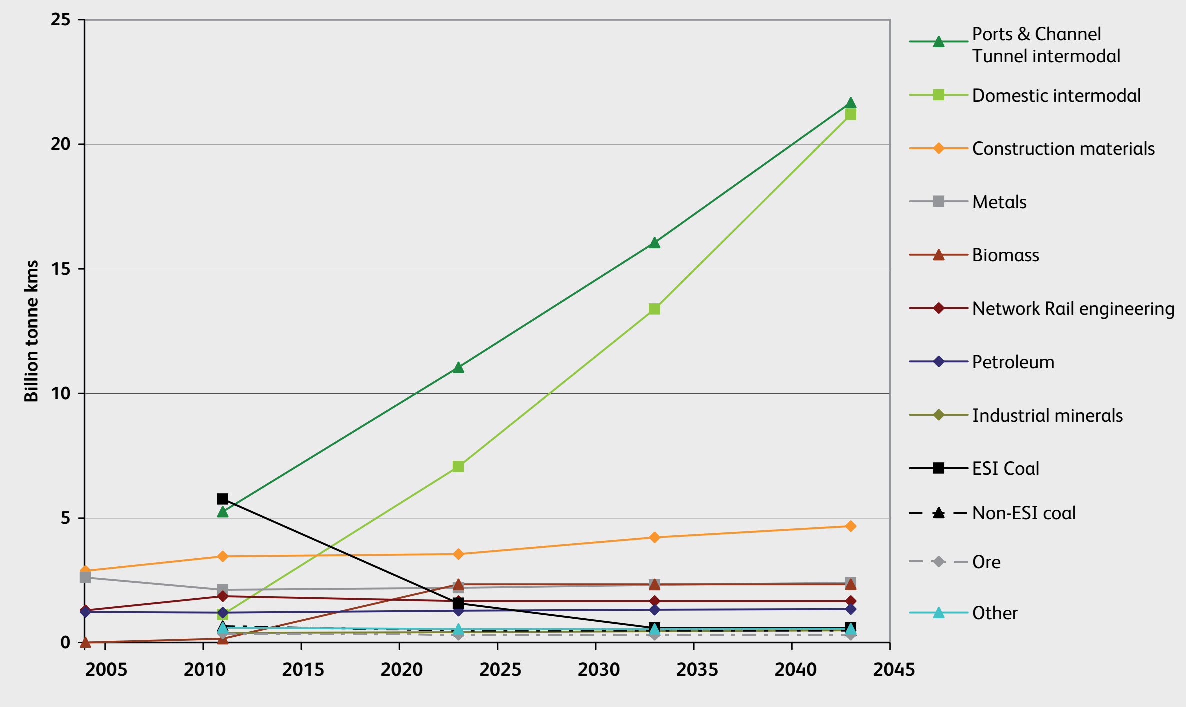
Figure 4.19 – Forecasts for total tonnes lifted (with actual data for 1980 to 2012)[26]



25 Actual data and forecasts exclude Network Rail engineering, for consistency.

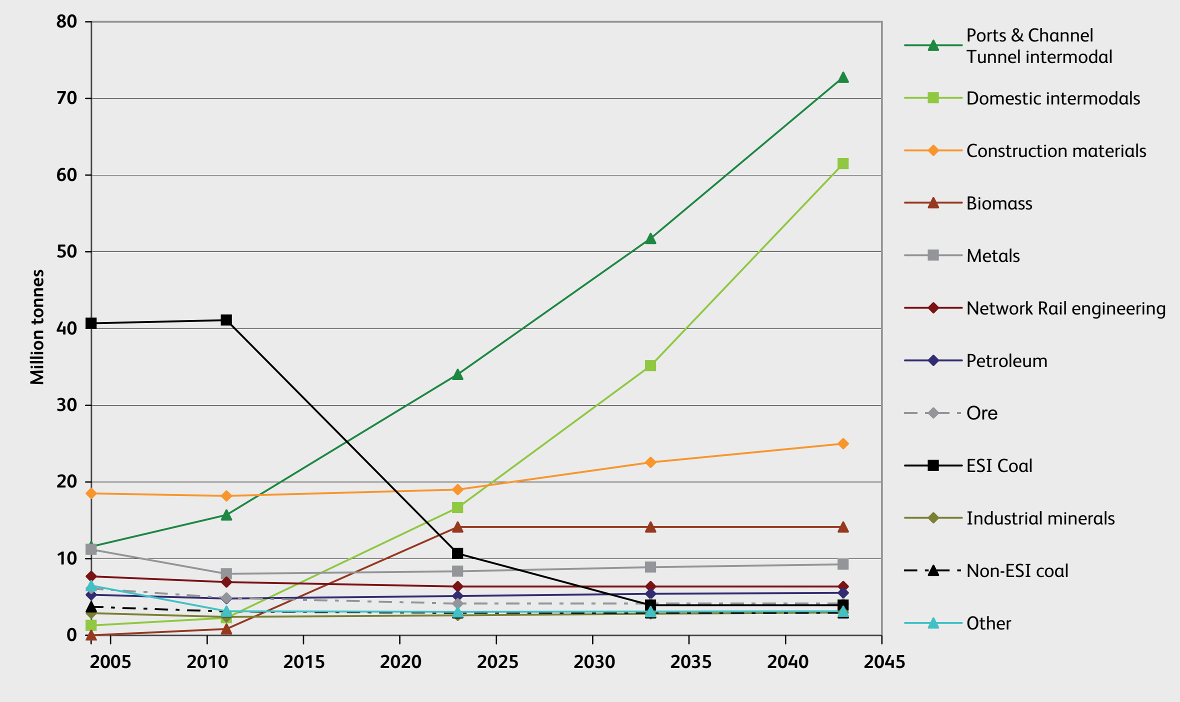
26 Actual data and forecasts exclude Network Rail engineering, for consistency.

Figure 4.20 – Forecasts by sector: tonne kilometres moved (with 2004 and 2011 actual data)[27]



27 2004 actual data are not available for some sectors. "Other" includes chemicals, domestic waste and automotive.

Figure 4.21 – Forecasts by sector: tonnes lifted (with 2004 and 2011 actual data)[28]



28 'Other' includes chemicals, domestic waste and automotive.

Table 4.30 – Summary of forecasts by sector: billion tonne kilometres moved (with actual data for 2004 and 2011)	Ports & Channel Tunnel intermodal	Domestic intermodal	ESI Coal	Biomass	Construction materials	Metals	Petroleum	Ore	Industrial minerals	Non-ESI coal	Domestic waste	Chemicals	Automotive	Network Rail engineering	Total
2004 (actual)	N/A	N/A	N/A	0.0	2.9	2.6	1.2	N/A	N/A	N/A	N/A	N/A	N/A	1.3	21.6
2011 (actual)	5.3	1.1	5.8	0.2	3.5	2.1	1.2	0.4	0.4	0.7	0.2	0.1	0.1	1.9	22.9
2023 (forecast)	11.0	7.1	1.6	2.3	3.6	2.2	1.3	0.3	0.4	0.5	0.1	0.1	0.1	1.7	32.5
2033 (forecast)	16.1	13.4	0.6	2.3	4.2	2.3	1.3	0.3	0.5	0.5	0.1	0.1	0.1	1.7	43.7
2043 (forecast)	21.7	21.2	0.6	2.3	4.7	2.4	1.3	0.3	0.5	0.5	0.1	0.1	0.1	1.7	57.7
Compound annual growth rates															
2004 to 2011	N/A	N/A	N/A	N/A	2.7%	-3.0%	-0.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.8%
2011 to 2023 (forecast)	6.4%	16.6%	-10.3%	25.5%	0.2%	0.3%	0.5%	-1.5%	0.8%	-2.6%	-3.5%	0.4%	1.3%	-0.9%	2.9%
2011 to 2033 (forecast)	5.2%	11.9%	-9.9%	13.2%	0.9%	0.4%	0.4%	-0.8%	0.8%	-1.4%	-2.1%	0.4%	0.8%	-0.5%	3.0%
2011 to 2043 (forecast)	4.5%	9.6%	-6.9%	8.9%	0.9%	0.4%	0.4%	-0.6%	0.8%	-1.0%	-1.4%	0.4%	0.6%	-0.3%	2.9%

Notes: For each year there is a small difference between the sum of all the sectors and the overall totals due to other traffic.

Table 4.31 – Summary of forecasts by sector: million tonnes lifted (with actual data for 2004 and 2011)	Ports & Channel Tunnel intermodal	Domestic intermodal	ESI Coal	Biomass	Construction materials	Metals	Petroleum	Ore	Industrial minerals	Non-ESI coal	Domestic waste	Chemicals	Automotive	Network Rail engineering	Total
2004 (actual)	11.5	1.3	40.7	0.0	18.5	11.2	5.3	6.1	2.9	3.7	3.1	1.6	0.4	7.7	115.4
2011 (actual)	15.7	2.3	41.1	0.8	18.2	8.0	4.8	4.9	2.4	3.1	1.6	0.7	0.3	6.9	111.3
2023 (forecast)	34.1	16.6	10.6	14.1	19.0	8.4	5.1	4.1	2.6	3.0	1.5	0.7	0.4	6.4	127.0
2033 (forecast)	51.8	35.1	3.9	14.1	22.6	8.9	5.4	4.1	2.8	3.0	1.4	0.8	0.4	6.4	161.1
2043 (forecast)	72.8	61.5	3.9	14.1	25.0	9.2	5.6	4.1	3.0	3.0	1.4	0.8	0.4	6.4	211.7
Compound annual growth rates															
2004 to 2011	4.5%	8.8%	0.2%	N/A	-0.3%	-4.6%	-1.3%	-3.2%	-2.8%	-2.7%	-9.0%	-10.7%	-1.8%	-1.4%	-0.5%
2011 to 2023 (forecast)	6.7%	18.0%	-10.6%	26.8%	0.4%	0.3%	0.6%	-1.4%	0.7%	-0.4%	-0.9%	0.3%	1.5%	-0.7%	1.1%
2011 to 2033 (forecast)	5.6%	13.2%	-10.1%	13.8%	1.0%	0.5%	0.5%	-0.8%	0.7%	-0.2%	-0.6%	0.5%	0.9%	-0.4%	1.7%
2011 to 2043 (forecast)	4.9%	10.9%	-7.1%	9.3%	1.0%	0.4%	0.5%	-0.5%	0.7%	-0.1%	-0.4%	0.5%	0.7%	-0.3%	2.0%

Notes: For each year there is a small difference between the sum of all the sectors and the overall totals due to other traffic.

05 Routeing

Introduction

A key part of the Freight Market Study is the routeing of freight services from origin to destination. Network Rail in collaboration with the Freight Market Study Working Group has developed routeing principles which have been applied to the forecast commodity tonnages. These assumptions, along with those to convert tonnes into assumed numbers of trains and train paths, will form the primary freight input into the Route Studies.

5.1 Approach to routeing of the freight forecasts

The Freight Market Study has developed demand forecasts, and an approach to routeing, efficiency and tonnage per train assumptions in the base and forecast years. This has been the product of extensive collaboration and one to one discussion with the Freight Market Study Working Group, as well as a review of consultation responses to the Freight Market Study Draft for Consultation.

These demand forecasts and routeing assumptions are presented in this Freight Market Study for input into the remainder of the Long Term Planning Process, including the Cross-Boundary Analysis and individual Route Studies. For illustration purposes this study includes maps of average train paths per off-peak hour. Each Route Study will be provided with a detailed database of all the commodity flows for the freight services relevant to the study's geographic boundaries.

A key part of the forecasts of total tonnages by commodity are details of tonnages for each commodity by origin and destination. In consultation with the Freight Market Study Working Group the forecasts were mapped to the network. This mapping exercise includes, at a planning level, each key link on the network and is capable of illustrating tonnage carried, number of trains per annum, and forecast train paths per day in each direction. This process has been carried out for all three forecast years (2023, 2033, and 2043).

There are three distinct steps for routeing flows and these steps are:

1. flows whose routeing assumptions are articulated within existing Route Utilisation Strategies (RUS) and other freight forecasting work.

The preferred freight train routeing assumptions that have been developed by previous RUS and freight forecasting work have been reviewed. Where the assumptions have not altered these routeings are used in this Freight Market Study. In many cases previous strategy assumptions have not changed since the Route Utilisation Strategies or last generation of freight forecasts.

2. flows which could or can take into account revised routeing assumptions.

There have been some specific changes either in the form of new infrastructure schemes or to routeing policy since the RUSs were established. Where this has occurred the FMS has considered the possible routeing options and proposed either a preferred routeing or options to be tested.

3. new flows which need to be mapped to the network.

For new flows the Freight Market Study has assumed that services will be routed via the shortest distance unless there is a strong logic to do otherwise. The routeing recognises that freight operators will have a desire to use particular routes. In some instances the shortest route might involve a significant amount of time awaiting a suitable timetable slot or path, and it could be more efficient for the service to operate via an alternative which may mean that a higher average speed, and therefore shorter journey time is achieved. The needs of differing types of freight services, for example fast intermodal or heavy coal traffic, have also been considered. For intermodal freight it is assumed that a gauge cleared route would be the preferred route.

5.2 Routeing assumptions

The routeing assumptions that have been agreed with the Working Group for key sections of the network where there is a choice of routeings or where routeings are affected by recent committed schemes, are described as follows where there have been changes from previous assumptions:

5.2.1 Intermodal routeing assumptions

5.2.1.1 Haven Ports

Intermodal freight traffic from the Port of Felixstowe and potentially from the future port development at Bathside Bay can take one of two main route choices to destinations in the East Midlands, West Midlands, North West and Scotland. They can either:

- travel from the Haven Ports via London on the Great Eastern Main Line, North London Line and West Coast Main Line as the majority of trains do currently, or
- travel from the Haven Ports via Peterborough and Nuneaton.

The Freight Market Study makes the assumption that for terminals south of Nuneaton existing and new flows travel via London on the

Great Eastern Main Line. This includes destinations in the South East, south Midlands, Greater London, West Country and Wales.

For terminals north of Nuneaton on the West Coast Main Line it is assumed that existing flows move progressively to travel via Peterborough and Nuneaton until all services to these destinations use this route in 2043. For flows to Scotland it is assumed that the existing flows migrate progressively until by 2033, 80 per cent of flows travel via Peterborough and Nuneaton and 20 per cent via Doncaster.

For traffic to Greater Manchester it is assumed that existing flows migrate progressively until all flows via Manchester Piccadilly by 2033 travel via Peterborough, to Stenson Junction and Stoke-on-Trent. A proportion of traffic is assumed to go via Newton-le-Willows to approach Greater Manchester from the west.

5.2.1.2 Great Northern/Great Eastern Joint Line (GN/GE Joint Line)

For intermodal freight traffic between Peterborough and Doncaster in the base year all flows are shown via the East Coast Main Line. For future years existing flows migrate progressively from the East Coast Main Line to the GN/GE Joint Line until all flows travel via the GN/GE Joint Line by 2033. New flows which appear after the base year are assumed to exclusively use the GN/GE Joint Line.

5.2.1.3 Midland Main Line

There are no intermodal terminals on the southern portion of the Midland Main Line, but there are a number proposed. For intermodal traffic from Essex Thameside to and from any new terminals developed on the Midland Main Line the Freight Market Study has assumed that 25 per cent of the traffic travels via the Gospel Oak to Barking line and the southern Midland Main Line to destinations south of Chesterfield. For the remaining 75 per cent of traffic from Essex Thameside to any new terminals on the Midland Main Line the Freight Market Study has assumed that they should be routed via the East Coast Main Line and Peterborough. This proportion reflects the previous generation of freight forecasts.

From the Haven Ports it is assumed any intermodal traffic would go via Peterborough to any new terminals on the Midland Main Line.

From Kent Thameside it is assumed that any intermodal traffic would go via the South London Line, West London Line, Dudding Hill Lines and then on to the Midland Main Line.

For traffic from Southampton it is assumed that trains would go via Reading West, Oxford and East West Rail for any new terminals on the Midland Main Line.

5.2.3 Project specific routeing assumptions

5.2.3.1 East West Rail

East West Rail will be a re-opened rail link between Bicester Town and Bletchley. Once completed it will allow trains from Oxford to connect with the West Coast Main Line at Bletchley or with the Midland Main Line at Bedford. The London and South East RUS considered freight routeing options using East West Rail from the port of Southampton. However, when the RUS was established in 2011 the scheme was, at that time, an aspiration. Subsequently, funding was announced and it was included in the 2012 High Level Output Specification for England and Wales as part of the wider proposals to provide an electrified trunk route linking Southampton to freight destinations in the Midlands.

There are a number of freight routeing options that have been suggested for East West Rail and the Electric Spine. The primary option which has been illustrated in the maps in this chapter is for freight traffic where East West Rail is the shortest route. East West Rail is also a potential diversionary route between Oxford and Solihull and Nuneaton for Southampton traffic to West Midlands, North West, Scotland, North East and Yorkshire and Humberside.

Other routeing options using East West Rail have been suggested to address capacity gaps on other sections of the network. A 'one way' system to and from the West Coast Main Line was put forward by the London and South East RUS to reduce flat junction conflicts at Nuneaton and Coventry. A variation of this option could be tested with a proportion of the traffic using East West Rail in both directions. Further options also involve Southampton traffic to and from Yorkshire and Humberside, and the North East going via East West Rail and the Midland Main Line. These options will need to be tested to establish if they are value for money.

5.2.3.2 High Speed 2

The Freight Market Study forecasts and routeing of future freight traffic will be an input into the work on the classic network to develop post HS2 service specifications.

5.2.4 Commodity specific routeing assumptions for Biomass and ESI Coal

The Freight Market Study forecasts for Biomass and ESI Coal provide a total tonnage and assume that the pattern of coal import and consumption remain similar to today. As a result the routeings that have been used for both ESI Coal and Biomass are largely unchanged from the base year. This interim assumption has been made because it is not certain what the decisions of power generators are on whether to convert to Biomass and which port that Biomass will be imported from. The interim assumption will therefore inform the initial Route Studies. Network Rail will revisit the ESI Coal and Biomass assumptions in 2014 as it is believed that the decisions of energy generators will have become clearer by this stage.

5.3 Conversion of forecast tonnes to trains and train paths

The Freight Market Study has only mapped flows in the dominant, in other words 'more loaded', direction. This is because from a planning perspective it is the maximum tonnage in the dominant direction which drives the infrastructure and rolling stock requirements to operate a service. It is also assumed that for the most part the wagons returning in the opposite direction will equal those required in the dominant direction and therefore the number of paths required is the same. A technical description of how the flows were mapped can be found in Appendix 2.

There are four steps required to convert annual net tonnes (the weight of the cargo transported excluding the weight of the wagons) detailed in Chapter 4 into train paths per off-peak hour. These steps are:

1. Operating days of the week – the annual net tonnes is divided by the number of weeks in the year and then the numbers of days freight trains operate. It is assumed that there will be an increase in days of operation from five to five and a half days per week for most commodities in 2023, and to six days per week for most commodities by 2033 and 2043

2. Net tonnes (weight of cargo excluding the train) – by using the current or assumed future average net weight per train the daily net tonnes can be converted into an average number of trains per day

3. Path utilisation – not all freight train paths in the timetable are used, this is because flexibility is required to cater for different volumes or destinations at different times of the week or year. Therefore the number of paths required in the timetable is greater than the number trains that will actually operate. Network Rail in the Freight Route Utilisation Strategy (RUS) made estimates of the utilisation of freight train paths and these have been applied to each commodity to calculate the number of freight train paths per day

4. Paths per off-peak hour – in order to express freight train requirements in a comparable way to the passenger timetable the Freight Market Study shows the average paths required per off-peak hour. This is calculated by dividing the daily train path figure by the 18 off peak hours in the day. The study recognises that this is in some respect an artificial distinction as in some parts of the country there is no peak passenger flow.

Intermodal, Biomass and Construction commodities have been treated as follows:

5.3.1 Intermodal

In 2011-12 the average tonnes per intermodal train in one direction was 489 net tonnes. The Freight Market Study has made an adjustment to reflect the fact that intermodal flows are, potentially, loaded in both directions. On average in 2011-12 57 per cent of intermodal tonnage was carried in the dominant direction and 43 per cent in the opposite and therefore 'less loaded' direction. The Freight Market Study has applied this same percentage factor to the average tonnes per train. This results in 560 net tonnes per train in the dominant direction as opposed to 489 net tonnes which is an average of both directions. It is the dominant direction which dictates the maximum number of paths and therefore infrastructure required to accommodate a given tonnage. It is the number of paths in the most loaded direction which is used for freight planning purposes.

The Strategic Freight Network has the objective of investing in infrastructure to enable longer and heavier intermodal trains. In order to reflect the assumption of 20 per cent longer trains this value is increased to 672 tonnes by 2033 forecast years. For 2023 it is assumed that 10 per cent average lengthening will have occurred. Based on the 2011-12 Track Access billing data, the average intermodal train is 460 metres long. This increases to an average of 540 metres in the forecast years (2033 and 43). This value will be used as the central planning value. However, individual Route Studies may wish to assess option with fewer, longer, and heavier trains on a given route, dependent upon circumstances. See Section 4.2.1 for details of the assumptions about road and rail productivity which have been used in the demand forecasting.

The Freight Market Study Working Group reviewed the path utilisation factor for intermodal flows and the Freight Market Study has used an 85 per cent figure. While this increases the number of paths required, 672 tonnes per train is heavier than used by previous forecasts. The overall impact is therefore little change in the number of paths forecast, but gives a more representative number of trains.

5.3.2 Biomass

Biomass is a developing commodity for the rail freight sector and currently accounts for relatively low tonnages in comparison with ESI Coal. The current average net tonnes per train for this commodity is not therefore likely to be representative of the future forecast traffic. The Freight Market Study has therefore made an assumption that future Biomass trains will be 1,160 net tonnes per train. This assumption is based on 24 loaded wagons each with a net capacity of 58 tonnes.

For Biomass no representative path utilisation value exists. Therefore it has been assumed that there would be a higher take up of paths (75 per cent) than ESI Coal because of the smaller volumes of biomass that can be stored at a power station. A recent report[1] for the Department of Energy and Climate Change stated that, “Coal stations switching to biomass will consequently need to transition their fuel supply operations from a large volume stockpile facility to a situation with effectively a ‘just-in-time’ delivery system “This would need a more consistent supply of biomass to each power station than ESI Coal. However, as this is a developing market the utilisation of train paths and the average net tonnes per Biomass train will need to be kept under review.

5.3.3 Construction materials

The Strategic Freight Network is investing in lengthening some construction flows and therefore the Freight Market Study has assumed that there is a growth in average trailing loaded up to 1,500 net tonnes per train.

5.3.3 Other commodities

The Freight Market Study has used the 2011-12 net tonnes per train for those commodities where the freight flow is only loaded in one direction for:

- automotive
- chemicals
- coal other
- domestic waste
- ESI coal
- general merchandise
- industrial minerals
- metals
- petroleum.

For these commodities the averages of both directions net tonnes per train have been multiplied by two in order to derive the net tonnes per train in the loaded direction only. The Freight Market Study has only assumed increases in the net tonnes per train for those commodities in which the railway industry is investing strategically to lengthen freight trains.

Table 5.1 shows the operating days of the week, net tonnes per train, and path utilisation for each commodity in all of the forecast years.

1 UK Readiness to meet 2020 targets - biomass supply chain infrastructure (June 2013) page 9

Table 5.1 – Assumptions used for days of operation per week, net tonnes per train and path utilisation										
Freight commodity	2011-12			2023			2033			2043
	Days of operation	Net tonnes per train	Path utilisation	Days of operation	Net tonnes per train	Path utilisation	Days of operation	Net tonnes per train	Path utilisation	
Automotive	5	292	50%	5.5	292	50%	6	292	50%	The same assumptions as 2033
Biomass	5	856	75%	5.5	1160	75%	6	1160	75%	
Chemicals	5	890	50%	5.5	890	50%	6	890	50%	
Coal Other	5	1390	45%	5.5	1390	45%	6	1390	45%	
Construction materials	5	1416	37%	5.5	1500	37%	6	1500	37%	
Channel Tunnel Intermodal	5	560	85%	5.5	610	85%	6	672	85%	
Domestic Intermodal	5	560	85%	5.5	610	85%	6	672	85%	
Domestic Waste	5	1224	50%	5.5	1224	50%	6	1224	50%	
ESI Coal	5	1440	45%	5.5	1440	45%	6	1440	45%	
General Merchandise	5	706	50%	5.5	706	50%	6	706	50%	
Industrial Minerals	5	960	50%	5.5	960	50%	6	960	50%	
Iron Ore	5	1700	50%	5.5	1700	50%	6	1700	50%	
Metals	5	1220	51%	5.5	1220	51%	6	1220	51%	
Petroleum	5	1626	56%	5.5	1626	56%	6	1626	56%	
Ports Intermodal	5	560	85%	5.5	610	85%	6	672	85%	

Key to Figure 5.1

Total: 2011-12 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

5.4 Actual 2011-12 freight traffic

The Freight Market Study has used the year to September 2012 (the 2011-12 base year) tonnage of freight commodities transported as the starting point for its forecasts. The purpose of the exercise is to produce a base year data set that is at an appropriate level of detail and can be used for planning purposes for comparison with the future forecast years. Each Route Study will have to review this base year in detail against the Working Timetable to establish the actual numbers of paths at key locations as well as the current utilisation of those paths.

Figure 5.1 shows the estimated freight paths for all freight commodities in the 2011-12 base year based on the actual net tonnes data from to origin and destination. The map shows the relative differences in volumes of freight traffic across the railway network.

Figure 5.1 – Estimated 2011-12 average paths per off-peak hour for all commodities

Key to Figure 5.2

Total gross freight tonnes* (millions) both directions 2011/12

- No freight
- up to and including **1**
- above **1** and up to **5**
- above **5** and up to **10**
- above **10** and up to **20**
- above **20**

*Includes all freight commodities except Network Rail's own infrastructure trains

Network Rail has a record of the gross tonnes (the weight of the train and its cargo) on each section of the network for the financial year 2011-12. This is different from the tonnes referred to elsewhere in the Freight Market Study as gross tonnes include the weight of the wagons, cargo and locomotive. Figure 5.2 shows the gross freight tonnes for all freight commodities on each section of the network in both directions. The gross tonnes have been included because they are recorded for each section of the network of where every freight train actually ran.

The map shows the relative differences in volumes of freight traffic across the railway network. Gross tonnages differ from net because the train, whether it is loaded or not, is included in the data. There are also differences between commodities, for commodities such as intermodal port containers the weight of the wagon and the train make up a greater proportion of the gross tonnage of the train. For dense commodities such as Coal, the weight of the goods themselves makes up a greater proportion of the gross weight of the train. This difference, along with the fact that for operational reasons actual operation of freight trains may take a wide variety of routes in the course of the year, accounts for most of the different distribution of traffic seen between the maps of net and gross freight.

Figure 5.2 – Actual 2011-12 gross freight tonnes in both directions on each section of the network for all commodities

Key Figure 5.3

Total: 2023 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

5.5 Forecast freight paths

The Freight Market Study has summarised the unconstrained forecast paths per off-peak hour for each of the Central Case forecast years (2023, 2034 and 2043). The 2043 year will be the starting point for the analysis in the Route Studies of the passenger market study conditional outputs. As a summary consistent with the passenger market study conditional outputs the Freight Market Study has provided key commodity specific paths per hour maps for 2043.

The Route Studies themselves will be provided with a database of all of the freight flows within their geographic scope and will conduct a detailed local assessment of the current capability and future freight requirements. They will use the detail provided by the Freight Market Study as their common starting point. The Cross-boundary analysis will consider those freight issues which span one or more Route Study boundary to maintain consistent assumptions across the network.

The forecast off-peak paths per hour are unconstrained and enhancements to capacity and/or in some cases capability of the current network are likely to be required beyond that which is currently committed if these forecasts were to be accommodated. It will be for the Route Studies to assess if and how these path forecasts could be accommodated as well as the value for money of any proposed interventions. They will also have to consider, where applicable, different options for both freight routeing and also of the tonnes per train to establish the choices for funders.

The maps that follow all show the Freight Market Study forecast for 2023, 2033 and 2043. The 2043 forecasts, along with their passenger equivalents, will be the starting point for the Route Study analysis.

5.5.1 Forecast paths 2023

Figure 5.3 shows the forecast freight paths for all freight commodities in the 2023 forecast year. The forecast tonnage has been converted into paths per off- peak hour using the assumptions in Table 5.1.

Figure 5.3 – Unconstrained forecast 2023 average paths per off-peak hour for all commodities

Key to Figure 5.4

Total: 2033 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

5.5.2 Forecast paths 2033

Figure 5.4 shows the forecast freight paths for all freight commodities in the 2033 forecast year. The forecast tonnage has been converted into paths per off-peak hour using the assumptions in Table 5.1.

Figure 5.4 – Unconstrained forecast 2033 average paths per off-peak hour for all commodities

Key to Figure 5.5

Total: 2043 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

5.5.3 Forecast paths 2043

Figure 5.5 shows the forecast freight paths for all freight commodities in the 2043 forecast year. The forecast tonnage has been converted into paths per off-peak hour using the assumptions in Table 5.1. Figures 5.6, 5.7, and 5.8 provide commodity specific forecast freight tonnages for the three largest commodities (Intermodal, ESI Coal and Biomass and Construction Materials).

Figure 5.6 demonstrates the extent of intermodal growth forecasts. In contrast for ESI Coal and Biomass Figure 5.7 shows that the numbers of paths is substantially lower than today which reflects the forecast scenarios in Chapter 4 for this sector.

Figure 5.7 details the 2043 forecast paths for construction, while this sector is forecast to change less radically than the intermodal and ESI Coal and Biomass, nevertheless it still represents a substantial volume of rail freight particularly on key corridors such as the Great Western Main Line.

Figure 5.5 – Unconstrained forecast 2043 average paths per off-peak hour for all commodities

Key to Figure 5.6

Intermodal: 2043 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

Key to Figure 5.7

ESI Coal & Biomass: 2043 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

Figure 5.6 – Unconstrained forecast 2043 average paths per off-peak hour for Intermodal (Domestic, Ports and Channel Tunnel)

Figure 5.7 – Unconstrained forecast 2043 average paths per off-peak hour for ESI Coal and Biomass

Key to Figure 5.8

Construction materials: 2043 paths per off peak hour in one direction

- No freight
- up to and including **0.25**
- above **0.25** and up to **0.50**
- above **0.50** and up to **1.50**
- above **1.50** and up to **2.00**
- above **2.00**

Figure 5.8 – Unconstrained forecast 2043 average paths per off-peak hour for Construction Materials

5.6 Conclusion

The forecast freight train paths per hour for 2043 will, along with the passenger market studies, be the starting point of Route Study and Cross-Boundary Analysis in the LTPP. In collaboration with the Working Group the freight forecasts have been mapped to the network, showing for each link on the network an estimate of tonnage carried, number of trains per annum, and required train paths per off-peak hour. This Chapter has summarised in map form these inputs to the LTPP. It has also explained the assumptions which underpin how forecast tonnes have been mapped onto the railway network and tonnes translated into freight train paths per off-peak hour.

06 Consultation

Introduction

The Long Term Planning Process has adopted an open and inclusive approach from the outset. It has been designed so that it allows an opportunity for all stakeholders to contribute if they are interested in influencing the rail industry's plans for the future. This chapter sets out how that has been done, and outlines the key themes emerging from the responses that have been received to the Freight Market Study Draft for Consultation published on 25th April 2013. The chapter then describes the next steps.

Containers travelling between Coatbridge and Daventry.

6.1 Freight Market Study – Study Development

Consultation and guidance of the work during the development of the Freight Market Study has been extensive and at a number of levels. There have been three key groups guiding the development of the work:

- Rail Industry Planning Group
- Freight Market Study Working Group
- 'Regional Group' Meetings.

The role of Rail Industry Planning Group is set out in Chapter 1. In relation to the Freight Market Study, it provided strategic overview of the work and a link between the Long Term Planning Process (LTPP) and other industry planning processes. The Rail Industry Planning Group has met on a quarterly basis during the development of the Freight Market Study.

The Freight Market Study Working Group was established as a group to steer, challenge, and monitor progress of the work, as well as to agree to the publication of the draft and final document. It has met on an as required basis.

Regional Group meetings have been held throughout the development of the LTPP and these have been used to inform stakeholders on the progress of the Freight Market Study as the work has developed.

In addition, individual meetings have been held with interested parties, both with representatives of the Working Group, as well as outside the rail industry to guide and develop the work.

6.2 Consultation Process

The Freight Market Study Draft for Consultation was published on the Network Rail website on 25th April 2013. The consultation period closed on 26th July 2013. Information was also available on the Network Rail website to publicise the document and this was used to inform a number of articles in the specialist railway press to advertise the publication of the study and assisted in ensuring that as wide a range of views as possible were obtained.

During the consultation period, the study was discussed at a number of 'regional' group meetings held around the country where Local Authority, Local Economic Partnership and other interested stakeholders were briefed on the work. These groups were an important opportunity for local stakeholders to raise any queries they may have and inform their own stakeholders within their organisations and assist in focusing the responses received as part of the consultation process.

In addition presentations were given to meetings of the Rail Freight Group and Freight Transport Association on the Freight Market Study Draft for Consultation. A small number of presentations were also given to other interested parties who wished to be briefed on the study.

6.3 Consultation Responses

In total, 60 consultation responses were received, and these have been categorised as follows.

Consultation responses to the Freight Market Study Draft for Consultation have been placed on the Network Rail website and can be found at the following web address: www.networkrail.co.uk/LTPP

Table 6.1 – Freight Market Study Consultation Responses

Response Categories		Number of Responses	Percentage of Responses in each category
Working Group	Working Group Industry Representatives	5	8%
	Working Group Government Representatives	3	5%
Industry / Transport Sector	Other Industry Parties	7	12%
	Passenger Transport Executives	4	7%
	Port Groups	4	7%
	Terminal Developers / Operators	4	7%
Individual Responses	Members of Parliament	1	2%
	Members of the Public	1	2%
Local Authorities & Local Economic Partnerships	Local Authorities	13	22%
	Local Economic Partnerships	2	3%
	Other Local Authority / Local Economic Group: Combined Response	8	13%
Campaign, User Groups & Community Rail Partnerships	Campaign Groups	7	12%
	Rail User Groups	1	2%
Total Responses		60	100%

6.4 Key issues in the consultation responses.

A number of themes emerged from the consultation process which are applicable across the programme of four market studies. These included helpful suggestions and requests for clarification. Some of these clarification requests concerned the relationship between the Market Studies, and, in turn, how the Market Studies relate to Route studies. As a result the study has clarified in Chapter 1 how the individual studies relate to each other.

Common changes across the four market studies which have been included within this final Freight Market Study include changes intended to make the document more transparent with more detail on how the four market studies interact, more comment on how the market studies will be used in the rest of the LTPP, and a clearer statement of how the analysis has been used to develop the conclusions with a clearer explanation of the chosen approach.

Somewhat inevitably in a consultation process, it can be the case that consultee suggestions are potentially helpful but can contradict other responses. To aid understanding, Network Rail has clarified in this study how the work has been taken forward, and where respondents have supplied detailed supporting information this has been reviewed.

A number of respondents had prepared summaries of information on proposals for additional routes, new routes, or terminals. These suggestions are helpful, but are not considered at this stage of the LTPP process which concentrates on markets rather than specific delivery methods or operations. Such suggestions will be considered within relevant Route Studies or Cross-Boundary Analysis where appropriate.

In general, respondents expressed support for the Long Term Planning Process and understood the rationale for examining the various markets. In particular, comments were received which indicated that further consideration be given to expected growth in intermodal market sectors.

These comments have been taken forward with the Freight Market Study Working Group and have been used to inform additional work on the potential for growth in these market sectors.

6.4.1 Summary of detailed comments

There was recognition and support for the strategic approach being taken by the LTPP process. There was comment from some consultees that some issues may not be picked up in the Draft for Consultation, based on consultee views of the expected changes in demand. Respondents provided a number of comments around market sectors, such as consideration of new or re-emerging markets for the rail sector. Comments around existing market sectors have been incorporated, where possible, into the forecasting work and where quantitative information is not available, incorporated within this Chapter.

Others responded on the proposed changes to rail freight charging as part of the Control Period 5 Periodic Review process querying what impact the proposals would have upon the growth forecasts set out in the Draft for Consultation. Since the publication of the Draft for Consultation, further detail on freight charging has been published by the ORR and the potential impacts have been considered by the Working Group and included in Chapter 4.

Stakeholders expressed support for a number of particular schemes, such as enhanced gauge clearance, specific freight routes and 'piggyback' trailers. Where new or enhanced routes have been proposed, this information will be retained and used as appropriate in the forthcoming Route Studies, and Cross-Boundary Analysis.

A number of respondents noted that in relation to terminals, the distinction between National and Regional Distribution Centres was not required and there was a recognition of the need for the market, including the planning system, to deliver rail linked distribution centres to meet customer requirements for terminals in order for growth in the intermodal sector to occur. Others suggested that terminal design and hours of operation can be a constraint, as can local road networks. This study has therefore removed the split between National and Regional Distribution Centres, and notes the need for the market, including the planning system, to deliver. Comment on the detail of terminal design and capacity of local road networks is outside the remit of the rail industry Long Term Planning Process, and will be considered in detail through the planning system.


A Royal Mail Train on the West Coast Main Line.

Responses suggested that the study include more recognition of the time sensitivity of freight/freight paths which is a key issue for the Freight Operating Companies impacting upon their operations and ability to deliver. Comments were also made that the study should consider different length freight trains, predominately longer, but in one case shorter. It remains the case that differing solutions may be appropriate for different markets, and that the Freight Market Study does not preclude the implementation of bespoke solutions in practice.

There was a significant level of response to **Chapter 4**, the forecasting chapter, with a number of consultation responses requesting further clarification on the use of forecasts. The intention in preparing this study has been to explain why and how forecasts will be used in the LTPP, together with more clarity on the assumptions and methodology used in each sector with a more detailed explanation of how the modelling has been carried out. Across the responses, there was a general expectation of further growth in rail freight, apart from ESI coal, and some comment that the forecasts are considered to be robust, certainly for the bulk sectors, with a general understanding of the position in these markets. Respondents noted the expectation of the reduction in the movement of ESI coal which is dependent upon Department for Energy and Climate Change forecasts of the use of fuel for electricity generation.

However there were differing views on the level of expected growth in the Ports Intermodal, Domestic Intermodal, Channel Tunnel and, to an extent, Automotive sectors. Some respondents suggested that intermodal markets have been a source of growth for rail, even in the economic turbulence since 2008, and could be expected to continue, some, that the forecasts are reasonable, others, that changes in the logistics market, such as Port Centric logistics, could potentially reduce rails share of the intermodal market. Overall though, there was support for the study to consider a range of potential scenarios for the development of these markets. This has led to further work using available models to explore a range of intermodal growth scenarios, the results of which are set out in **Chapter 4**.

A small number of respondents thought that automotive traffic could grow if it were not constrained by an apparent limitation in the availability of wagons. This issue has been discussed with the Working Group who noted that there are a number of market and technical barriers, including the availability of wagons, presently constraining the market. Although the potential for growth remains, it was concluded that the sector did not warrant specific further analysis at this stage.

There were a small number of responses concerning the proposed approach to scenarios and routeing. Work on scenarios has been incorporated within the modelling revisions for the intermodal sectors. Further work has been carried out with the Freight Market Study Working Group on freight train routeing which is set out in **Chapter 5**. This work has noted caveats around the need for certainty in the market, the need to take into account High Speed 2, current charging and potential future charging regimes, the need to avoid non discriminatory outcomes and the need to maintain diversionary routes. A number of responses also noted the need to open up opportunities for overnight and weekend traffics as well as the need for consideration of longer trains.

During the development of the Freight Market Study and as part of the consultation process, respondents suggested that there are a number of freight markets which have been lost to rail which may make a return in an alternative manner which reflect modern logistics, or markets which are developing in Great Britain, but which are not sufficiently mature to be able to forecast with a sufficient level of certainty. The growth of Biomass is a good example of the development of new markets. It is only in recent years that Biomass has started to develop as a significant market in total, including for rail, illustrating how freight markets can develop quickly.

Consultees suggested a number of potential new to rail markets based around changes in the economy, new sources of energy or new transport developments which may lead to an opportunity for the rail sector. These include:

- Interurban Logistics. The rail freight sector has recently operated a number of trial flows to explore the opportunity of using central London railway stations as hubs to serve urban retail centres. These have centred on using facilities available at these stations remaining from previous motorail, newspaper and letter traffic which has led to a potential opportunity. It may be the case that these trial flows develop into more permanent operations over time

- Express Parcels. There are currently a number of parcels companies using spare capacity on the passenger rail network as high speed parcel distributors between specific origins and destinations, as well as a recent increase of use of rail by Royal Mail. In addition, a trial has taken place to operate a high speed parcel service from France into London St Pancras International. It may be that rail can win traffic from the existing Air Freight market in the future.

Should these two markets develop, then it may be the case that additional capacity may be required at railway stations, airport interchanges and on the lines leading from them to nearby cities to carry such high value but low weight goods. Alternatively, it is possible that capacity may be available in periods of the day when passenger travel is lighter.

A number of respondents put forward proposals for the use of rail to carry either the inputs, or outputs in terms of extraction of resources from shale rock (fracking), whether it be through movement of water, chemicals, sand, oil, gas or bi-products of the process. Whilst there is some evidence from the USA, where rail has been used, currently it is too early to consider, in detail, what impact there might be on rail freight in Great Britain.

In addition, one respondent set out that there may be an opportunity for increased movements of fresh produce and food by rail. To an extent, these developments are expected to be a part of the growth of Domestic Intermodal sector. However, there may be an opportunity, alongside the markets set out above, to review opportunities in the future.

The Freight Market Study Working Group wish to take this opportunity to thank those individuals and organisations from across the country who have taken the time to read and prepare a response to the Freight Market Study Draft for Consultation. These responses have helped the Working Group to shape this Freight Market Study.

6.5 Next Steps

The Freight Market Study will become established 60 days after publication unless the Office of Rail Regulation (ORR) issues a notice of objection within this period.

Further details of the Long Term Planning Process, including an overview of the work, frequently asked questions and contact details for other complementary Market Studies can be found on the Network Rail website, via the following link: **http://www.networkrail.co.uk/ltpp**

Appendix 01: Rail Freight Forecasting Technical Note

1.1 Introduction

The forecasts in this report are based on MDS Transmodal's (MDST) forecasts as published by MDST in April 2013 (Rail Freight Forecasts to 2023/24, 2033/34 and 2043/44).

MDST's forecasts use their Great Britain Freight Model (GBFM) for the following sectors: intermodal, construction materials, petroleum, chemicals, industrial minerals, metals and automotive.

A bespoke model was used by MDST to forecast ESI coal and biomass. The approach is described in Chapter 4.

MDST do not model domestic waste, ore, other coal and other sectors. Following consultation with industry parties, it was agreed that for these sectors no change in total tonnes or tonne kilometres or in the origins and destinations of the traffic was assumed relative to the base year (see below), except for some changes for domestic waste destinations which are noted in Chapter 4.

All the forecasts use a base year of the year to September 2012. As noted in Chapter 4, some changes between 2011 and the forecast years are due to changes between 2011 (i.e. financial year 2011/12) and the base year.

The forecasts were developed before the ORR's National Rail Trends data for 2012 (the financial year 2012/13) were published, but these data are presented in the report in some figures (e.g. Figures 3.1, 3.2, 4.18, and 4.19).

1.2 Differences between Freight Market Study forecasts and MDS Transmodal's forecasts

Following the consultation period and responses received, the FMS working group discussed and decided that the differences between the Freight Market Study forecasts (under the central case) and MDST's forecasts (as published in April 2013) relate to the following issues.

1.2.1 Ports and domestic intermodal

The final FMS uses different assumptions as inputs to the MDST's Great Britain Freight Model (GBFM) published in the FMS Draft for Consultation. The assumptions used for the Freight Market Study are set out in Section 4.3.1. The Freight Market Study assumes no change in rail productivity relative to road productivity and no reduction in handling costs at terminals, while MDST's forecasts assume (under the central case) that rail productivity improves relative to road productivity and it assumes a £5 per container reduction in terminal handling charges. The results of using MDST's forecast assumptions are shown as the higher scenario in Section 4.3.3.

Whilst the Freight Market Study uses the same assumptions as MDST for the total area of rail connected warehousing sites for each forecast year, the Freight Market Study does not use the specific site assumptions used by MDST. As discussed in Appendix 2, the Freight Market Study groups the sites at a local level into regional clusters and only models freight flows to and from these clusters rather than to and from individual sites. This means that the Freight Market Study uses the same assumptions as MDST at a regional level, but not necessarily at the level of individual sites. This reflects uncertainty about the development of individual sites and avoids endorsing particular sites.

1.2.2 Channel Tunnel through rail

The Freight Market Study assumes a £20 per container-unit-equivalent reduction in costs for Channel Tunnel through rail traffic, while MDST's forecasts assume a £50 per container-unit-equivalent reduction in costs for this traffic. The results of using MDST's forecast assumptions are shown as the higher scenario in Section 4.3.3 and Section 4.15.3.

1.2.3 Re-allocation of empty containers which carry bulk commodities on their loaded legs

The Freight Market Study has re-allocated certain empty containers from the domestic and Channel Tunnel intermodal sectors to various bulk sectors. The MDST forecasts, as published in April 2013, separately identified these empty containers but retained them within the domestic intermodal sector. The relevant empty containers are those which carry bulk commodities such as domestic waste in the loaded direction. The reallocation is not used in the loaded directions; the re-allocations only apply in the unloaded direction.

The total tonnes and tonne kilometres associated with these containers, and the re-allocations in 2011 and each forecast year, are shown in Table 1. MDST's forecasts did not include any significant changes in these volumes during the forecast period. The result of the re-allocation is to reduce domestic intermodal forecasts and increase the forecasts for domestic waste, metals and

The historic data for the relevant sectors has been adjusted in Chapter 3 . After these adjustments, the domestic intermodal forecasts only reflect fast-moving-consumer-goods. The re-allocations are summarised in **Table 1**.

Table 1 – Reallocation of empty containers carrying bulk commodities in loaded direction

	Reallocated to:			
	Domestic waste	**Metals**	**Construction materials**	**Total**
Reallocations in million tonnes lifted				
2004 (actual)	0.72	0.04	0.02	0.78
2011 (actual)	0.40	0.03	0.01	0.45
2011 (actual) (base year)	0.48	0.03	0.02	0.52
2023 (forecast)	0.37	0.03	0.01	0.42
2033 (forecast)	0.35	0.03	0.01	0.39
2043 (forecast)	0.35	0.03	0.01	0.39
Reallocations in billion tonne kms moved				
2004 (actual)	0.11	0.02	0.01	0.14
2011 (actual)	0.06	0.02	0.01	0.08
2011 (actual) (base year)	0.07	0.02	0.01	0.10
2023 (forecast)	0.04	0.01	0.00	0.06
2033 (forecast)	0.03	0.01	0.00	0.05
2043 (forecast)	0.03	0.01	0.00	0.05

Notes: Although most of the above traffic is reallocated from domestic intermodal a small proportion (less than 0.02 million tonnes or 0.01 billion tonne kms, in each forecast year) is reallocated from Channel Tunnel intermodal. The tonne km figures for 2004 and 2011 are estimates based on tonnes data and base year average haul lengths. The above figures are prior to the adjustments for the access charge changes (see below)

1.2.4 Construction materials

The Freight Market Study assumes that total tonne kilometres increase in line with total tonnes during the forecast period, such that there is no change in average haul length relative to the base year (although there is a small fall relative to 2011/12 financial year). All individual flows in the base year increase at the same rate , to reflect overall growth in tonnes, during the forecast period. MDST's forecasts assume that total tonne kilometres increases by less than tonnes, such that average haul length falls over the forecast period. It assumes that shorter flows increase at a higher rate than longer flows during the forecast period.

The Freight Market Study assumes that regional quarries are expected to continue to close during the forecast period, in favour of larger national quarries (see **Section 4.5**).

1.2.5 Adjustments to take account of access charge changes

The Freight Market Study forecasts take account of changes to access charges during CP5 which were announced by the ORR in June 2013 as part of the Periodic Review process. MDST's forecasts do not take account of these changes since they were published before the ORR's announcement. The changes include the introduction of freight specific charges for ESI coal, iron ore and spent nuclear fuel.

The Freight Market Study takes account of these changes by adjusting its forecasts (which were developed before the ORR's announcement) by an adjustment factor for each sector. The adjustment factors are shown in **Table 2**.

For example the ports intermodal forecasts for 2023, 2033 and 2043 were increased by 0.8 per cent, while the construction material forecasts for each year were reduced by 4.7 per cent.

The forecasts for ESI coal and biomass have not been adjusted on the basis that these forecasts are determined by government energy policy rather than changes to access charges.

The forecasts for Network Rail engineering have not been adjusted since access charges do not apply to this traffic.

The adjustments only relate to changes announced for CP5. No real terms changes in access charges are assumed after CP5.

The adjustments in **Table 2** were estimated as follows.

First the changes in variable access charges for each sector were derived from Table 16.63 in the ORR's Draft Determination of Network Rail's Outputs and Funding for 2014-2019 (June 2013). The changes in **Table 2** are the changes between CP4 and the end of CP5. The changes in variable charges reflect new freight specific charges as well as changes to variable usage charges, which are increasing for bulk commodities, such as construction materials, relative to the intermodal sectors. The high increase in the charges for ore reflects the introduction of a freight specific charge for this sector.

Next the elasticities were derived from **Table 17** in MDST's report Impact of Changes in Track Access Charges on Rail Freight Traffic. Elasticities are the change in demand in response to change in price, in this case change in variable charges. This report was published by the ORR in February 2012.

Table 2 – Adjustments to forecasts to reflect changes in access charges in CP5

	Ports intermodal	Channel Tunnel intermodal	Domestic intermodal	Construction materials	Metals	Petroleum	Ore	Industrial minerals	Non-ESI coal	Domestic waste	Chemicals	Automotive
Change in variable charges (%)	-6%	-14%	-6%	24%	11%	-12%	75%	22%	38%	18%	18%	-13%
Elasticity	-0.14	-0.14	-0.14	-0.19	-0.05	-0.06	0.00	-0.14	-0.01	-0.15	-0.14	-0.08
Adjustment to forecasts (%)	0.8%	1.9%	0.8%	-4.7%	-0.5%	0.7%	0.0%	-3.1%	-0.3%	-2.6%	-2.4%	1.0%

Table 17 of the MDS report shows the percentage change in tonnes and tonne kilometres from various percentage changes in variable usage charges. Given the percentage change in variable charges from the Draft Determination, such as 24 per cent for construction materials, it was possible to estimate the relevant elasticities for that change in variable charges. The average of the elasticities for tonnes and tonne kilometres were estimated and these are the elasticities shown in **Table 2**. The elasticity for construction (-0.19) is relatively high, while those for ore (-0.00) and non-ESI coal (-0.01) are much lower. The elasticities are all well below one because the variable charges are a relatively small proportion of total Freight Operating Company operating costs.

Finally, the adjustments to the forecasts were estimated by multiplying the change in the variable charges by the elasticities for each sector. The same adjustments were applied to tonnes and tonne kilometres and were applied as a simplification. For example, all construction flows were reduced by 4.7 per cent, such that both total tonnes and total tonne kilometres fell by this percentage.

The overall impact of these adjustments for each forecast year is marginal – changes in total tonnes and tonne kilometres of less than 1 per cent. The reductions in the forecasts for some bulk commodities, such as construction materials, are offset by increases for the intermodal sector.

Note that the ORR's Final Determination is due to be published in late October 2013 and the changes in variable charges by sector are subject to change. However the adjustment factors were finalised before the publication of the Final Determination.

1.3 Intermodal scenarios

The detailed results for the scenarios for each intermodal sub-sector are shown in the following tables. The results for all the scenarios are from the GBFM except for the tonne kilometre figures under the lower scenarios. These figures are derived from the total tonne figures (from the GBFM) and estimates of the average haul length, which are based on the observed relationship between total tonnage and average haul length for the relevant sub-sector.

Table 3 – Ports intermodal scenarios for 2033 (with 2011 actual data)

	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	15.1	5.1	338	15.1	5.1	338
2033 (forecast)	56.1	17.2	307	44.9	14.2	317
Compound annual growth rates:						
2011 to 2033 (forecast)	6.1%	5.7%	-0.4%	5.1%	4.8%	-0.3%

Table 4 – Channel Tunnel intermodal scenarios for 2033 (with 2011 actual data)

	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	0.6	0.1	238	0.6	0.1	238
2033 (forecast)	5.2	1.0	197	1.7	0.4	207
Compound annual growth rates:						
2011 to 2033 (forecast)	10.5%	9.6%	-0.9%	5.2%	4.5%	-0.6%

Table 5 – Domestic intermodal scenarios for 2033 (with 2011 actual data)

	Higher scenario			Lower scenario		
	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)	Million tonnes lifted	Billion tonne kms moved	Average length of haul (km)
2011 (actual)	2.3	1.1	492	2.3	1.1	492
2033 (forecast)	44.3	15.9	358	23.3	9.2	396
Compound annual growth rates:						
2011 to 2033 (forecast)	14.4%	12.8%	-1.4%	11.2%	10.1%	-1.0%

Notes: These figures exclude empty containers which carry bulk commodities on the loaded leg. They therefore represent domestic intermodal traffic related to fast moving consumer goods (FMCGs) only. See Section 1.2.3 in this appendix for details of these empty container flows.

Appendix 02 – Freight Routeing Technical Note

Introduction

The purpose of this appendix is to explain the technical details of how the Freight Market Study forecasts have been mapped onto the railway network. Behind the forecasts of total tonnages by commodity are details of forecast tonnages for each commodity by origin and destination. In collaboration with freight operators the freight forecasts were mapped to the network, showing for each link on the network an estimate of tonnage carried, number of trains per annum, and required train paths per day in each direction.

Long term forecasts will inevitably be subject to a large degree of uncertainty; the purpose of the exercise is to produce forecasts that of the correct order of magnitude for planning purposes.

1.1 Mapping

1.1.1 Flows

Each flow (other than some very small flows, typically less than one train per week) was entered into a spreadsheet which records the assumed routeing, sums all traffic over the network, and calculates the tonnage, annual train numbers and daily paths required.

A large number of the flows accounted for a small proportion of the overall tonnage. These flows were not mapped as their material impact is small in comparison with the effort required to include them. The table below shows for each commodity the threshold for a flow to be mapped.

Table 1 – Thresholds for mapping

Commodity	Threshold for mapping (tonnes per annum in 2043)
Automotive	10,000
Chemicals	10,000
Coal Other	10,000
Domestic Waste	10,000
General Merchandise	10,000
Industrial Minerals	10,000
Iron Ore	10,000
Metals	10,000
Petroleum	10,000
Ports Intermodal	10,000
Domestic Intermodal	10,000
Channel Tunnel Intermodal	10,000
Coal ESI	50,000
Biomass	50,000
Construction Materials	50,000
Total	n/a

Two commodities have been treated differently. These are Domestic Intermodal and Engineering Haulage. Both are comprised of a very large number of flows which it would have been impractical to route in their entirety. These challenges have been addressed as follows:

- Domestic Intermodal – of the nearly 2,000 flows approximately 25 per cent of them accounted for over 80 per cent of the 2043 tonnes. It was not practical to plot the remaining 1,500 flows, so the unallocated 20 per cent of tonnage was distributed proportionally across the mapped flows
- Engineering haulage – these flows accounted for the largest single number of flows of any commodity. Most were very small and reflected a wide range of Network Rail's engineering activities not just maintenance and renewals. As a result a simplifying assumption was made to use the Network Delivery Service's trunk route timetable between distribution centres and quarry to virtual quarry ballast movements.

1.1.2 Intermodal clusters

The forecasts for intermodal traffic were based on a number of new distribution centres being operational. To take account of the fact that it is difficult to predict which of the individual distribution centres will come to fruition (and that other centres not yet planned may open by 2043) and to avoid seeming to endorse particular proposals, the distribution centres in the Freight Market Study forecast are clustered into geographical areas.

The clusters that have been chosen reflect a combination of statistical regions and railway geography. The choice of cluster location can have substantial impacts upon routeing of freight trains and therefore the numbers of paths on a given section of network. The regional clusters are shown in Table 2.

All forecast traffic which was either from, or to, a new intermodal terminal has been mapped to a regional cluster rather than a specific terminal. While it would be more detailed to map the traffic to a specific terminal, such detail would be spurious in the light of the uncertainty around the location of individual distribution centres.

The forecasts as shown should not be used to:

- assess the demand to serve specific inland terminals development
- make assumptions about which terminals are strategically favoured.

Table 2 – Intermodal regional clusters and their geographic points

Intermodal cluster locations	Geographic routeing point
Aberdeen area	Aberdeen
Bristol area	Holesmouth Junction
Daventry and Northampton area	Rugby
Essex Thameside area	Thames Haven
Exeter and Plymouth area	Exeter St David's
Glasgow area	Mossend North Junction
Greater Manchester area	Trafford Park
Great Western Main Line eastern area	Slough
Haven ports area	Felixstowe Beach
Humberside area	Immingham
Inverness area	Inverness
Kent Thameside area	Crayford Creek Junction
Merseyside and Cheshire area	Edge Hill
Midland Main Line southern area	Bedford
Midland Main Line northern area	Trent South Junction
South Wales area	Cardiff Central
South Yorkshire area	Doncaster
Southampton & Portsmouth area	Southampton
Staffordshire area	Norton Bridge Junction
Teeside and Tyneside area	Shell Junction (Redcar)
West and North Yorkshire area	Altofts Junction
West Midlands area	Coventry

Glossary

Term	Definition
ATOC	Association of Train Operating Companies
Conditional Outputs	Statement of aspirations for the level of service provided
Control Period 3 (CP3)	The 2004/05 to 2008/09 period
Control Period 4 (CP4)	The 2009/10 to 2013/14 period
Control Period 5 (CP5)	The 2014/15 to 2018/19 period
Control Period 6 (CP6)	The 2019/20 to 2023/24 period
Colas Rail	A rail freight operating company
Devon and Cornwall Railway	A rail freight operating company
DB Schenker	A rail freight operating company
DECC	Department of Energy and Climate Change
Deep Sea shipping	Shipping between the UK and countries outside Europe and the Mediterranean
DfT	Department for Transport
DRS	Direct Rail Services, a rail freight operating company
ERTMS	European Rail Traffic Management System
ESI Coal	Coal transported for the use of the Electricity Supply Industry
FMCG	Fast Moving Consumer Goods
FOC	A generic term for a rail freight operating company
Freightliner	A rail freight operating company
Freight RUS	Freight Route Utilisation Strategy, Network Rail, 2007
FTA	Freight Transport Association
GB	Great Britain
GBFM	Great Britain Freight Model
GBRf	GB Railfreight, a rail freight operating company
HGV	Heavy Goods Vehicle
HLOS	High Level Output Specification
HS2	Proposed high speed link between London and Birmingham beyond to Leeds and Manchester
Local Distribution Centre	A Network Rail depot used to store railway engineering materials (such as ballast), for use in maintaining and renewing the rail network
LTPP	Long Term Planning Process

Glossary

Term	Definition
N/A	Data not available
NDS	National Delivery Service. The division of Network Rail which brings together a wide range of products and services which supports Network Rail in delivering its day to day business
National Operating Strategy	Network's Rail's National Operating Strategy is a new way of managing, controlling and operating rail services on the network
ORR	Office of Rail Regulation, the regulator for the rail industry in Great Britain
Periodic Review	The process which establishes Network Rail's outputs and funding for the following Control Period
RDG	Rail Delivery Group
Renewables obligation	This is currently the main financial mechanism by which the Government incentivises deployment of large-scale renewable electricity generation
RFG	Rail Freight Group
RFOA	Rail Freight Operators Association
RIPG	Rail Industry Planning Group
RUS	Route Utilisation Strategy
SFN	Strategic Freight Network
Short Sea shipping	Shipping between the UK and countries inside Europe and the Mediterranean
SRFI	Strategic Rail Freight Interchange. A large multi-purpose rail freight interchange and distribution centre linked into both the rail and trunk road system. It has rail-connected warehousing and container handling facilities and may also include manufacturing and processing activities
W10	The loading gauge which enables 9' 6" containers to be conveyed on conventional wagons.
W12	Allows a 9'6 high container to be carried on a standard container wagon, including refrigerated containers up to 2,600mm wide. This is the recommended height for renewed structures

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