Network Rail

Network RUS

Scenarios & Long Distance Forecasts

June 2009

Foreword

I am delighted to present this document, which forms part of the Network Route Utilisation Strategy (RUS). Unlike the geographic scope of the majority of RUSs, the Network RUS looks at issues affecting the network as a whole, using a consistent approach across Great Britain.

This particular strategy presents four alternative scenarios for the future and examines the impact each may have on demand for long distance passenger and freight services. It considers a number of factors, including economic growth and development, social trends and sustainability.

It is vitally important that the rail industry looks in detail now at what the future may hold. This will help us to understand how demand for passenger and freight services may be affected, and to plan effectively and appropriately in response to those developing situations. It will also enable governments and other funders to make informed investment decisions in a way that takes into account the long lead times for major transport infrastructure projects. With the changing economic climate putting the public finances under even greater pressure than before this is perhaps even more important now than ever.

The industry is already working together to develop a clear long-term vision for rail that meets the needs of passengers and freight users. The Network RUS Scenarios & Long Distance Forecasts will contribute to this work, and help to ensure that investment decisions taken now are consistent with that long-term strategy and vision.

This is an extremely important and exciting area of work. A broad consensus has now developed of the need to invest in the railway, and it is the responsibility of the industry to show that it has the collective will to respond to the challenge of helping to provide future generations and Britain as a whole with a rail network that is efficiently planned, environmentally sustainable and meets the needs of Britain, its economy and its people.

This RUS was initially published as a Draft for Consultation in March 2009. There was broad and strong support for the approach it adopts, though a wide range of issues were raised during the consultation that have influenced several aspects of the strategy. I would like to thank everyone who responded to the consultation for their contribution.

The development of this strategy has been led by Network Rail, but it has been the result of joint working across the whole rail industry. A large number of organisations have been fully involved, notably including our customers, the passenger and freight operators. I would like to thank them all for their efforts.

Iain Coucher
Chief Executive

Executive summary

Few things are certain when planning for the long term. The only certainty is that we don't know what the future will hold. 30 years ago few would have predicted that the railway would be privatised, the coach market deregulated, that London's rundown docklands would develop into a financial centre and that there would be an influx of hundreds of thousands of young workers from an expanded European Union. There will be similar uncertainties when we look forward 30 years from now.

Long-term planning is viewed as vital by the railway's funders. The development of a clear long-term vision enables efficient planning, facilitates efficient short to medium-term investment decisions as well as ensuring that an efficient and environmentally friendly railway is available to future generations. Recent planning documents published by both the Department for Transport (DfT) and Transport Scotland have established the need to plan long-term and, given the longer planning horizons, to plan for uncertainty. The DfT's Delivering a Sustainable Transport System (DaSTS) document identifies a requirement to balance the 'need to provide a stable climate for investment with the need to cater for demand uncertainty'. It puts emphasis on the understanding of the drivers of demand and how they might be expected to evolve over time. It concludes that a long-term plan should be developed for a range of scenarios.

The Network RUS Scenarios & Long Distance Forecasts document builds on these themes. It presents a series of long-term scenarios and considers how long distance demand for both passenger and freight services would be impacted by the alternative scenarios.

Other than the Freight RUS, which was established in May 2007, the Network RUS is the only RUS which covers the entire network. Its network-wide perspective – supported by a stakeholder group with network-wide expertise – enables the development of a consistent approach to issues which underpin the development of the network. It enables strategies to be developed by the rail industry and its funders, users and suppliers which are underpinned by a network-wide perspective to planning. The outputs of the RUS will be used in subsequent industry planning, including the geographical RUSs, thereby ensuring that the key issues are dealt with consistently throughout the RUS programme.

The Network RUS is overseen by a Stakeholder Management Group (SMG) consisting of Network Rail, the DfT, Transport Scotland, the Welsh Assembly Government (WAG), Transport for London, the Passenger Transport Executive (PTE) Group, the Association of Train Operating Companies (ATOC), Freight Operating Companies (FOC), Passenger Focus, London TravelWatch, Rolling Stock Companies (RoSCos) and the Rail Freight Group. The Office of Rail Regulation (ORR) attended SMG meetings as observers. The Scenarios & Long Distance Forecasts work was developed by a working group consisting of Network Rail, the DfT, WAG, Transport Scotland, ATOC, DB Schenker, Transport for London, the PTE Group, Passenger Focus and the Rail Freight Group, again with the ORR as observers.

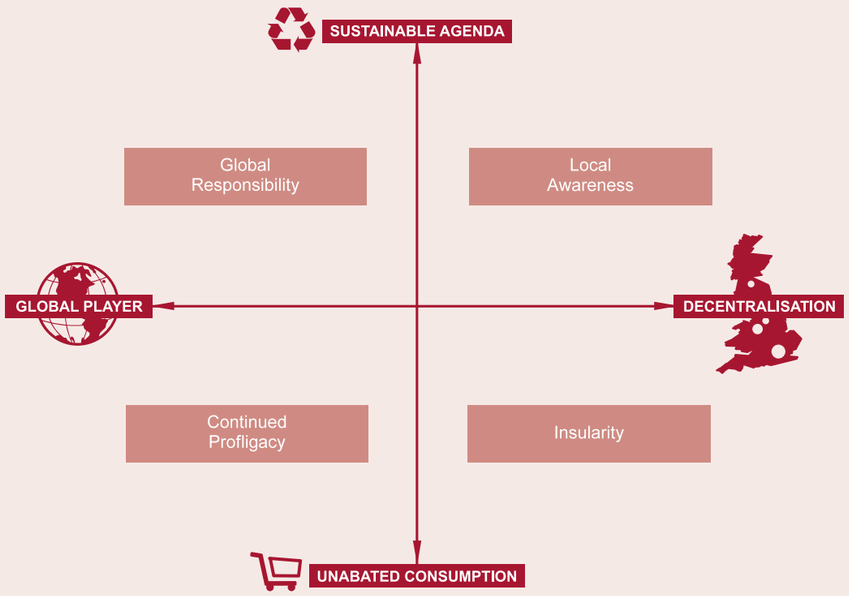
The RUS considers the current long distance rail market for both passenger and freight movements. It outlines current forecasting practices and planning scenarios. It identifies a gap in long-term forecasting techniques.

Conventional rail demand forecasts plan on the basis of observed patterns of movement and an understanding of factors affecting demand. They generally assume that existing behavioural responses to change will continue and that the economy will continue to grow at a consistent rate. Such methods have been moderately successful at forecasting relatively short-term demand but are less useful for long-term planning.

When considering a longer-term planning horizon, consideration of alternative scenarios can help decision makers for policies in the face of uncertainty. They can help planners understand what is within their control and what isn't. As such they can help in an assessment of the robustness of plans.

The Network RUS working group identified four scenarios on the basis of the two factors which they viewed to be critical to rail demand (both passenger and freight) and sufficiently uncertain to justify scenario analysis. They identified the factors that they viewed as critical in driving change in the use of transport in general and rail in particular. These were the degree to which sustainability will be pursued and the degree to which the UK participates further in global trade (or whether the economy becomes more decentralised) (see Figure ES1).

Figure ES1 Scenario axes and names



The scenarios are defined by a cross-tabulation of these factors, ie.

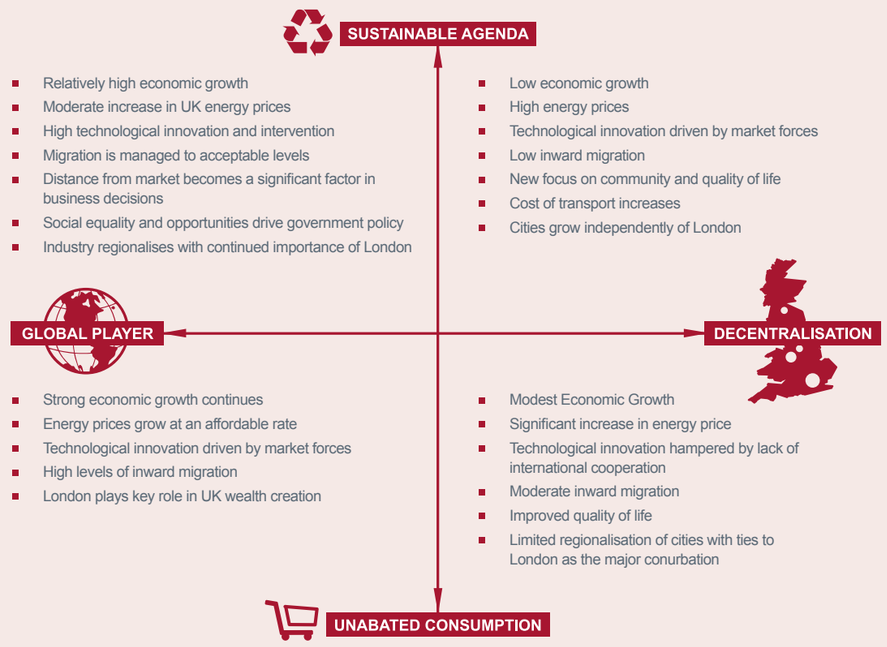
- ‘Global Responsibility’ (ie. UK as a global player with a sustainable agenda)
- ‘Continued Profligacy’ (ie. UK as a global player with unabated consumption)
- ‘Local Awareness’ (ie. a more decentralised economy with a sustainable agenda)
- ‘Insularity’ (ie. a more decentralised economy with unabated consumption).

The RUS examines what these alternative worlds would look like. It considers those factors which would be constant between the scenarios (eg. birth and death rates) and, critically, those that vary between the scenarios. Those factors which vary between the scenarios include the level of economic development, the degree to which the UK trades with other countries, social trends, energy prices and the degree to which each mode recovers its external costs (and consequently its competitiveness). This is shown in Figure ES2.

Long-term forecasts of long distance passenger and freight demand are presented for each of the four scenarios. The levels of demand vary considerably between them. The pattern of growth is shaped by the influence of two key demand drivers: economic growth which affects growth in all modes of transport and sustainability (which particularly impacts on rail’s share of the market).

The RUS presents forecasts of ‘background growth’, ie. growth determined by anticipated changes in the population or economy and generally excluding the demand generated by current, planned and, as yet, unidentified interventions in the railway.

Figure ES2 Scenario descriptors



The impact of economic growth varies from near stagnation in the Local Awarness to strong economic growth in the Continued Profligacy scenario.

Growth in passenger numbers is forecast in all exemplar long distance rail corridors in all four scenarios. Rail growth rates are highest in the Global Responsibility scenario and the Continued Profligacy scenario. In the first instance this is due to a high share of a moderately sized market. In the latter this is due to a lower share of a large market.

The rates of background rail growth forecast vary from 28 percent in 30 years in the London to Hampshire/Dorset corridor in the Local Awareness scenario to 95 percent in 30 years in the cross-country corridor in the Global Responsibility scenario.

A sustainability agenda is beneficial to long distance rail in all long distance corridors, but the growth is higher in those which currently have a comparatively low market share such as cross-country and trans-Pennine corridors. In all scenarios passenger growth rates are higher on those routes which have a higher proportion of business trips.

The 30-year growth rates for freight also vary considerably between the scenarios. The globalisation/decentralisation dichotomy has a great effect on the market for imported goods – which dominates the intermodal and Channel Tunnel market. Similarly, assumptions on the use of coal in the sustainability agenda have a direct impact on the amount of coal carried from ports to power stations. The sustainability agenda is assumed to have a positive impact on the competitive impact of rail freight.

The amount of coal carried is forecast to be highest in the Continued Profligacy scenario (a zero percent change from today) and lowest in the Local Awarness scenario where it is assumed to decrease by 70 percent in 30 years. Given that each of the scenarios assumes positive economic growth, inter-modal levels increase in each scenario from 60 percent in the Insularity scenario to over 300 percent in the Global Responsibility scenario. Construction traffic increases vary from 6 percent in the Local Awareness scenario to 50 percent in Continued Profligacy scenario. The level of domestic intermodal traffic varies depending on assumptions made about the development of new terminals. The levels carried are negligible at present but, given the assumption of terminal development could grow considerably (tripling in the ‘insularity’ scenario or even up 13-fold if in a sustainable world with a global economy).

It is recommended that the scenarios and exemplar forecasts introduced in this RUS be used in long-term planning work. Applications are expected to include the next generation of RUSs and the DfT’s emerging DaSTS workstream.

Contents

1. Background

1.1 Context

Following the Rail Review in 2004 and the Railways Act 2005, the Office of Rail Regulation (ORR) modified Network Rail's licence in June 2005 to require the establishment of Route Utilisation Strategies (RUS) across the network. Simultaneously, ORR published guidelines on RUSs. The licence was further amended to confirm the role and reflect the emerging process in April 2009. A RUS is defined in condition 1 of the licence, in respect of the network or part of the network, as a strategy which will promote the route utilisation objective.

The route utilisation objective is defined as:

> 'the efficient and effective use and development of the capacity available, consistent with funding that is, or is likely to become, available'

Extract from ORR Guidelines, April 2009

The ORR Guidelines identify two purposes for RUSs, and state that Network Rail should balance the need for predictability with the need to enable innovation. Such strategies should:

> 'enable Network Rail and persons providing services relating to railways to better plan their businesses, and funders better plan their activities'

The guidelines also set out principles for RUS development and explain how Network Rail should consider the position of the railway funding authorities, the likely changes in demand and the potential for changes in supply. Network Rail has developed an RUS Manual which consists of a consultation guide and a technical guide. These explain the processes we will use to comply with the Licence Condition and the guidelines.

These and other documents relating to individual RUSs and the overall RUS programme are available on the Network Rail website at **www.networkrail.co.uk**

The process is designed to be inclusive. Joint work is encouraged between industry parties, who share ownership of each RUS through its industry Stakeholder Management Group (SMG).

RUSs occupy a particular place in the planning activity for the rail industry. They use available input from Government Policy documents such as the Department for Transport's (DfT's) Rail White Papers and Rail Technical Strategy, the Wales Rail Planning Assessment, and Transport Scotland's Scottish Planning Assessment. The recommendations of an RUS and the evidence of relationships and dependencies revealed in the work to reach them in turn form an input to decisions made by industry funders and suppliers on issues such as franchise specifications, investment plans or the High Level Output Specifications (HLOS).

Network Rail will take account of the recommendations from RUSs when carrying out its activities and the ORR will take account of established RUSs when exercising its functions.

1.2 Document structure

This document starts by describing, in **Chapter 2**, the role of the Network RUS in the RUS programme. It describes the scope of the Network RUS Scenarios & Long Distance Forecasts workstream including the key issues which it will consider, its geographical coverage and the time horizon which it addresses. It outlines the policy context and the relationship between the RUS and related policy issues which are being considered concurrently by industry funders.

Chapters 3 and 4 present the baseline for this study. **Chapter 3** describes the long distance passenger and freight markets. **Chapter 4** outlines the existing methodologies used to determine long distance traffic forecasts.

This is followed in **Chapter 5** where the need for forecasting techniques that can deal with the uncertainties of long-term planning is identified. **Chapter 6** discusses the value of a scenario-based approach when dealing with uncertainty. It identifies factors used to develop four alternative scenarios which would be sufficiently robust to test plans against a wide variety of outcomes.

The resulting scenarios are described.

Chapter 7 explores how key drivers which affect demand vary between the scenarios. **Chapter 8** gives an overview of the methodologies adopted to produce demand forecasts and presents the demand forecast in the four alternative scenarios for both passengers and freight.

Chapter 9 outlines the responses received during the consultation.

This is followed in **Chapter 10** by a discussion of how the outputs of the RUS will be used in rail industry planning.

2. Scope and planning context

2.1 The role of the Network RUS within the RUS programme

Other than the Freight RUS, which was established in May 2007, the Network RUS is the only RUS which covers the entire network. Its network-wide perspective – supported by a stakeholder group with network wide expertise – enables the development of a consistent approach on a number of key strategic issues which underpin the future development of the network.

The unique nature of the Network RUS, the broad range of its stakeholders and its inevitable interface with other key strategic workstreams make it somewhat different from the geographical RUSs. To this end, the Network RUS team has developed a meeting structure, industry consultation and programme to ensure that it produces key, timely and thoroughly consulted deliverables.

Network-wide perspective

The Network RUS enables strategies to be developed by the industry and its funders, users and suppliers which are underpinned by a network-wide perspective of rail planning. The development of such strategies, which will subsequently act as inputs into the geographical RUSs, will ensure that key issues are dealt with consistently throughout the RUS programme.

It enables strategies to be developed which by their very nature cross RUS boundaries (eg. the development of future rolling stock families and electrification) or benefit from the development of strategies for best practice for different ‘sectors’ of the railway (eg. strategies for inter-urban, commuting and rural stations).

Organisation: Stakeholder Management Group and Working Groups

In common with all other RUSs, the Network RUS is overseen by the SMG which is chaired by Network Rail. It has members from:

- Department for Transport
- Transport Scotland
- Welsh Assembly Government
- Transport for London
- Passenger Transport Executive (PTE) Group
- ATOC
- Freight Operating Companies
- Passenger Focus
- London TravelWatch
- RoSCos
- Rail Freight Group
- ORR (observers).

The majority of the work and detailed stakeholder consultation, however, is carried out within Working Groups which have been formed to steer each of the Network RUS workstreams. The Working Groups manage each of the workstreams as if it were a ‘mini’ RUS. The groups vary in size but are all small enough to ensure effective levels of engagement between the participants. However, given that each is composed of individuals with a relevant expertise or strategic locus for the specific ‘mini RUS’ strategy, they play an important role in recommending a strategy for endorsement by the SMG.

The SMG is the endorsement body for the outputs of the individual workstreams.

Its agenda concentrates on key decisions – from endorsement of the Working Group remits to approval of key documents and ultimately the resulting strategy.

If the SMG has comments or questions on papers these would be referred back to the Working Group which contains each of the SMG organisations’ specialist representatives.

Network RUS workstreams

The first meeting of the SMG identified those elements of strategy which it wished to include in the Network RUS. A Working Group was formed to take forward each chosen element of strategy.

The Scenarios & Long Distance Forecasts Working Group consists of members of the following organisations:

- Network Rail
- ATOC
- Freight Operating Companies
- Department for Transport
- Welsh Assembly Government
- Transport Scotland
- PTE Group
- TfL London Rail
- Passenger Focus
- Rail Freight Group
- ORR (observers).

Each geographical RUS will use the strategies recommended by the established Network RUS when developing its route based strategy. The strategies identified by the Network RUS will be considered further by the geographical RUS in the light of other factors identified by that RUS. It is envisaged that the Network RUS strategy will be adopted by the geographical RUSs.

2.2 Time horizon

The Network RUS takes a 30-year perspective to be consistent with the long-term views of transport planning taken by UK governments in their recent strategy documents, notably the DfT's Rail White Paper (2007) and Transport Scotland's Strategic Transport Project Review (2008). To assist the development of funders' strategies, the output of the RUS will be expressed in terms of 5-year periods which align with regulatory Control Periods.

2.3 Scope of the RUS

Following on from the publication of the Governments' strategy documents outlined in Section 2.3, the Scenarios & Long Distance Forecasts workstream has developed a set of long-term scenarios which will be applicable for testing the robustness of scheme development to a variety of alternative futures. The strategy then goes on to use those scenarios to develop a long-term view of demand.

The scope of the RUS has evolved since its conception, in agreement with the SMG. The initial impetus for the work was the aspiration of the SMG to revisit the Long Distance Statements for Passenger and Freight Services produced by the Strategic Rail Authority (SRA) as part of its Capacity Unitisation Policy in June 2003. The scope was extended to develop planning scenarios in line with the increasing interest in the use of scenarios for long-term planning and to test the emerging view of long distance demand against the scenarios.

The Long Distance Statements set out the SRA's working assumptions on future service levels for passengers and freight. The statements were developed to inform RUSs, future franchise specifications and wider industry planning. They were to act as a guide to planning with the understanding that the extent to which they would be realised would depend on an iterative process with future decisions, eg. the content of future RUSs and franchise specifications.

The SRA's Long Distance Statements took the form of a series of tables which outlined peak and off-peak service levels for passenger services and 24-hour and 'typical off-peak hour' paths for freight in both 'current' and a specified future planning year.

The Network RUS SMG requested that the statement be reviewed and updated by the Network RUS which, given its unique role in addressing network-wide issues within the RUS programme, would be well placed to provide a joined-up perspective. The Working Group was remitted to produce an updated version covering a ten-year time horizon. This was later extended to become a thirty-year horizon to fit with the longer time horizons being developed by funders. The remit proposed that the new 'statement' would take the form of demand forecasts for passenger and freight services of over 50 miles in length which cross RUS boundary areas and that it would be informed by relevant existing studies. The development of a replacement statement would be expected to be consistent with governments' strategies, including for example the Eddington Report, placing emphasis on current and future economic activity.

2.4 Planning context

England and Wales

The DfT published its White Paper 'Delivering a Sustainable Railway' in July 2007. It provided a vision for the next thirty years. Over this period, it envisaged a doubling of passenger numbers and of freight transported by rail. It envisaged a railway which would expand to meet the increased demand, reduce its environmental impact, and meet increasing customer expectations, whilst at the same time continuing to improve its cost efficiency.

The White Paper outlined the Government's priorities for inter-urban rail in England and Wales. These are to increase capacity in order to tackle overcrowding and to secure the railway's contribution to sustainable economic growth. To this end the England and Wales HLOS for Control Period 4 (CP4) contains a number of capacity enhancements and works to enable the introduction of a new generation of Intercity Express trains. The paper proposed that these works, plus further investment in line with the Paper's capacity and funding projections in later control periods, along with the development of radio-based signalling, would be sufficient to accommodate projected growth until about 2031.

Nonetheless the White Paper does observe that long-term demand forecasts are uncertain and that there may be a need to ensure that feasible options exist to meet alternative growth profiles. It observes that demand forecasts are built on historical relationships between demand, price, economic activity and supply but that these relationships can, and will, change. Subsequently, the DfT has published two documents which build upon the strategy introduced in the Rail White Paper: 'Towards a Sustainable Transport System' (TaSTS) published in October 2007 and 'Delivering a Sustainable Transport System' (DaSTS) published in November 2008. These documents address the role of transport in the nation's economic development and in affecting climate change. They emphasise the importance of looking across modes before deciding upon funding priorities.

The DaSTS paper puts further emphasis on the need to cater for demand uncertainty. It identifies a 'need to balance the need to provide a stable climate for investment with the need to cater for demand uncertainty'. It cites the reversal of the decline in rail demand over the last ten years as evidence of the danger of extrapolation of trends. Rather, emphasis is put on understanding the drivers of demand and how they might be expected to evolve over time. The paper concludes that a long-term plan should be developed for a range of scenarios.

Scotland

In December 2008, Transport Scotland published its 'Strategic Transport Projects Review' (STPR). The document outlines the role of a safe, efficient and effective transport system as a key enabler of the development of a successful and dynamic nation. It reinforces the importance of linking the major Scottish cities (and areas of greatest population growth) and international gateways by fast effective links.

The STPR, in common with the White Papers produced south of the border, recognises that there is an element of uncertainty in demand forecasts, particularly over long time horizons. The schemes outlined in the STPR reflect one possible scenario of future demand but a number of scenarios were considered as the policy evolved. The scenarios have included variations in the levels of economic growth, land use developments and fuel prices.

As mentioned in **Chapter 1**, the RUS outcome will help inform the DfT's and Transport Scotland's HLOSs for Control Period 5 (CP5).

3. Baselining I: Markets

3.1. Introduction

This chapter gives an overview of current long distance passenger and freight markets in Britain, based on the most up-to-date information available at the time of publication. The intention is to provide the reader with an understanding of the magnitude and distribution of long distance rail flows on the national rail network. A more comprehensive understanding can be gained from reading the East Coast Main Line RUS, and the Great Western, East Midlands and West Coast Main Line RUSs which are published or in preparation – for current status see the Network Rail website: **www.networkrail.co.uk** A more comprehensive description of the freight market is presented in the Freight RUS.

This RUS defines 'long distance' flows as those journeys which are over 50 miles in length. This description is also adopted by the National Travel Survey (NTS)[1] and the National Travel Model (NTM). Similarly, research sponsored by the DfT identifies 50 miles as the threshold at which people begin to respond differently to cost and time stimuli.

Section 3.2 of this chapter describes the current long distance passenger market followed in Section 3.3 by a description of the freight market.

3.2 The long distance passenger market

Nationally, over 60 percent of all passengers using services run by long distance operators are travelling over 50 miles. Excluding CrossCountry and TransPennine Express, who both carry a large number of passengers over relatively short distances, this figure increases to over 70 percent.

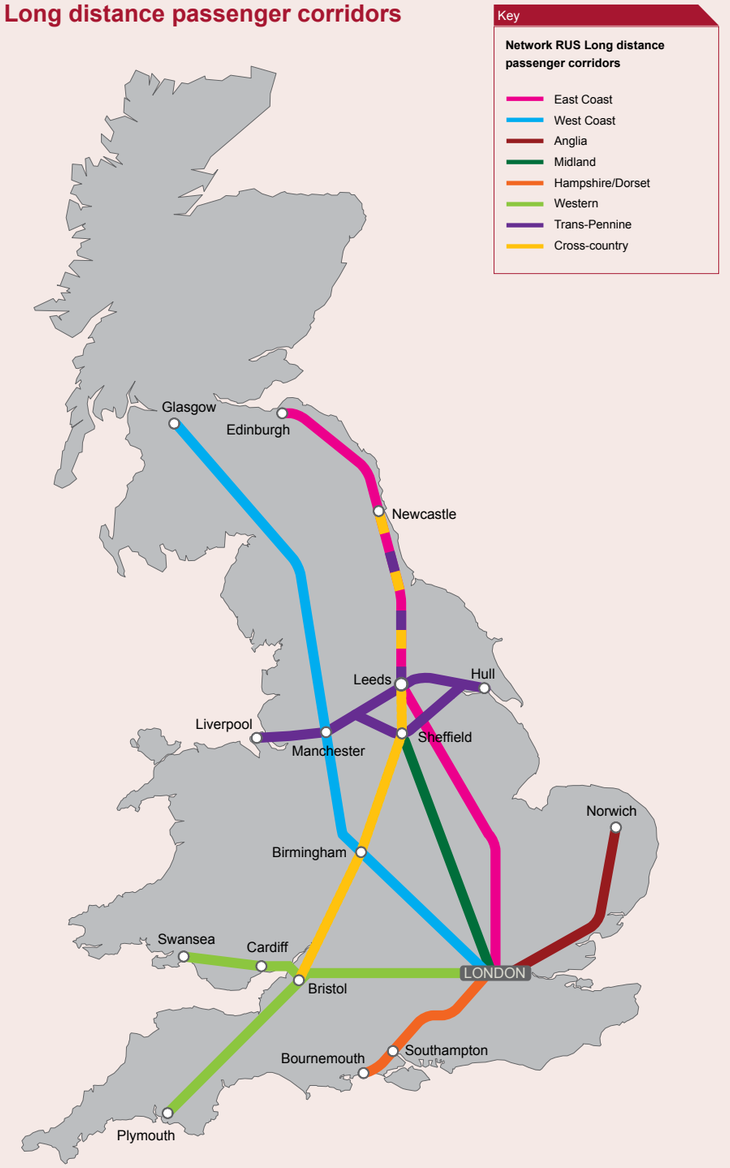
The RUS considers long distance journeys over 50 miles within eight exemplar strategic national corridors, listed below. These are consistent with those proposed in DaSTS and include the main routes from Scotland and Wales to England. The corridors are shown in Figure 3.1.

- London & South East/West Midlands/ North West/Scotland (West Coast Main Line, M1, M40, M6 & M74)
- London & South East/Lincolnshire/ Yorkshire & Humber/North East/Scotland (East Coast Main Line, A1)
- London & South East/East Midlands/South Yorkshire (Midland Main Line & A1(M))
- London & South East/Western Home Counties/Somerset & West of England/ South Wales, Devon & Cornwall (Great Western Main Line, M4, M5, A303 & A38)
- London/East Essex, Suffolk/Norfolk (Great Eastern Main Line, A12)
- London/Surrey/Hampshire/Dorset (South West Main Line, M3, M27 & A3)
- Yorkshire & Humber/North West/North East/ Merseyside (trans-Pennine route, M62)
- South West/West and East Midlands, Yorkshire & Humber/North East (cross-country route/M5, M1 & A1(M)).

Figure 3.1 shows the exemplar corridors used in this RUS. Demand is also included where relevant from adjacent areas. For example, the Western corridor is illustrated in the figure as ending at Plymouth, but effectively extends further west and includes the whole of Cornwall. Similarly the East and West Coast corridors extend into east and west Scotland respectively, and the Western corridor at Swansea to west Wales.

1 Department for Transport, National Travel Survey, 2002-2006 [computer file]. 2nd Edition. Colchester, Essex: UK Data Archive [distributor], August 2008. SN: 5340.

Figure 3.1 Long distance passenger corridors



3.2.1 Modal share of long distance passenger journeys

The NTS shows that long distance trips account for just 2 percent of all journeys made by all modes. Over 60 percent of households surveyed by the NTS made no long distance trips during the period covered by the survey.

Long distance journeys account for 30 percent of the total distance travelled across Great Britain. This equates to approximately 1.4 billion long distance trips per year by all modes, with approximately 150 million of these being made by rail.

Long distance trips therefore make a significant contribution to the external impacts of transport. For example, research for DfT shows that long distance journeys constitute 44 percent of traffic on the M1, 68 percent of traffic on the M6, and 43 percent on the M40.

83 percent of all long distance trips are made by car. Nationally, rail's share of long distance journeys is only 10 percent, although it is significantly higher (18 percent) across long distance commuting markets.

Rail becomes increasingly competitive over longer distances. Domestic airlines hold significant market share over 350 miles, which appears to have been gained mostly from the car. Even over very long distances, car retains just under half of the market share, as shown in Table 3.1.

Table 3.1 Long distance journey market share by distance

Main Mode	50 to Under 75 Miles	75 to Under 100 Miles	100 to Under 150 Miles	150 to Under 250 Miles	250 to Under 350 Miles	350 Miles+
Car/Van	85%	85%	85%	81%	73%	44%
Bus/Coach	3%	4%	5%	6%	8%	6%
Rail	10%	9%	9%	11%	14%	12%
Air	0%	0%	0%	1%	4%	36%
Other	2%	2%	1%	1%	1%	2%

Trip origin and destination also have a significant influence on mode choice. Rail's share of long distance journeys to and from Greater London is 29 percent, reflecting the cost, congestion and complexity of driving within it. The importance of the London market to rail is reflected in rail's market share of long distance journeys within the strategic national corridors (Table 3.2).

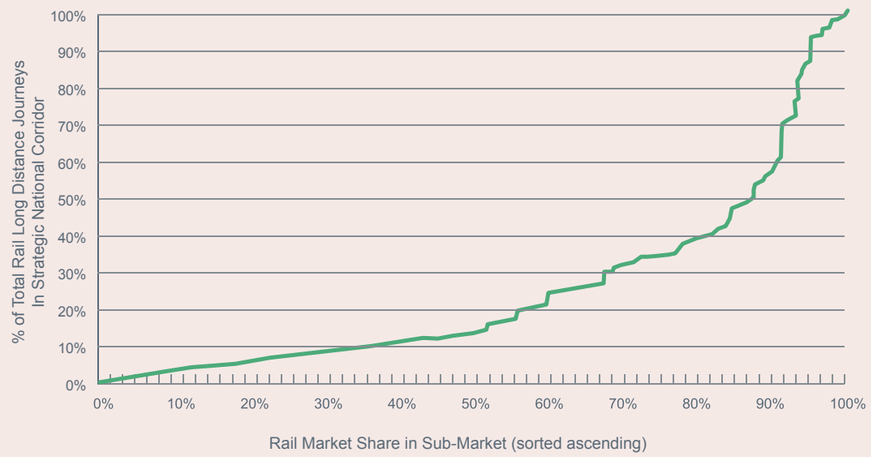
'Average' market shares, are shown in Table 3.2. The overall market includes a series of polarised submarkets in which either rail or car dominate. For example, Figure 3.2 illustrates this point for the West Coast corridor, where half of long distance rail demand is derived from sub-markets in which rail has over 90 percent market share.

Table 3.2 Rail's share of long distance travel in exemplar strategic national corridors

Strategic National Corridor	Rail Market Share of Long Distance Journeys
West Coast	31%
East Coast	29%
Midland	29%
London to Hampshire/Dorset	28%
Western	26%
Anglia	20%
Cross-country	8%
Trans-Pennine	5%

Source: PLANET Strategic Model (excludes coach & bus demand).

Figure 3.2 West Coast strategic national corridor rail demand by sub-market share



3.2.2 Market segmentation

This RUS has adopted a market segmentation approach in order to forecast long distance demand.

The markets listed below are known to respond differently to price, journey time, and other characteristics of long distance travel. They are:

- people making journeys over 50 miles in the course of their employer's business, including the self-employed (referred to in this RUS as 'employers' business');
- commuting over 50 miles to and from a normal place of work or education (referred to in this RUS as 'commuters'); and
- leisure travel over 50 miles, including entertainment, holidays, visiting friends and relatives and tourist travel (referred to in this RUS as 'leisure').

Table 3.3 provides a summary of reasons for making long distance journeys in Great Britain. These profiles are similar across all strategic national corridors.

Greater London is a significant generator and attractor of long distance trips – more than one in five long distance journeys start or finish in the Capital. For long distance commuting, this proportion is almost one in three.

Table 3.3 Long distance journey purpose, all modes

Long Distance Journey Purpose	Proportion of Long Distance Journeys	Proportion of Long Distance Mileage
Employer's Business	22%	23%
Commuting	14%	11%
Leisure	64%	66%

3.2.3 Profile of long distance travellers

Many factors influence an individual's propensity to undertake long distance travel. These include income, nature of employment, home and work location, car ownership, and a range of socio-economic factors.

Table 3.4 presents the income profile of long distance travellers. It shows the proportion of trips made by each income quintile (ie. the population equally divided into 5 wealth bands). Over one in three long distance trips are made by households in the highest income quintile, rising to one in two for long distance commuting and business trips.

Despite the growth of low cost airlines, almost 70 percent of domestic airline passengers are in the highest income quintile band.

75 percent[2] of households own at least one car. Car ownership amongst long distance travellers is significantly higher at 94 percent. Given that car trips dominate the long distance market, this suggests that not owning a car is a significant barrier to making long distance journeys.

Approximately two-thirds of long distance trips by public transport are made by a household that owns at least one car, but has clearly chosen not to use it. Makers of long distance leisure trips are twice as likely as business travellers to not have access to a car. Table 3.5 illustrates this.

2 Source: TEMPRO.

Table 3.4 Long distance journeys by income quintile group

Household Income Quintile Group 2006	Proportion of All Long Distance Journeys	Proportion of Long Distance Business Journeys	Proportion of Long Distance Commuting Journeys	Proportion of Long Distance Leisure Journeys
Lowest	8%	4%	4%	10%
2nd	11%	8%	4%	14%
3rd	17%	13%	14%	19%
4th	26%	27%	30%	25%
Highest	38%	48%	47%	32%

Table 3.5 Long distance journey car availability profiles

Household Car/Light Van Ownership	Proportion of Long Distance Business Trips	Proportion of Long Distance Commuting Trips	Proportion of Long Distance Leisure Trips
0	4%	3%	8%
1 or 2	82%	81%	82%
3+	14%	16%	10%

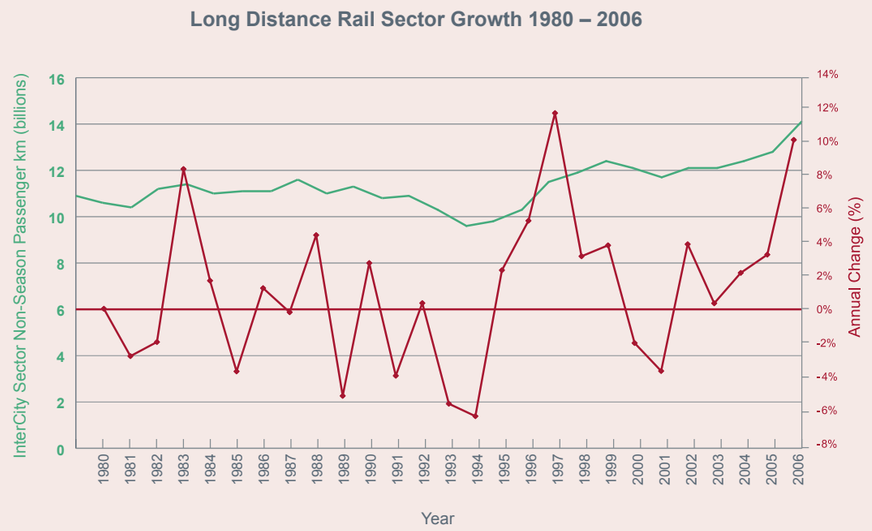
Table 3.6 provides a summary of long distance trip making propensity across Great Britain.

People who live in the South West and South East English regions are most likely to make long distance trips. Whilst Greater London is a significant attractor of trips, its residents on average are less likely to make long distance trips than many of the English Regions. Scottish residents have a similar trip rate to those of Greater London. Residents in the North East of England make the fewest long distance trips per head.

Table 3.6 Long distance journey making propensity by nation or Government Office region

Government Office Region/ UK nation of Journey Origin	Proportion of Long Distance Trips	Proportion of GB Population	Ratio of Trips: Population (High to Low)
South West	12%	9%	1.34
South East	17%	14%	1.25
East of England	11%	10%	1.15
East Midlands	8%	7%	1.08
Wales	5%	5%	1.02
West Midlands	8%	9%	0.92
Yorkshire & the Humber	8%	9%	0.91
North West	10%	12%	0.85
Scotland	7%	9%	0.84
Greater London	11%	13%	0.84
North East	3%	4%	0.60

Figure 3.3 Growth trends across the long distance rail operators



3.2.4 Long distance rail trends

The rail industry maintains patronage statistics for the long distance high speed operators. Growth in passenger km since 1980 is illustrated by Figure 3.3.

Figure 3.3 demonstrates that long distance passenger km for passengers not travelling on season tickets fell from 10.9 billion in 1980 to 9.6 billion in 1994. Since then, the market has risen to 14.1 billion in 2006, an average compound growth rate of 3.2 percent per annum.

3.2.5 Profile of long distance rail passengers

In 2007/08, over 104 million journeys were made on services operated by long distance rail operators. Nationally, 27 percent of long distance rail journeys are made in the course of employer's business, 25 percent for commuting to work, and 48 percent for leisure purposes.

Table 3.7 shows the journey purpose of long distance trips by corridor.

Business travel forms a relatively high share of rail demand along the West Coast strategic national corridor, due to the alignment of London, Birmingham, Manchester and Glasgow along this route. The London to Hampshire/ Dorset (South West Main Line) corridor has the highest proportion of long distance commuting at 41 percent. Leisure travel has a higher share of non-London rail markets.

Table 3.7 Journey purpose of long distance rail trips

Strategic National Corridor	Rail Long Distance Journeys: Business	Rail Long Distance Journeys: Commuting	Rail Long Distance Journeys: Leisure
West Coast	33%	17%	50%
East Coast	30%	27%	43%
Midland	25%	36%	39%
Western	24%	30%	46%
Anglia	25%	31%	44%
London to Hampshire/Dorset	20%	40%	40%
Trans-Pennine	32%	13%	55%
Cross-country	29%	18%	53%

Source: PLANET Strategic Model (excludes coach & bus demand).

Table 3.4 showed the distribution of income for the long distance market by all modes. Table 3.8 shows the distribution for long distance rail passengers. Long distance rail passengers tend to have high incomes; almost half (47 percent) are in the highest income quintile band (compared to 38 percent of all long distance travellers). Long distance rail commuting is almost exclusively undertaken by higher income households.

3.2.6 Summary of rail's competitive strengths in long distance markets

At present, rail's competitive strengths in long distance markets are:

- city centre to city centre journey times, particularly during peak travel times
- the ability to make productive use of travel time, relax or eat, including benefits derived from Wi-Fi connectivity
- comfort, and the opportunity to use a range of retail facilities at stations and on-train
- travel time reliability
- rail is also perceived as having environmental advantages.

Its weaknesses relative to car are:

- for journeys not starting or ending close to a rail station, overall journey time is sometimes uncompetitive. For example, rail's market share between central London and central Manchester is over 80 percent[3]. But between north London and central Manchester rail's market share falls to less than 15 percent
- car journeys are often perceived as having a relatively small marginal cost
- rail travel is not always favoured by large groups, particularly those involving small children with related luggage
- the need to book ahead to achieve the lowest prices
- perception of personal security.

According to the Autumn 2008 wave of National Passenger Surveys, 84 percent of rail passengers on high speed long distance operators rated their journey as 'Satisfied' or 'Good'. Rail scores particularly well on three important aspects of quality – the frequency of trains on the route, punctuality/reliability, and scheduled journey time/speed.

Relatively low scores were achieved for facilities for car parking (52 percent), space for luggage on train (49 percent), train toilet facilities (49 percent), and how the train company deals with delays (48 percent).

3 Source: PLANET Strategic Model.

Table 3.8 Income quintile group of rail passengers by journey passengers

Household Income Quintile Group 2006	Proportion of Long Distance Rail Business Journeys	Proportion of Long Distance Rail Commuting Journeys	Proportion of Long Distance Rail Leisure Journeys
Lowest	2%	4%	15%
2	4%	2%	14%
3	11%	5%	16%
4	29%	2%	21%
Highest	54%	62%	34%

3.3 The long distance freight market

The movement of freight is quite different in nature to the passenger market. Rather than individuals travelling for work or leisure, freight is the movement of goods and services towards consumption centres or the supply of intermediate goods for industry consumption.

Goods often need to be delivered on a 'just in time' basis to reduce the waste associated with stockpiling materials and the costs to the end purchaser.

The overall size of the surface freight market (rail and HGV) in the UK in 2007 was 2,376 million tonnes lifted, according to the DfT's Delivering a Sustainable Transport System – The Logistics Perspective. Rail freight has a five percent share of the market in terms of tonnes lifted which has remained relatively constant in recent years. This is, however, a constant share of an expanding market.

In 2007 the total freight market lifted by distance was 255 billion tonne kilometres. Rail freight has a 12 percent share in terms of tonne kilometres (weight of freight multiplied by the distance carried) which has increased from approximately 10 percent in 1994. This reflects an increase in the average distance of rail freight movements whilst the average distance of road hauls has declined.

Freight operates over the majority of the UK national rail network. Maps detailing significant flows of freight services, by commodity, are illustrated in the Freight RUS. The document is available to view on the Network Rail website: **www.networkrail.co.uk**

Recent trends have shown a shift towards longer distances freight movements. This reflects a number of changes including those in the Electricity Supply Industry (ESI) coal sector (such as a reduction in UK-mined coal replaced by imported coal requiring haulage from ports and an increase in overall coal use for electricity generation as first generation nuclear power stations come off line). The level of containerised consumer goods imported from non-EU origins has also increased significantly.

In 2007/08 approximately 60 percent of freight tonnes were carried on flows over 50 miles in length, although the proportion varies widely by commodity.

Only one percent of iron ore carried is on long distance flows because this traffic is concentrated on short journeys between ports and steelworks, whereas for containers the figure is 98 percent, reflecting the predominance of long distance movements from ports to inland distribution centres. 51 percent of coal is moved on long distance flows, while for metals and construction the proportions are 61 percent and 73 percent respectively. The high figure for construction traffic occurs because of the relatively large distances between the major quarries and the areas where aggregates are used.

The major commodities moved by rail include coal, metals (iron ore as raw materials and finished products), materials for use in the construction industry (aggregates, concrete), petroleum products (oil, diesel etc), imported containers from Europe through the Channel Tunnel, intermodal (containers from around the world), and infrastructure (materials such as ballast, rails and sleepers for the rail industry).

Containers can convey many types of goods including car parts and engines, house products, clothing, furniture and food and drink.

The Freight RUS provided a comprehensive description of the freight markets and forecasts to 2014/15. This chapter includes a summary description and, where possible, updates the figures reported by the Freight RUS

3.3.1 Profile of the rail freight market

Table 3.9 shows the volume of rail freight lifted identified by key types of commodities.

The figures are for the years between 2002 and 2008. The total grew from 96 million net tonnes lifted in 2002/03 to 108 million net tonnes lifted in 2006/07. There followed a reduction in 2007/08, mainly driven by a fall in the coal volumes.

The trends in tonne kilometres or freight moved (weight of freight lifted multiplied by the distance carried) are shown for the same period in Table 3.10. The table uses the same commodities as Table 3.9 and also includes infrastructure figures (ie. freight moved for the purposes of rail engineering works).

The strong growth trend to 2007 in the commodity sectors outlined above has led to the rail network being more heavily used by freight services in recent years than at any time since the structural changes that took place in the UK's heavy industries in the 1970s and 1980s. That period saw large decreases in the demand for transport of bulk products by rail such as iron ore, industrial and domestic coal, metals and, as the pipeline network developed, petroleum.

Tables 3.9 and 3.10 illustrate how the rail freight business has been based upon the bulk commodity markets. Coal, metals and construction constituted over 80 percent of rail freight lifted and nearly 50 percent of rail freight moved in 2004/05. Petroleum constituted seven percent of tonnes lifted and nearly five percent of freight moved in the same year. Intermodal traffic (predominantly deep sea containers but also domestic movements) is established as a major market. In 2004/05 it accounted for almost 14 percent of rail freight moved. By 2007/08 intermodal accounted for 22 percent of movements. The major commodities are examined in further detail in the next sections.

Table 3.9 Rail freight lifted

Millions of net tonnes lifted	2002/03	2003/04	2004/05	2005/06*	2006/07*	2007/08*
Coal	42.9	45.1	45.5	47.6	48.7	43.3
Metals[4]	16.9	18.0	17.4	n/a	n/a	n/a
Construction	19.3	21.1	22.8	n/a	n/a	n/a
Oil and petroleum	7.0	7.3	7.6	n/a	n/a	n/a
Channel Tunnel[5]	0.8	1.1	1.2	n/a	n/a	n/a
Intermodal[6]	7.9	8.0	8.7	n/a	n/a	n/a
Other[7]	1.2	1.8	1.8	57.7	59.5	59.1
Total	**96.0**	**102.4**	**105.0**	**105.3**	**108.2**	**102.4**

*Source: 2002/03 to 2004/05: EWS; Freightliner; Network Rail estimates of DRS and GB Railfreight tonnages from billing data. National Rail Trends 2007/08. *2005/06/07/08: Disaggregated data for commodities other than coal is unavailable.*

4 Includes ore.
5 Includes all commodities which have originated at or are destined for the Channel Tunnel.
6 Includes both deep-sea and domestic.
7 Includes automotive and waste services. Excludes infrastructure (railway engineering) trains.

Table 3.10 Rail freight moved

Billion net tonne km moved	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Coal	5.66	5.82	6.66	8.26	8.56	7.73
Metals	2.64	2.41	2.59	2.22	2.04	1.83
Construction	2.51	2.68	2.86	2.91	2.70	2.79
Oil & petroleum	1.15	1.19	1.22	1.22	1.53	1.58
Channel Tunnel	0.46	0.48	0.54	0.46	0.44	0.37
Intermodal	3.38	3.53	3.96	4.33	4.72	5.15
Other	2.72	2.77	2.53	2.29	1.89	1.73
Infrastructure	1.18	1.23	1.29	1.38	1.36	1.70
Total	**19.7**	**20.11**	**21.65**	**23.07**	**23.24**	**22.88**

Source: National Rail Trends, 2007/08 Yearbook, ORR.

3.3.2 ESI coal

90 percent of the total coal tonnes lifted is transported to coal-fired power stations for the Electricity Supply Industry (ESI). The remainder is industrial coal, used in the production of steel and construction products.

There were two structural changes in ESI generation in the past ten years. The first was the reduction in the UK production of coal. This led to an increase in coal through ports. These were generally located further from the power stations, which were built close to the collieries and this increased the distance moved by coal. The decline of deep mined coal has been particularly pronounced, falling by 50 percent between 2003 and 2007.

There has been a shift by electricity generators to burning more low sulphur coal (which is primarily imported) in order to meet emissions targets and so reduce costs. Coal imports increased by nearly 40 percent from 2003 to 2007[8].

The second change was the increase in the price of gas in recent years. Combined with relatively low prices for coal, this has resulted in a shift for electricity generation from gas to coal burn.

These changes produced an almost 10 percent increase in coal burn for electricity generation over the five years to 2007 although this has now returned to the 2003 level after peaking in 2006. Despite this overall levelling in market size, the volume of ESI coal lifted by rail increased by more than a third over the four years to 2006/07.

This resulted from a switch towards more electricity being generated at rail-served power stations and rail's competitive position improving as the average distance between coal supply points and power stations increased. Between 85 and 90 percent[9] of all ESI coal is now hauled by rail.

8 Coal data source: BERR.

9 This is a percentage of mainland UK ESI coal burn and does not include coal burnt in Northern Ireland.

3.3.3 Maritime intermodal container market

The number of maritime containers arriving at UK ports has increased at an average rate of around 5 percent a year since 2001 reaching 8.7 million twenty foot equivalent units (TEU) in 2005. TEU is the standard measurement in the container market for quantum of boxes taking into account variations in length (a 20ft-length box is one TEU, a 40ft-length box is two TEUs).

Table 3.11 shows the growth experienced in the market since 2001.

In theory, the transportation of deep sea containers is well suited to rail. A large number of containers arrive at a small number of UK ports for long distance onward shipment to inland distribution centres, making rail transport viable.

Rail is a competitive mode for these inland journeys to population centres from the South East (where the major deep sea ports themselves are currently located). The main destinations are the West Midlands, Manchester, Merseyside, Leeds and Glasgow.

The deep sea shipping market growth has been driven by a continuing trend of migration of manufacturing activity from Europe to Asia coupled with strong domestic demand.

The volume of deep sea traffic carried on rail has increased greatly since 1995/96, the year of privatisation of rail freight, when market share was only 17 percent. The container volumes at the largest GB ports (in terms of TEU throughput) are shown in Table 3.12.

These ports have all experienced growth in excess of the national average since 2003.

Table 3.11 Container volumes at GB ports since 2001 (twenty-foot equivalent units) index 2001 = 100

	2001	2002	2003	2004	2005	2006	2007
TEU (thousands)	7000	7,234	7,324	8,023	7,788	7,738	8,575
Indexed to 2001 = 100	100	103	104	114	111	110	122

Source: Maritime Statistics 2007, Department for Transport.

Over 80 percent of maritime container trains serve Felixstowe and Southampton, which themselves handled 77 percent of the total deep sea throughput in the UK in 2007. It is expected that London Gateway (previously Shell Haven) will grow significantly in the coming years. A growing proportion of deep sea traffic is transported in High Cube containers which are 9ft 6in high. It is expected that this will reach 50% by 2012.

This is significant as these containers require W10 gauge clearance to be moved on conventional wagons.

Rail mode share of onward movement of containers from rail-connected ports at Felixstowe, Southampton and London Gateway is detailed in Table 3.13.

Table 3.12 Largest GB ports by TEU throughput

	2003		2004		2005		2006		2007	
TEU (thousands)	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port
Felixstowe*	2,482	63%	2,717	63%	2,760	66%	3,030	67%	3,343	68%
Southampton	1,374	90%	1,446	93%	1,382	93%	1,500	90%	1,869	84%
London ports	911	20%	979	35%	735	41%	743	40%	844	36%
Seaforth (Liverpool)	566	47%	603	43%	612	44%	613	51%	675	50%
Medway	518	86%	632	83%	707	87%	535	87%	519	81%
All GB ports	7,074	53%	7,744	55%	7,753	56%	7,999	58%	8,575	58%

Source: Maritime Statistics 2003-07, Department for Transport. Deep sea percentage reflects proportion of total TEU throughput at each port.

**Felixstowe Port estimates that the deep sea share of total TEU throughout is approximately 7 percent higher than statistics indicate due to assignment of empty containers for export.*

Table 3.13 Rail modal share at the largest deep sea ports

	2004	2005	2006	2007	2008
Felixstowe	21%	22%	25%	n/a	23%**
Southampton	26%	28%	32%	n/a	27%
London Gateway	n/a	n/a	n/a	n/a	18%

Source: Base data Hutchison Ports UK: Felixstowe; ABP Southampton and DPWS. All data is rail share of total port throughput. As some TEU are for trans-shipment, rail share of TEU for surface transport will be higher.

***2008 figure excludes trans-shipments.*

3.3.4 Other key markets

Construction

The construction market was the other key driver of growth in the five years to 2004/05, having experienced approximately 17 percent growth in both tonnes lifted and tonne kilometres. Growth has occurred nationwide, but rail has a particularly strong share of the market for the movement of products to London and the South East with approximately 40 percent market share of aggregates used within the M25. Long distance flows include those originating from quarries in the South West, East Midlands and the Peak District to a large number of unloading terminals where onward local transportation is usually by road. Very large construction projects such as the Olympic Park and Heathrow Terminal 5 have contributed to the overall demand in recent years.

Metals

Volumes of metals traffic have remained broadly static over the last six years. The metals market includes large volumes of steel transported within South Wales and the North East/South Humber area and also between these regions. Transport of scrap metal by rail has increased considerably over the last few years, in particular flows from inland scrap yards to ports.

Petroleum

Petroleum and oil traffic hauled by rail has also remained broadly constant. In addition to road haulage, rail competes with an underground pipeline network. Rail flows are predominately between refineries located at deep sea ports and major inland distribution centres including sites in the Midlands and along the M4 corridor. Rail's strengths in this sector are where the pipeline network is less developed. The most significant of the refineries is Lindsey near the Port of Immingham which accounts for approximately 55 percent of all rail-hauled petroleum traffic. The first two quarters of 2006/07 saw continued petroleum growth on rail suggesting that some growth which occurred following the major fire at Buncefield may well be retained in the longer term.

Infrastructure

Infrastructure services include all trains on the network conveying materials for (or engaged in) the maintenance and renewal of the railway. These services currently account for approximately seven percent of all freight gross tonnes on the network. Services in this category are not confined to specific route corridors and operate across the entire network. There are, however, particularly heavy flows between key infrastructure materials depots. Trends in this traffic sector are intrinsically linked to maintenance and renewal activity on the network.

Channel Tunnel

Freight volumes through the Channel Tunnel declined sharply in 2001/02 when there were security problems which disrupted traffic. Volumes have struggled to recover and are yet to attain the pre-security crisis levels. These volumes are also affected by the Channel Tunnel toll and restricted European gauge clearance on the UK network. Intra- European road haulage for unitised traffic has remained extremely competitive over the last few years, with drivers and hauliers from Eastern Europe helping to keep the price of road transport down in this highly competitive market.

Domestic intermodal

Domestic intermodal and general distribution traffic has shown some growth in recent years although this is still an extremely small market relative to other commodities. To date, rail has been uncompetitive in many markets as the need for two road legs of transportation adds significantly to costs. However, domestic intermodal services between the West Midlands and Scotland, in particular, have grown significantly with a number of major supermarket chains now making regular use of rail services.

4. Baselining II: passenger & freight forecasting techniques

4.1 Introduction

This chapter gives an overview of techniques currently used to forecast the long distance market. Details of the techniques can be found elsewhere; primarily in the Passenger Demand Forecasting Handbook (PDFH) currently administered by the Passenger Demand Forecasting Council, chaired by ATOC, and in the Freight RUS. It is not intended that the detail in those documents is repeated here, rather that salient features relevant to forming an approach to long distance demand forecasts over long time periods are identified. The chapter also introduces work on planning scenarios, which have been developed to help understand alternative futures for rail.

4.2 Passenger demand forecasting

All forecasts – be they short, medium or long-term – are subject to degrees of uncertainty. This arises from uncertainty in how the drivers of demand will change over the period, compounded by uncertainty in how the market will respond. This increases as forecasts are pushed further out in the future, which, in turn, leads to uncertainty in investment decisions, particularly where delivery lead times, asset life or payback periods are long.

Despite the current economic climate, most forecasters expect the rail market to grow over the medium-to-long term. This growth is expected to be fuelled by a combination of economic and population growth, plus favourable changes in socio-economic factors.

Two broad categories of model are commonly used to forecast rail demand:

- Single-mode elasticity models
- Multi-modal models.

Single-mode elasticity models forecast the number of additional trips using an elasticity which describes the relationship between changes in demand drivers and market growth. The resulting factor is used to scale base year demand.

This approach is summarised by the guidance contained in the PDFH. This document is currently the subject of an ongoing programme of work to improve rail passenger demand forecasting methods.

The forecasting parameters given in the current edition of PDFH were calibrated and tested over the period of time following rail privatisation. This period represents a time of significant growth in the industry's history, as demonstrated by Figure 3.3. This means that almost by definition the parameters are successful at extrapolating growth in times of economic expansion. However, PDFH forecasts do not explicitly reflect the natural limits to rail growth of market share and trip-making saturation.

As PDFH tends to extrapolate recent growth forward (on the assumption of continuing 'trend' changes in demand drivers), forecasts are thought to be most suitable for the short to medium-term. For long term forecasting, the DfT recommends that PDFH forecasts are capped in 2026[1]. This approach is not appropriate for appraising interventions with long-term financial payoffs.

Multi-modal models estimate the overall demand for travel, and then subsequently estimate the impact of interventions on mode choice using a form of 'logit' model. These models are appropriate for forecasting the impact of large-scale interventions. They are also useful for forecasting demand where no rail market currently exists (for example, an assessment of a new station). Examples include the modal choice model in PLANET Strategic and the HSAM model used to forecast the effects of Heathrow Express before it was introduced. Multi-modal models have historically underestimated the recent rail growth, and the reasons for this are currently the subject of DfT funded research.

1 WebTAG 3.13.1.

4.3 Freight demand forecasting

The industry recently produced a set of freight forecasts for the period to 2014/15. These were contained in the Freight RUS, published in March 2007. This was a collaborative industry document for freight and recommended various capacity and capability enhancements to benefit freight services, the majority of which have now been funded. It also contained the freight forecasts up to 2014/15. There were two methods used to provide the forecasts.

One was termed the 'top down' approach in the Freight RUS. This used the Great Britain Freight Model (GBFM). This system was developed by MDS Transmodal and is an established modelling tool used by the DfT to forecast freight growth. The GBFM is designed to forecast freight moved within Great Britain, including freight to and from the ports and the Channel Tunnel. It covers different modes such as road and rail and routeing of trains. The model itself forecasts on the basis of relative transport costs (which are similar to those used for rail grant purposes), trends and econometric analysis of the drivers behind freight market growth. It produces a matrix of all the freight flows.

The other method was termed the 'bottom up' approach. The freight operators worked together to produce a set of forecasts. They used their specialist knowledge of operating in the market, trends based on past experience and market intelligence and known changes. These were applied to the individual market segments based on flows.

These two methods produced broadly compatible results which enabled the Freight RUS to be built on firm foundations. A small number of differences were covered in different scenarios.

Given the time horizon of the Network RUS, freight forecasts are required which extend beyond 2014/15. The method for 2031 used both a top down and bottom up approach, but using the experience of the Freight RUS to reduce the amount of work undertaken.

Using the 'top down' method, MDS Transmodal produced a set of freight forecasts for 2031. This used the same method as for the Freight RUS, incorporating the market changes, modal choice and train routeing. The base year chosen was 2006. A matrix of the individual freight flows was produced for each commodity.

4.4 Scenario planning

4.4.1 Current approaches to dealing with uncertainty

Uncertainty in forecasting is normally quantified through sensitivity testing, changing one assumption in each test.

However, uncertainty is most realistically tested by varying several assumptions simultaneously. Some form of probabilistic analysis and simulation is required to properly estimate the combined impact of uncertainty.

4.4.2 Dealing with uncertainty through scenario planning

To date the use of scenario planning in the rail industry has been limited. The basis of scenario planning is that consideration is given to how the world could change (economically, socially, politically and technologically) to influence transport and travel demand.
The differences between scenario planning and forecasting have been summarised by Chatterjee & Gordon[2], and is summarised in Figure 4.1.

The purpose of building scenarios is therefore not to forecast what is likely to happen. Scenarios are used as a challenge tool, and to ask if what is planned to be done is robust in the light of what could happen. Consequently, there are no preconceptions about which scenario is the most likely outcome.

4.4.3 Scenario development: RSSB sustainable rail programme

In 2007 the Rail Safety and Standards Board (RSSB) published a set of future planning scenarios. This development of the scenarios was researched as part of the Sustainable Rail Programme: Foresight Studies in Sustainable Development. The key objective of the work was to 'build a shared understanding of those actions which need to be taken in order for the industry to be sustainable between now and 2040'.

In development of their scenario matrix, a project question was proposed to a mixed group of rail stakeholders to define the range of the project. This was based around the potential futures of the railway, the factors that would affect its operations and the ability for this to become sustainable over the following 30 years. To support this question a set of drivers likely to affect the rail industry now and in the future was identified. These were ranked and grouped into subsets. They were split in terms of which were most important and least certain and most important and most certain.

Two core areas of 'most certainty' and of 'most uncertainty' were identified in the RSSB work and these related to passenger travel behaviour and also the investment and competitive behaviour of the transport sector. The work noted that where the drivers identified were important and uncertain, these offered opportunities for influence.

The drivers identified included climate change consensus, empowered consumers, accounting for externalities and personal security as important and certain drivers.

Figure 4.1 Forecasting and scenario planning

Forecasting	Scenario Planning
Focuses on certainties and disguises uncertainties	Focuses on and legitimises recognition of uncertainties
Conceals risk	Clarifies risk
Results in single point projections	Results in adaptive understanding
More quantitative than qualitative	More qualitative than quantitative

2 'Planning for an unpredictable future: transport in Great Britain in 2030' Chatterjee & Gordon 2007.

Important but uncertain drivers were split into consumer and competitive investment frameworks, including economic growth and transport demand, railway ownership and accountability, pressure to reduce costs, increasing costs of energy and materials and changing cost of road use.

The consumer behaviour element identified was predicated on whether people would travel more or less (measured in total distance across the UK per year) and the competitive and investment framework uncertainty was identified due to the varying extent to which this is driven by government policy. This latter uncertainty is also identified as such by the level by which fiscal policy and investment can differ.

These factors led to the selection of the axes which were required to fit with set criteria to define the scenarios. These stated that they must be: 'orthogonal' (ie. reflecting distinctively different uncertainties); allow 'space' to accommodate all drivers in the scenario quadrants; include both positive and negative elements; and provide scenarios that raise strategic issues.

Given these axes, the stakeholder groups were then given the opportunity to develop the scenarios further. The axis of end user behaviour remained intact, but the competitive framework axis was redefined and the competitive framework modified to pitch modal competition against whole journey planning in place of policy-led interventions against market-led interventions.

5. Summary of gaps identified

5.1 Approach

Recent planning documents published by the DfT and Transport Scotland have emphasised the need to plan for the long term (ie. up to thirty years) and to cater for demand uncertainty. The DfT's DaSTS document identifies a 'need to balance the need to provide a stable climate for investment with the need to cater for demand growth uncertainty'. Recent downturns in demand for both passenger services and rail freight highlight the danger of extrapolation of trends, without consideration of wider issues such as Britain's role in the global economy. The DaSTS document puts emphasis on the understanding of the drivers of demand and how they might be expected to evolve over time. It concludes that a long-term plan should be developed for a range of scenarios.

This RUS highlights the key gaps between conventional techniques and an approach which concentrates on the use of scenarios for planning to derive new forecasts. By doing this it enables planners to understand how those gaps could be filled by a scenario approach.

5.2 Key gaps identified

On the basis of the discussion above, the key gaps are as follows:

Gap 1: Techniques for long-term passenger forecasting

The rail industry's existing forecasting techniques – specifically those included in the PDFH and the Freight RUS – have been effective in estimating short to medium-term demand responses to incremental changes in rail capacity.

Current techniques can not, however, be used to produce reliable long-term forecasts. Since its first publication in 1986, the PDFH has been re-published three times, each time to incorporate revised elasticity values which have proved necessary because of changes in the behavioural response of passengers in the intervening years. The changes reflect the short to medium-term nature of the elasticities which are reported and emphasise the dangers that would have been inherent with forecasting using the first edition. The elasticities used in the current edition of PDFH (PDFH4) have all been derived since rail privatisation; a period of strong growth.

Existing techniques developed for forecasting in the short to medium-term can, of course, be extrapolated into the long term but this is fraught with risk. A common practice is to cap extrapolated forecasts in a particular planning year. This is generally viewed as quite a crude approach but a necessary evil given that few forecasters would be comfortable in suggesting that the existing demand forecasting patterns would carry on ad infinitum.

This RUS therefore concludes that there is a gap in the techniques available for reliable long-term passenger forecasting tools.

Gap 2: Techniques rooted in scenarios

The summary of the existing techniques described in **Chapter 4** and associated body of work underpinning it in the PDFH and the Freight RUS concentrate on those factors which affect rail demand at the margins, such as the response of passenger demand to changes in rail fare and journey time. External factors such as the state of the economy (usually expressed as GDP) are taken as inputs. Conventionally, rail forecasting approaches do not concentrate on how these drivers of demand change over time. Modellers make extensive use of sensitivity tests to understand how demand is affected by variants on the key assumptions and of optioneering to look at a range of possible infrastructure solutions. However, they make little use of planning scenarios which explore a range of outcomes of macro economics or policy.

Forecasts of rail freight traffic have been made for 2031. These are based on forecasts of total freight carried for the principal commodities, and the expected rail market share.

The conditions which will drive the total volume of freight moved, the pattern of traffic and the rail market share have not explicitly been linked to scenarios.

Gap 3: Scenarios which can be used to derive long distance demand forecasts

The RSSB has produced a significant piece of work which has taken the use of scenarios forward. The scenarios provide helpful insights into the alternative futures which may result from different levels of policy intervention and levels of travel. One of the defining characteristics of these scenarios is whether passengers 'travel more' or 'travel less'. This is clearly helpful to an understanding of alternative futures. However, different levels of passenger demand are taken as an externally imposed assumption. As such they can not be used to derive long distance passenger forecasts.

The scenarios were not developed with factors affecting freight as a prime consideration and do not include key determining factors of freight demand such as the level of international trade. A helpful narrative is included about the assumed affects on freight.

6. Long-term planning scenarios

6.1 Introduction: why scenarios?

> "The only function of economic forecasting is to make astrology look respectable"
>
> John Kenneth Galbraith

Few things are certain when planning 30 years ahead. The only certainty is that we don't know what the future will hold. In 1979 few would have predicted that in 2009 there would have been a privatised railway, a deregulated coach market, that London's rundown docklands would develop into a financial centre and that there would be an influx of over a million young workers from an expanded European Union. Quite logically, the planners at the time produced forecasts on the basis of the world that they knew and of the continuation of trends that they had witnessed. This approach, as described in **Chapter 4** underpins the PDFH, used extensively to plan passenger railways in the UK.

There will be similar difficulties when we look forward 30 years from now. Conventionally forecasters still plan on the basis of observation and understanding of the factors affecting recent trends. It is assumed that existing behavioural responses to factors such as fares levels or journey time savings will carry on into the future and, generally, that the economy will continue to grow at a consistent rate. Such methods have been moderately successful at forecasting relatively short-term demand but they may be insufficient for the longer term.

Conventional forecasting therefore can be seen as forming one view of the future: one scenario. However, when considering a longer planning time horizon it makes sense to consider alternative futures: alternative scenarios. The consideration of alternative scenarios can potentially help decision makers to form policies in the face of uncertainty. Used appropriately, they can help planners think more systematically about the different circumstances they may encounter in the future and the implications of those future possibilities for decision making in the present. They can be used to anticipate what is needed for a successful outcome for rail. If developed carefully, scenario testing could help decision makers understand what is within their control and what isn't. As such, they can help in an assessment of the robustness of plans.

The Cabinet Office website[1] recommends the use of scenarios when developing strategies. It says that good scenarios:

- are based on analysis of change drivers
- allow critical uncertainties and predetermined elements to be distinguished
- are compelling and credible
- are internally logical and consistent.

It also points out that scenarios will not ever be entirely right (although elements of each scenario could be) nor capable of persuading everybody.

1 http://interactive.cabinetoffice.gov.uk/strategy/survivalguide/skills/eb_scenarios.htm

6.2 The development of four scenarios

Research has shown that, in order to be readily understandable, four is the optimum number of scenarios for application in a planning framework. The Cabinet Office website states that the key reason is a practical one, ie. 'Managers who will be asked to use the final scenarios can only cope effectively with a small number of versions'.

To provide sufficient variation between their outcomes, the scenarios should be derived from variation in two factors. The factors need to be highly important determinants of rail demand and to be sufficiently uncertain that they could lead to a number of quite different future outcomes. These highly important, highly uncertain drivers are used to identify options for the principal axes to be used for scenario development.

To this end, the Network RUS Working Group identified four scenarios on the basis of the two factors that they viewed to be both critical to rail demand and sufficiently uncertain to justify scenario analysis. The scenarios represent possible future outcomes that could occur in about 30 years' time and would be expected to significantly affect demand for transport. The group, which comprises funders, operators and end users, considered the critical factors which may drive change but that are uncertain, and constructed a scenario matrix.

The four resulting scenarios were based around two axes:

- the first axis (shown as a vertical axis in the scenario diagrams presented throughout this RUS) represents a range of possible sustainability regimes. At one extreme is a sustainable society[2]. At the other extreme is a society focused on 'unabated consumption' and not adopting policies reflecting sustainability agenda
- the second axis (shown as a horizontal axis in the scenario diagrams in this RUS) represents a range of economic systems. The axis covers a range from full globalisation of trade – 'global economics' – to a decentralisation where global trade is restricted and national and regional cities grow in importance relative to London.

2 A sustainable society is defined by policies based on environmental, social and economic sustainability. In line with most analysis in this field it follows a concept espoused by Paul Etkins in Etkins and Manifred Max-Neef (eds) "Real Life Economics", Routledge, London 1992, i.e. the maintenance and development of different types of 'capital': natural capital, social capital and man-made capital. Much current literature looks at sustainability as economic development which values social capital and minimises the impact on natural capital.

These factors, when cross-tabulated, describe four scenarios based on two extremes of economic structure (whether the British economy will develop with a global focus or through decentralisation) and two extremes of social and environmental values (whether there will be sustainable development or unabated consumption).

These are:

- ‘Global Player/Unabated Consumption’ or ‘Continued Profligacy’
- ‘Global Player/Sustainable Agenda’ or ‘Global Responsibility’
- ‘Decentralisation/Unabated Consumption’ or ‘Insularity’
- ‘Decentralisation/Sustainable Agenda’ or ‘Local Awareness’.

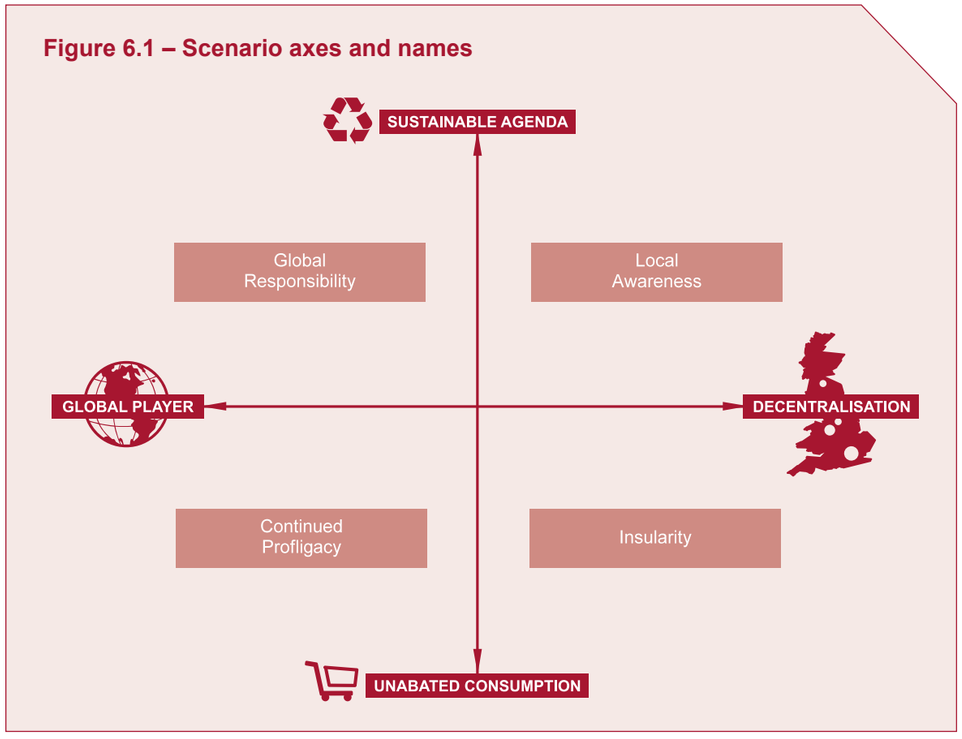
The scenarios are shown in Figure 6.1. In that diagram, the ‘Continued Profligacy’ scenario is shown in the bottom left quadrant, the ‘Global Responsibility’ scenario is located in the top left quadrant, the ‘Insularity’ scenario is shown in the bottom right quadrant and the ‘Local Awareness’ scenario is in the top right quadrant.

The scenarios were validated against a number of criteria:

- are the axes capable of encompassing all drivers of demand that stakeholders view as important in determining rail demand?
- are the axes independent of one another?
- are the resulting scenarios helpful for long term rail planning?

The Working Group confirmed that the scenarios do indeed pass the tests.

Figure 6.1 – Scenario axes and names



6.3 Scenario narratives

Each of the scenarios provides a story of how things might be in the future. To provide a full picture, and to ensure that a full understanding is obtained of the effects on rail demand, each scenario is outlined in terms of a high level story on:

- economic growth levels/competitiveness and productivity
- energy prices
- technological innovation
- demographic factors such as migration and life expectancy/health
- role of London and the national and regional centres
- social values/equality of opportunity/ quality of life.

As such the scenarios map directly to the five big challenges outlined by the DfT in its ‘DaSTS’ Paper and to Transport Scotland’s Strategic Transport Projects Review.

6.3.1 Continued Profligacy (Global Player/Unabated Consumption)

This scenario would see economic growth in the UK continue at the rate established over the last two decades, driven by increasing globalisation of trade, efficiency gains, and privatisation of services.

At the centre of this growth is London, which continues to thrive as a global financial centre. In this scenario London has an increasingly dominant influence on the development of the UK, with more businesses and workers in the regions both supporting its growth and relying on its wealth generation.

It is envisaged that income distribution remains broadly in line with current patterns. Standards of living would increase for all sections of society, though in absolute terms, the wealthy enjoy greater increases to disposable income.

Economic growth would be aided by energy prices increasing at an affordable rate. This would see the continued exploitation of traditional fuel sources for the majority of the UK’s energy needs, despite potential environmental drawbacks. The affordability of energy serves to reinforce the globalisation of trade, as distance from market remains an insignificant driver of business location.

Market forces would be expected to drive technological innovation, and in the absence of significant incentives, sustainable technologies are advanced at a relatively slow rate. The UK’s transport infrastructure is therefore developed around existing fuels, except for some small-scale experimental interventions.

Inward migration into the UK would be high. Economic migration would be both encouraged by, and required by, the high rate of economic development. Inward migration would also be driven by the displacement of populations from areas of increasingly volatile climatic conditions.

Life expectancy would reflect the economic polarisation of society. It would increase for the economically advantaged with means to access the private healthcare sector, but less quickly for the disadvantaged.

6.3.2 Global Responsibility (Global Player/Sustainable Agenda)

This scenario would also see relatively high economic growth in the UK. However, this would be suppressed to an extent by the need for businesses and government to invest in sustainable development, and pay their environmental costs. The ‘cost’ of sustainability in this scenario is therefore an economy which grows at a slightly lower rate than that seen over preceding decades.

Energy prices in the UK would increase, reflecting a requirement for the energy companies to invest in renewable sources. This private sector investment would moderate the costs to the taxpayer, although users would see a step change in charges. Technological innovation and intervention would be high, taking advantage of the incentives made available to develop 'green' technologies.

The UK would continue to require and encourage inwards migration to meet economic needs. However, the level of migration would be carefully managed to ensure sustainable consumption of both natural resources and public services.

Social values of equality and access to opportunities would drive policy and there would be an improvement in the quality of life for all sections of society. Life expectancy would increase for all, with noticeable improvements made for lower income groups.

Sustainable development dictates that minimising distance from market becomes a key driver of business location, overtaking cost of labour considerations.

Further, although London continues to play an important role in global markets, the UK's overall reliance on its economic performance stabilises as regional and national employment centres benefit from a renewed focus and greater vibrancy.

6.3.3 Insularity (Decentralisation/Unabated Consumption)
This scenario would see modest economic growth in the UK due to restricted global co-operation, at a rate well below that witnessed in preceding decades.

UK energy prices would rise significantly due to the growing costs of extracting fossil fuels, and the UK's growing dependency on resource-rich nations who increasingly seek to exploit their control of resources. This reduces the competitiveness of the UK's economy, reinforcing the suppression of economic development. Transport costs would rise significantly. Consequently proximity to customers becomes a key driver of business location.

Technological development would continue at a relatively slow pace, suppressed by low levels of development funding and reduced international collaboration and cooperation.

The UK would see low rates of inward migration due to the limited economic opportunities offered. There would also be an increasing trend of business leaders and skilled workers emigrating to emerging markets.

This scenario would see a new decentralisation ethos drive the political goal of equality and inclusiveness. Quality of life would be expected to improve for almost all sections of society. However, due to falling investment returns, an increasing proportion of the population will work into their seventies to fund their retirement.

One of the outcomes of this scenario would be an increased self-sufficiency and increased vibrancy of the UK's major cities outside of London, with regional economies growing at a faster rate than London and the south east. London's position as a leading global financial centre decreases, as the world's economy shifts its attention to emerging markets.

6.3.4 Local Awareness (Decentralisation/Sustainable Agenda)
Relative to the growth witnessed over preceding decades, this scenario would see the UK's economy slow to a point of virtual stagnation, as high energy and labour prices and restricted global cooperation make a damaging impact. The effects would be more significant in the financial and business services sector, whose output would shrink from levels enjoyed in the early years of the century. What growth does occur is fuelled by the manufacturing sector.

Energy prices would soar in the medium term, as the UK invests in energy self-sufficiency from sustainable sources, whilst in the short term increasing its dependency on a few resource-rich nations.

Technological innovation would be modest, restricted by a stagnant economy and reduced international cooperation.

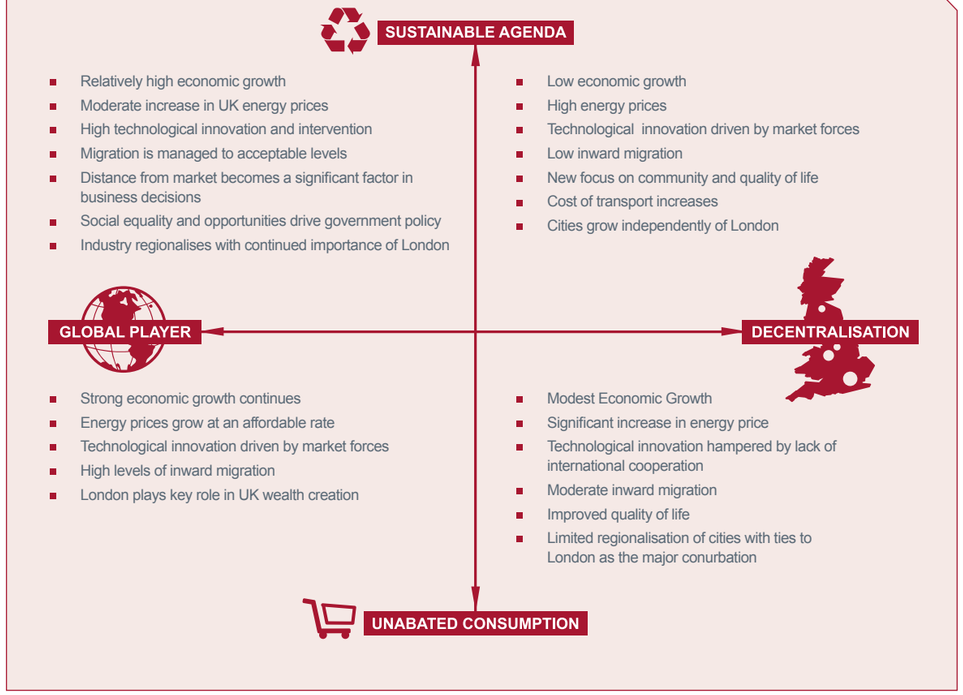
The lack of economic development would eliminate the need for net inwards migration to support growth. As a result, the population grows slowly driven by increasing life expectancy.

There will be further devolved decision making and increases in regionalisation, financing, local community development, health and the quality of life.

The sustainability agenda and the increased costs of energy would encourage the development of major cities outside of London into self-sustaining markets, reducing dependence on the capital.

Figure 6.2 summarises the key trends of economic growth, energy prices, technological innovation, social values and land use policy which can be associated with each scenario.

Figure 6.2 – Summary of the scenarios



7. Drivers of Long Distance Demand

7.1 Introduction

The description of the scenarios in **Chapter 6** paints a high level picture of four quite different, alternative future outcomes for the UK economy and society. In order to establish the level of rail demand that would be expected in each scenario, the next step is to understand the effect of the major drivers of demand and how they vary between the four scenarios. This chapter considers those drivers of the passenger and freight markets whose affects vary significantly in the different scenarios and examines the effect this may have on demand for rail on exemplar corridors.

The resulting forecasts give what is commonly called 'background growth'. That is, the increase in passenger demand that would be expected as a result of factors external to the rail industry itself[1].

7.2 Drivers of demand

The demand drivers have been split into five categories:

- economy
- population
- social trends
- competition
- rail pricing.

Within each category are a number of related drivers. Figure 7.1 shows a list of the demand drivers that have been taken into account.

In order to develop an understanding of the effect of the variables, each driver has been categorised as either a trend, policy choice or a scenario variable.

A trend variable is a variable that is independent of the scenarios. For example, the natural change in population (births and deaths) is assumed to be the same in each of the four scenarios.

A policy choice variable is a variable which varies between scenarios. Its influence will be in step changes, driven by public policy, rather than on a continuous scale.

A scenario variable is a variable that varies between the scenarios. For example, the level of population migration varies between the scenarios. It is assumed to be higher in those scenarios which result in a more successful economy.

The variables have been further categorised into whether they affect market size or share.

A 'market size' variable affects the overall size of the long distance market.

A 'market share' variable affects share of the long distance market which rail could capture.

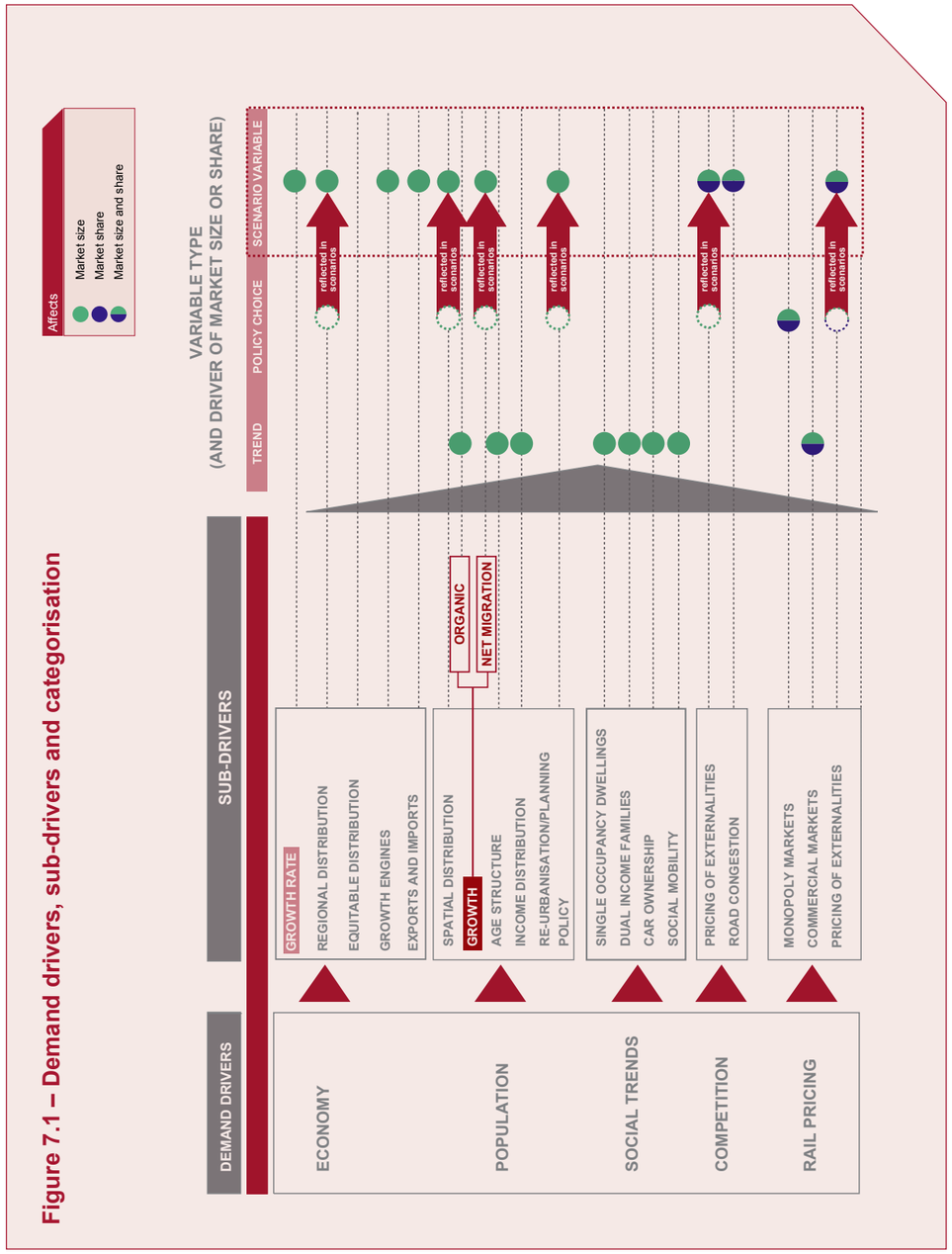


Figure 7.1 – Demand drivers, sub-drivers and categorisation

1 The one exception to this rule is rail pricing, which is within the gift of the rail industry and its funders. An assumption on price is, however, needed to produce background growth and this is presented later in this chapter.

7.3 Economic demand drivers

7.3.1 Growth rate of the UK economy

The UK[2] economy is mature and relatively globalised. Until the third quarter in 2008 the UK economy had grown in every quarter since 1992. The growth has been steady in terms of the productivity of the working population. Therefore, economic growth per capita should be in line with long-term gains in technological efficiency and productivity.

Figure 7.2 shows historic growth in Gross Value Added (GVA) and GVA per capita for the UK.

GVA[3] has been used because it is undistorted by fiscal policy. The impact of income distribution has been considered independently. The average annual growth in GVA since 1971 has been around 2¼ percent to 2½ percent per annum and apart from a decoupling since the early 1990s, average growth in GVA per capita per annum was roughly the same.

Figure 7.2 – Historic UK economic Growth

Source: Office for National Statistics, economic series YBFR.

Economic Growth per capita can be measured in terms of the productivity of the working population. This is dependent on:

- changes in the amount of time devoted to productive work
- changes in efficiency through technological advancement.

The amount of time devoted to productive work will depend on the relative value placed on leisure time with respect to economic prosperity which is dependent on the Sustainable Agenda/Unabated Consumption axis.

The rate of technological advancement can be seen as a function of:

- the number of people in the knowledge base
- the probability of someone in the knowledge base having a breakthrough in efficiency.

A globalised nation can take advantage of the productive advancement of other countries by tapping into a larger knowledge base and sharing knowledge with other countries increases the chances of having a breakthrough in technological efficiency.

Consequently, the rate of technological change varies across the Global Player/ Decentralisation axis of the scenarios.

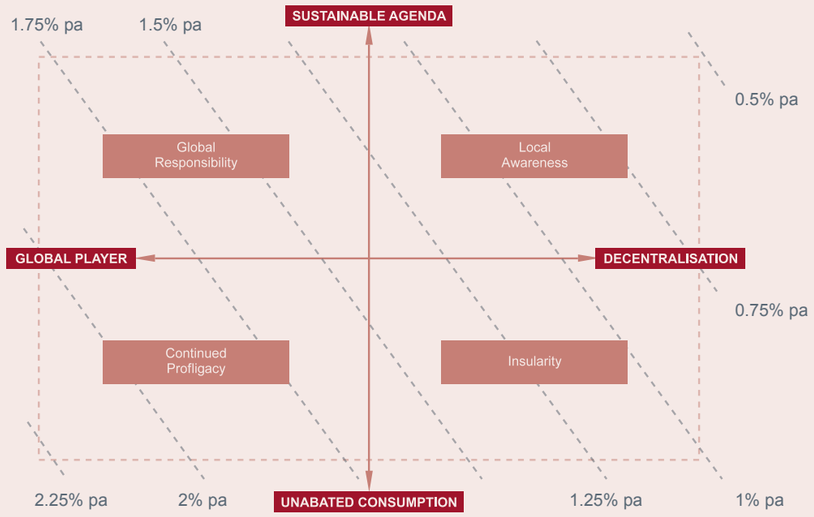
In addition, economic growth per capita varies both by the degree of sustainability and the degree of globalisation (the vertical and horizontal scenario axes).

Whilst economic downturns such as the current economic recession occur, the UK economy is mature, and as a result it is assumed that there should not be long-term economic stagnation, or indeed a significantly higher rate of growth than experienced in the last 30 years.

2 The UK economy, in this instance, refers to that of England, Scotland and Wales, and for the purposes of this RUS excludes Northern Ireland.

3 GVA is used to estimate GDP. The link between GVA and GDP can be defined as GVA plus taxes on products, less subsidies on products equals GDP (Source:ONS).

Figure 7.3 – Change in economic growth in GVA per capita by scenario axes



These factors, taken together, allow assumptions to be made about the magnitude of economic growth that can be reasonably assumed in the scenarios. The assumptions are summarised graphically in Figure 7.3.

Economic growth is assumed to be highest in the Continued Profligacy scenario and lowest where there is a more nationally focused sustainable approach.

7.3.2 Regional distribution of economic growth

Since 1989, average growth in GVA per capita has been highest in Greater London and the wider South East regions, and the income gap between the richest and poorest mainland UK nations and English regions has grown. Table 7.1 shows the GVA per capita of the UK and its constituent parts in 1989 and 2006, and the compound annual growth rate over the 17 years.

It is assumed that London would continue to be a world financial centre and contain clusters of many of the UK's major industries as well as central government in the two Global Markets scenarios. Decentralisation might imply, in some cases, a devolved government and independent regional industries.

It is hypothesised that governments with sustainable policies would invest in the major cities to increase opportunities outside of London. By contrast, a government with a strong economic rather than social agenda would continue to prioritise English and Welsh expenditure in London and the South East because of the high economic returns which it would expect from investment.

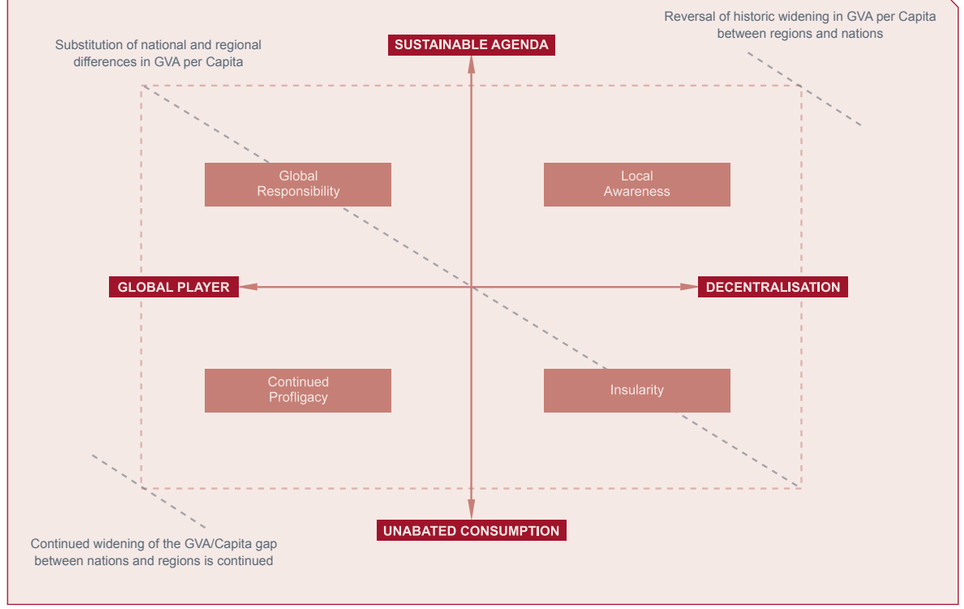
To reflect these arguments, regional economic growth is assumed to be affected by both the sustainability and global/local factor defining the scenario. Based on information from Table 7.1, Figure 7.4 shows the proposed future disparity of economic growth between the regions by scenario variable.

Table 7.1 Regional disparity in GVA per capita

Nations and regions	GVA Per Capita 1989 (2006 prices)	CAGR 1989 – 2006	GVA Per Capita 2006
London	£17,275	2.5%	£26,192
East of England	£14,704	1.7%	£19,599
South East	£14,640	2.3%	£21,514
United Kingdom	£13,641	2.0%	£19,063
Scotland	£12,979	1.9%	£17,789
East Midlands	£12,893	1.6%	£16,982
West Midlands	£12,436	1.7%	£16,583
South West	£12,362	2.1%	£17,467
North West	£12,285	1.7%	£16,234
Yorkshire & the Humber	£12,156	1.6%	£15,968
Wales	£11,416	1.4%	£14,396
North East	£11,291	1.8%	£15,177

Source: Office for National Statistics.

Figure 7.4 – Regional growth in GVA per capita by scenario axes



7.3.3 Equitable distribution of economic growth

Table 7.2 shows the distribution of income by quintile band over the 25 years to 2006. The distribution of income has stayed relatively constant since 1991. It is therefore assumed that the percentage change in economic growth will stay constant over all income bands in all scenarios.

Table 7.2 Distribution of income by quintile band

Year	Lowest Quintile	2nd Quintile	3rd Quintile	4th Quintile	Highest Quintile
1981	7%	12%	18%	24%	39%
1991	5%	11%	17%	24%	43%
2001	5%	10%	16%	24%	45%
2006	5%	10%	16%	24%	44%

Source: Family Expenditure Survey.

7.3.4 Economic growth engines

The UK economy is dominated by the service (or tertiary) sector. Table 7.3 shows that the service industry made up 77 percent of UK GVA in 2007, from 68 percent in 1983.

The size of the manufacturing base partly dictates imports consumed and in turn this directly affects the tonnage requiring movement from GB freight terminals.

The compound annual growth rate of the tertiary sector depends on economic growth. As discussed in Section 7.3.1, this is expected to vary greatly between the four scenarios.

In decentralisation scenarios, it is assumed that government would aim to develop a protectionist trade policy, increasing the cost of imported goods and the competitiveness of locally manufactured produce.

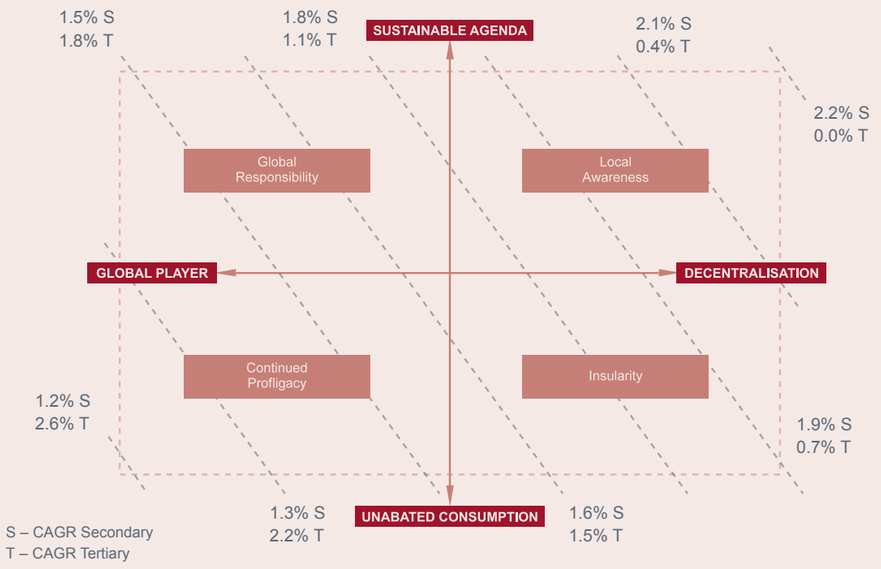
Consequently, Figure 7.5 shows that growth in both the secondary and tertiary sectors is assumed to vary between the four scenarios.

Table 7.3 Sector share of UK GDP

Sector	1983 Share of UK Economy	CAGR	2007 Share of UK economy	2035 Potential Share of UK Economy*
Service Industries	68%	3.2%	77%	85%
Production	24%	1.1%	17%	10%
Construction	7%	2.3%	6%	5%
Agriculture	1%	1.0%	1%	1%

**Assuming trends continue.*

Figure 7.5 Compound annual growth rates in the mainland UK secondary and tertiary sectors by scenario axes

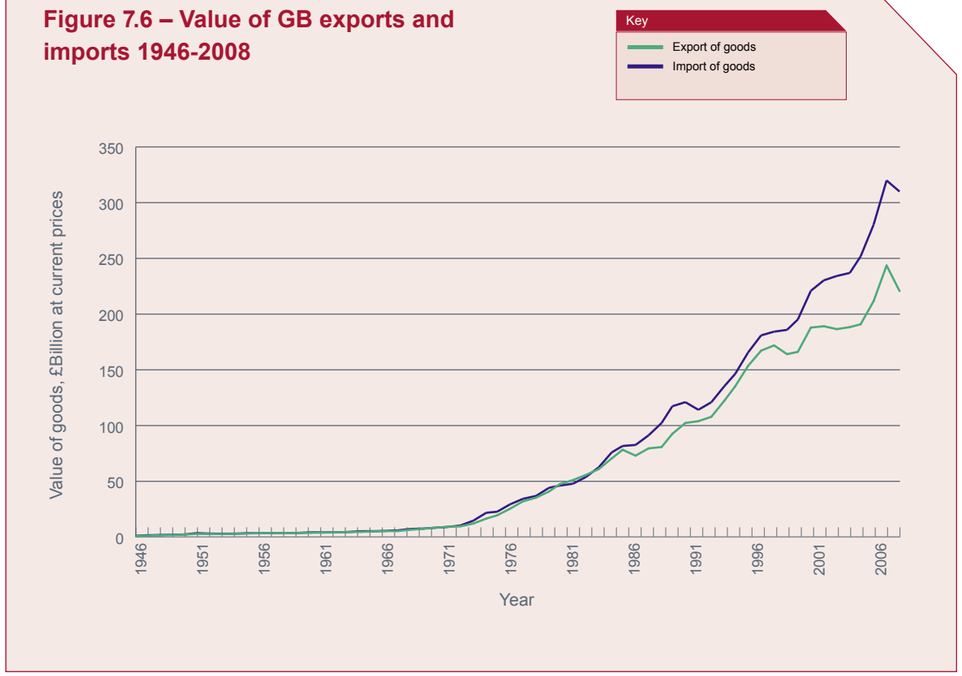


7.3.5 Exports and imports

Figure 7.6 shows annual growth in trade since 1946. This serves as an upper bound for proposed growth in trade by scenario. It is assumed that the strength of the market economy should ensure that trade would not stagnate in the long term. On average, the value of imports and exports has grown by seven percent per annum (nominal), with most growth occurring since 1970.

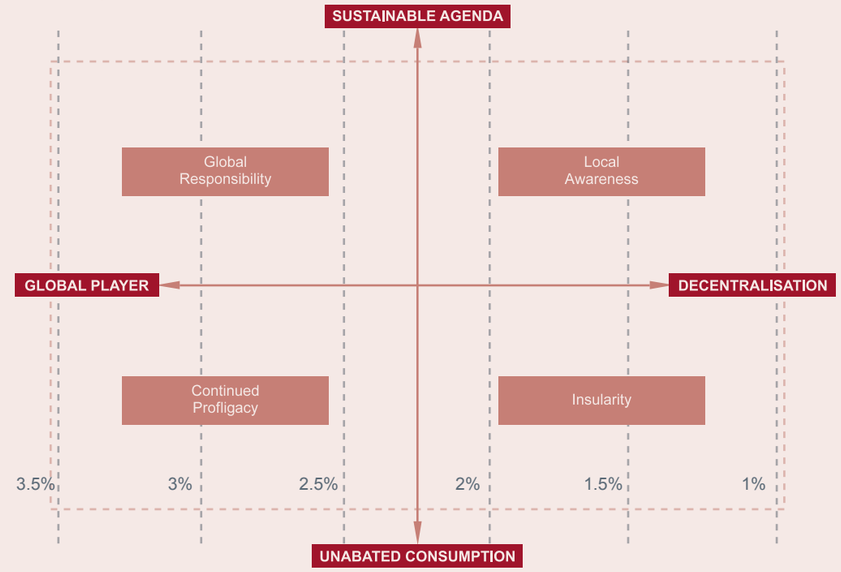
Exports and imports are a function of the Global Player/Decentralisation axis in the scenarios. If the economy were to become more decentralised (ie. to have greater inward focus) imports would become more expensive and growth in external trade would slow. Figure 7.7 shows the assumed variability of trade with the scenario axis. Therefore a one percent real growth in trade has been used as a lower bound for the forecasts.

Figure 7.6 – Value of GB exports and imports 1946-2008



Source: Office for National Statistics.

Figure 7.7 – Relative growth in the real value of trade with other nations by scenario axis



7.4 Population demand drivers

7.4.1 Population growth

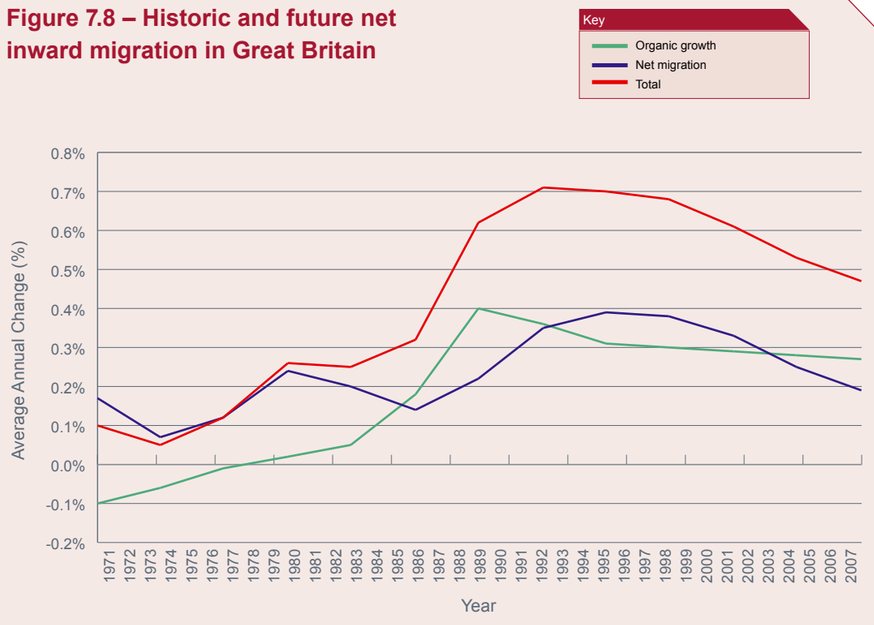
The components of population growth are the difference between birth and death rates (natural change) plus net migration. Natural change will be treated as a trend variable, ie. it will be the same in each of the scenarios whereas net migration will be treated as a scenario variable, ie. it will vary between scenarios.

Figure 7.8 shows the historic and projected components of population growth. Until the late 1990s net inward migration was very small. Since then, the data shows an influx of migrants into Great Britain, largely caused by the extension of the European Union and official projections are based on this period. Official figures show that some Eastern European migrants are now migrating out of the UK, and this may cause future projections of migration to be significantly less.

Consequently, the upper bound on proposed net inward migration by scenario has been set at a level below Government forecasts.

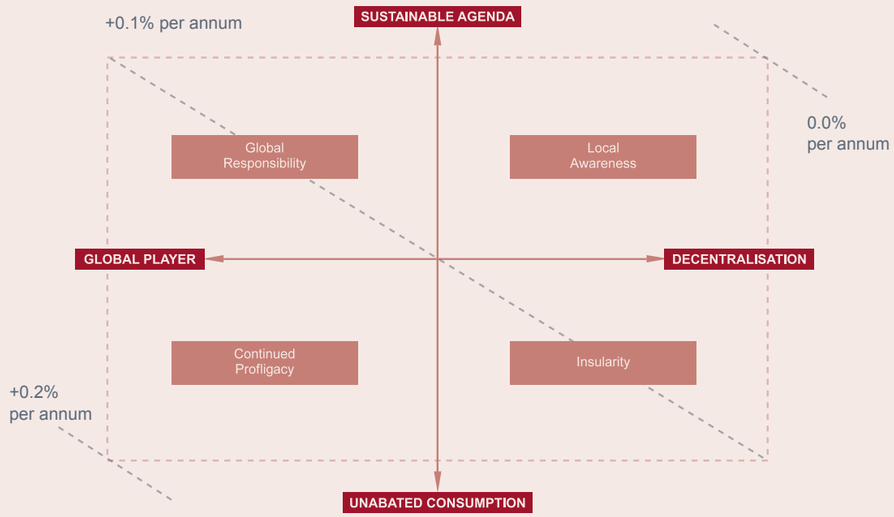
Migration tends to be positively correlated to economic growth because the increase in job opportunities makes the UK a more attractive place to live. It is also influenced by the level of protectionism, which in turn is related to the Global Player/Decentralisation axis. Therefore, migration is assumed to be dependent on variations in both scenario axes. Figure 7.9 shows proposed net inward migration by scenario.

Figure 7.8 – Historic and future net inward migration in Great Britain



Source: ONS Historic population estimates and Government Actuary Division (GAD) forecasts.

Figure 7.9 – Net inward migration by scenario variable



7.4.2 Spatial distribution of population

The population of the UK has become more concentrated in the South East since 1971. This was caused by, and has, in turn, accentuated disparity of income and employment opportunities between the regions. Table 7.4 shows each regions share of the population of Great Britain in 1971 and 2006 and the average change in share per decade.

Table 7.4 Share of UK population 1971 – 2006

Government Office region/UK nation	Share of UK Population 1971	Share of UK Population 2006	Average Change in Share per Decade
South East	12.2%	13.6%	0.4%
Eastern	8.0%	9.3%	0.4%
South West	7.4%	8.5%	0.3%
East Midlands	6.5%	7.2%	0.2%
Wales	4.9%	4.9%	0.0%
West Midlands	9.2%	8.9%	-0.1%
Yorkshire & Humber	8.8%	8.5%	-0.1%
North East	4.8%	4.2%	-0.2%
London	13.5%	12.4%	-0.3%*
Scotland	9.4%	8.4%	-0.3%
North West	12.7%	11.3%	-0.4%

Source: Office of National Statistics.

** London dropped significantly In the 1970s and then grew in the 1980s and 1990s.*

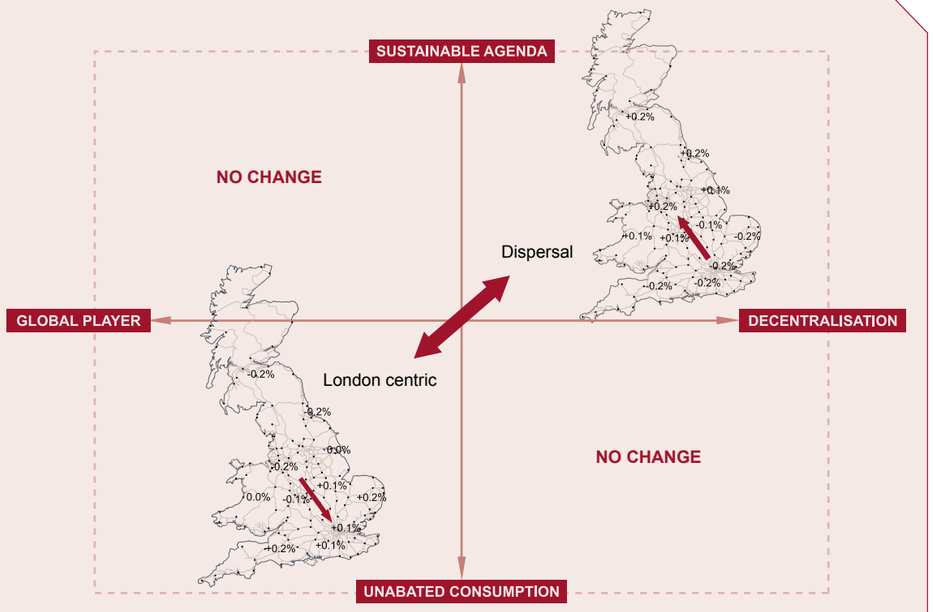
Figure 7.10 shows the change in share of the population by scenario variable. We propose that in the Continued Profligacy scenario, the average change in share per decade tends towards official forecasts for each region. In the Local Awareness scenario, the rates tend towards a reversal of the historic trends.

7.4.3 Change in age profile of the population

As people become older their travel patterns are likely to change and the UK now has an ageing population.

Table 7.5 shows forecasts of the proportion of the British population split by working age, dependent children or over the pensionable age. In the forecasting framework, the change in the age profile of the population will be in line with the forecasts in the table.

Figure 7.10 Change in share of the population by scenario variable



Source: Government Actuary Dept/ONS Forecasts.

Table 7.5 – Share of UK population 1971 – 2006

Year	Children	Working age	Pensionable age
1981	22.1%	60.0%	17.9%
2006	19.0%	62.2%	18.8%
2036 Forecast	17.5%	61.3%	21.2%
Change 2006 – 2036	-1.5%	-0.9%	2.4%

Note: Children under 16. Working age and pensionable age populations based on state pension age for given year. Between 2010 and 2020 state pension age will change from 65 years for men and 60 years for women, to 65 years for both sexes. Between 2024 and 2046, state pension age will increase in three stages from 65 years to 68 years for both sexes.

7.4.4 Planning policy and re-urbanisation

Research has demonstrated that people living or working within walking distance of a rail station are more likely to use rail as their preferred mode of travel. Table 7.6 shows the percentage of the population by proximity to a rail station at each of the last three census years.

A sustainable urbanisation and transport policy would naturally lead to the concentration of population close to stations.

A government with a focus on economic prosperity would be expected to have a relatively laissez-faire attitude to urbanisation.

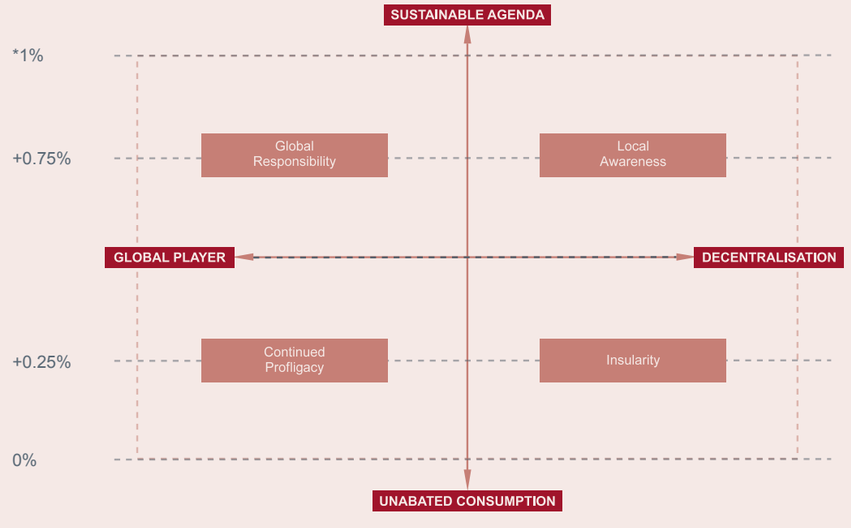
Figure 7.11 shows the assumed change in the percentage of the population within 800 metres of a rail station. The upper bound of 1 percent is based on the maximum of the historic change per decade. The lower bound reflects the fact that rail stations already exist and the people wouldn't necessarily choose to move away from a rail station.

Table 7.6 Percentage of population by distance from a station

Distance Band	Share of Population 1981	Share of Population 1991	Share of Population 2001
0 – 800 metres	19.5%	19.3%	20.2%
800m –1.5km	24.9%	24.8%	24.9%
1.5km+	55.6%	55.9%	54.9%
Total	100.0%	100.0%	100.0%

Source: Office for National Statistics.
Note: Estimates of population distance to stations is based on a sample of wards in England and Wales.

Figure 7.11 Percentage change per decade of population within 800 metres of a rail station by scenario variable



*Shift per decade in the percentage of population that will live within 800 metres of a rail station

7.5 Social demand drivers

Within the forecasting framework, some social drivers such as 'one person households' affect the proportion of the population that live in different household structures and therefore behave differently. Other social factors such as 'car ownership' dictate the mode chosen to make a journey.

7.5.1 One person households

The proportion of single occupancy dwellings is treated as a trend variable in the forecasting framework. Table 7.7 shows the average annual percentage change in the number of single occupancy dwellings. We propose that the trend continues and the number of single occupancy dwellings increases by 0.4 percent per annum to the end of the forecasting period.

7.5.2 Dual income families

Families with more than one wage earner in the household tend to have higher disposable income than those with only one. They are also more likely to make long distance commuting trips because the household will need to be located given the location of both occupations. Information on the number of dual income families shows that the number grew in the 1980s and 1990s but levelled off in 2000. Consequently, this work assumes that projections of the proportion of the population in a dual income family will stay the same.

Table 7.7 Change in the share of the UK population living in a single occupancy dwelling, 1971 – 2006

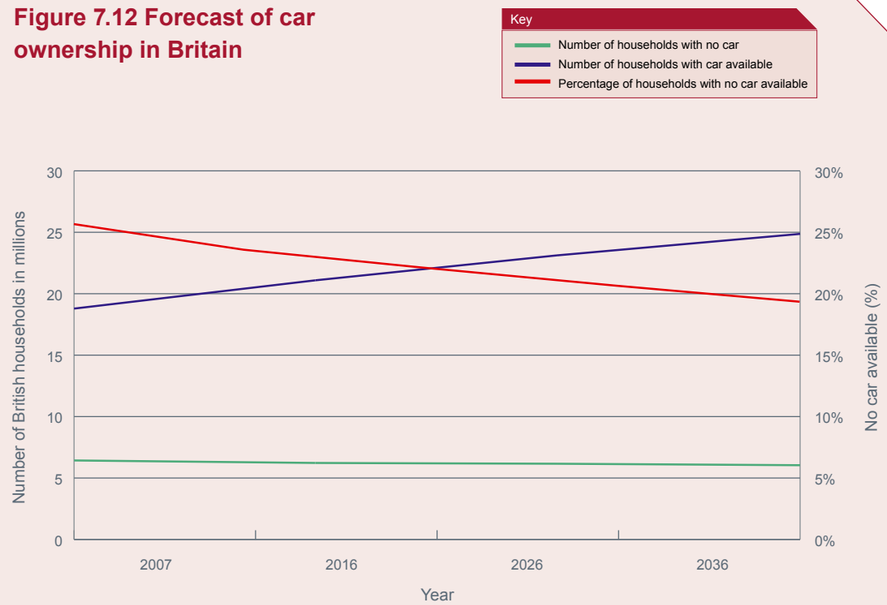
Single occupancy dwellings			
Year	**1971 – 1981**	**1981 – 1991**	**1991 – 2001**
Annual percentage change	0.2%	0.4%	0.4%

Source: Census of population 1981 – 2001.

7.5.3 Car ownership

The ownership of a private vehicle dictates the mode choices that can be made. Car ownership including permanent access to an employer's vehicle is treated as a trend variable in this work. The forecast of car ownership used is given in Figure 7.12.

Figure 7.12 Forecast of car ownership in Britain



Source: ONS Historic population estimates and Government Actuary Division (GAD) forecasts.

7.6 Mode competition

Modal competition factors affect the competitive advantage of rail compared to other modes.

Without looking specifically at supply, the demand drivers explore government policy on the appropriation of social costs, rail pricing and fiscal policy.

7.6.1 External costs of car

The disparity between the marginal private and external costs of travelling by car has been considered. The aim of this part of the analysis is to show the effect on rail patronage in the event of a government wishing to pursue a sustainable transport policy involving the internalisation of external costs.

It is difficult to estimate the increase in the costs of car use in 30 years' time assuming that the price paid by motorists was to include these external costs. Interaction between car costs, congestion, and road journey times make hypothesising an 'equilibrium' point challenging. This is further complicated by increasing car ownership, and the uneven distribution of external costs which are skewed towards peak hours.

The current typical marginal cost of travelling by car is roundly 19 pence per passenger mile, 5 pence of which is fuel duty paid[4].

Average external costs currently amount to around 18 pence per passenger mile[5] taking the following into account, though these can vary considerably between peak and off-peak hours:

- road congestion
- investment in infrastructure
- the cost of accidents
- deterioration in local air quality
- noise
- greenhouse gas emissions.

For the purposes of this analysis, it is hypothesised that the cost of car use increases by two-thirds by 2030 in order to internalise all marginal external costs.

7.6.2 External costs of air

The external costs of travelling by air can be categorised into:

- climate change
- air quality
- noise
- congestion (runway and airspace)
- water and soil pollution
- safety
- impact of airport infrastructure (visual intrusion, etc).

Research published by DfT, assuming an increase in Air Passenger Duty from November 2009, suggests that aviation tax and the marginal external cost of travelling by air are broadly equivalent.

It is assumed, however, that a sustainable transport system would levy value added tax on all modes of transport. Currently VAT is not applicable to air travel.

7.6.3 External costs of rail

Train operators currently pay marginal costs in the form of:

- infrastructure maintenance
- vehicle lease, operating costs and maintenance costs
- fuel (including reduced diesel duties)
- congestion – part paid via the capacity charge.

These are passed on to passengers in the form of fares.

The following external costs are not paid by the operator:

- crowding costs to other passengers – although this is likely to be relatively small on long distance operators;
- air pollution
- noise
- VAT not levied on fares
- climate change/greenhouse gases
- accidents.

It is assumed that rail fares would increase by 20% in order to cover marginal external costs in a sustainable scenario, most of which relates to VAT not currently paid.

7.6.4 Rail pricing

Certain rail fares are regulated by Government. It is assumed that these regulated fares will increase at 1 percent per annum in real terms until 2013/14. We have also assumed that unregulated fares will rise at 2.5 percent in real terms until 2013/14.

4 Automobile Association Running Cost tables, 2008.

5 WebTAG.

8. Forecasts

8.1 Introduction

This chapter discusses the methodology used to produce passenger and freight demand forecasts for each scenario. It outlines the results, showing how the scenarios lead to quite different outcomes for the key markets.

8.2 Passenger demand forecasting methodology

8.2.1 Approach

The key drivers of passenger demand, discussed in **Chapter 7**, were categorised according to whether they primarily impact upon:

- market size, or the propensity to undertake long distance trips. Examples include population growth and distribution
- modal choice, for example household's proximity to long distance railheads
- both of the above, for example the cost of travel.

A cross-sectional approach was adopted to forecasting demand. This approach, which links the characteristics of the population with its propensity to travel, is ideal for forecasting under different scenarios.

The modelling was done in two parts; first, the total market was estimated by estimating long distance trip rates for specific origins and destinations, then the rail share was estimated using a modal share model.

8.2.2 Summary of market segmentation

The population of Great Britain was segmented for modelling purposes by geographical area, household structure, and income band. The geographical segmentation was based upon the Planet Strategic Model (PSM) zone structure, which itself is an aggregation of the Unitary Authority/ Local Authority Districts (UALADs).

Household structure is a key determinant of long distance trip rates.

Consequently, each zone was further segmented by household structure using census data as follows:

- 1 adult aged 16 – 64
- 1 adult aged 65+
- 2 adults, Household Representative Person (HRP) aged 16 – 64
- 2 adults, HRP aged 65+
- single adult, 1 or more children
- 2 adults, 1 child
- 2 adults, 2 or more children
- other households.

The market was further segmented into five income bands using data from the Expenditure and Food Survey.

The use of such detailed segments in the modelling process enables the model to reflect the impact of income distribution, social trends, and population changes (as defined by the scenarios) on long distance trip rates.

8.2.3 Long distance trip rates

The forecasts use the NTS to define relationships between real income growth, economic development and the propensity to undertake long distance trips. These relationships are defined for each household type and income band and for business and leisure trips in Figure 8.1.

Figure 8.1 – Long distance trips, per person, per annum

Journey Purpose	Income Band	Other Households	Single Adult 16 – 64	Single Adult 65+	Single parent family
Business	Bottom	1.4	1.3	0.3	0.1
Business	2nd	2.6	1.6	0.5	0.5
Business	3rd	3.7	2.4	0.8	0.6
Business	4th	6.3	7.0	2.0	3.3
Business	Top	9.8	14.5	1.4	6.1
Leisure	Bottom	7.7	7.5	6.7	7.4
Leisure	2nd	9.1	9.8	7.2	7.3
Leisure	3rd	11.4	10.4	10.5	12.7
Leisure	4th	13.3	14.3	13.6	17.9
Leisure	Top	18.5	20.5	13.5	20.9
Journey Purpose	**Income Band**	**2 Adults 1 child**	**2 Adults 2+ Children**	**2 Adults, Hoh/ HRP 16 – 64**	**2 Adults, Hoh/HRP 65+**
Business	Bottom	0.8	0.7	3.1	0.7
Business	2nd	1.1	1.7	1.9	1.2
Business	3rd	3.4	3.1	4.1	1.2
Business	4th	6.0	4.6	5.8	3.1
Business	Top	9.8	6.9	14.0	3.1
Leisure	Bottom	5.2	5.4	10.8	9.8
Leisure	2nd	9.1	8.7	12.5	9.4
Leisure	3rd	9.6	9.8	14.5	15.1
Leisure	4th	13.9	14.3	15.3	20.0
Leisure	Top	17.4	21.6	22.9	24.0

Source: National Travel Survey 2002 – 2006.

Figure 8.2 shows an example of the relationship between income growth and the propensity to undertake long distance leisure trips for households with two adults and two or more children.

Households with relatively high incomes have a higher propensity to undertake long distance trips, however the marginal impact of increasing wealth on trip rates is less than for lower income households.

8.2.4 Mode choice factors

Some of the demand drivers discussed in **Chapter 7** impact upon passengers' choices of mode. The forecasts reflect these factors by applying an incremental mode choice model, consistent with PSM.

Generalised costs changes for each mode feed into a hierarchical logit model, with the higher nest reflecting the choice between public transport and car. The lower nest reflects the choice between rail and air.

The mode choice parameters, for business, leisure and commuting trips, are consistent with PSM, as is the generalised cost elasticity to overall market size.

Figure 8.2 Relationship between household income and propensity to consume long distance leisure trips for households with 2 adults and 2 or more children

8.3 Passenger forecasts

8.3.1 Passenger forecasts

Figure 8.3 tabulates passenger rail forecasts by scenario and exemplar strategic national corridor. For convenience all forecasts shown in this section use the same grid format as the scenarios introduced in **Chapter 6**. The corridors are ranked in terms of their relative growth rates.

These corridors have been chosen to illustrate the application of the methodology on a variety of routes. The methodology can be equally applied to forecast long distance travel on other routes.

Growth is forecast in all corridors, in all scenarios to 2036. Intermediate year forecasts are also included for 2021 in Figure 8.3. These are interpolated, assuming a consistent growth rate. The pattern of results in Figure 8.3 is shaped by the influence of two key demand drivers:

- primarily, the impact of economic growth increasing from the Local Awareness scenario (top right) to Continued Profligacy serves to increase forecast rail growth
- the positive impact of moving from Unabated Consumption to a Sustainable Agenda (bottom to top) on long distance rail demand is also evident.

Total forecast rail demand is highest in the Global Player scenarios. However, growth in the Continued Profligacy scenario is driven more by market size factors and growth in the Global Responsibility scenario is driven by changes in market share. The impact of market share drivers is strongest on those flows where rail still has a significant proportion of the market to gain, as demonstrated in the non-London corridors

Figure 8.3 Long distance passenger demand forecasts by scenario

SUSTAINABLE AGENDA

Rank	Corridor	2007 growth to 2021	2007 growth to 2036
1	Cross-country	38%	95%
2	West Coast	36%	89%
3	Western	32%	79%
4	Trans-Pennine	32%	79%
5	East Coast	31%	74%
6	Midland	30%	71%
7	Anglia	29%	70%
8	Hants/Dorset	26%	62%

GLOBAL PLAYER

Rank	Corridor	2007 growth to 2021	2007 growth to 2036
1	West Coast	36%	88%
2	Western	34%	83%
3	Anglian	33%	79%
4	Cross Country	32%	78%
5	East Coast	32%	78%
6	Midland	32%	77%
7	Hants/Dorest	31%	74%
8	Trans-Pennine	29%	69%

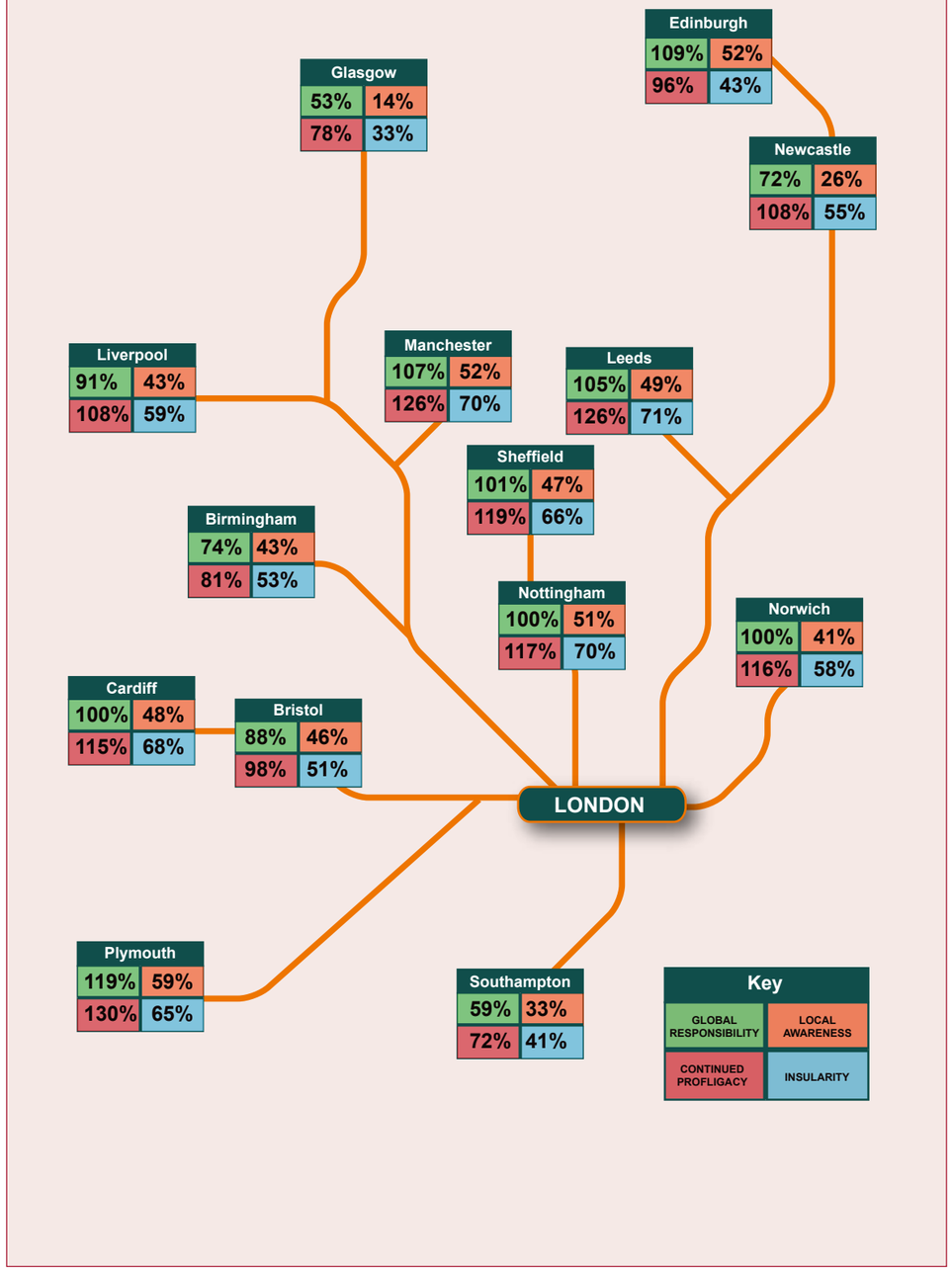
DECENTRALISATION

Rank	Corridor	2007 growth to 2021	2007 growth to 2036
1	Cross-country	21%	48%
2	West Coast	20%	45%
3	Western	17%	39%
4	Trans-Pennine	16%	36%
5	Midland	16%	36%
6	East Coast	15%	34%
7	Anglia	13%	29%
8	Hants/Dorset	13%	28%

UNABATED CONSUMPTION

Rank	Corridor	2007 growth to 2021	2007 growth to 2036
1	West Coast	21%	47%
2	Midland	20%	45%
3	Cross Country	19%	43%
4	Western	18%	41%
5	East Coast	18%	41%
6	Anglia	17%	40%
7	Trans-Pennine	17%	38%
8	Hants/Dorset	16%	36%

Figure 8.4 – Growth of London flows under all scenarios in 2036



In all strategic national corridors, growth in demand for rail in the long distance business market is highest. In contrast, the commuting market is forecast to grow relatively slowly because growth is largely related to employment rates.

Figure 8.4 illustrates how the passenger forecasts in Figure 8.3 correspond to increases to London flows. The schematic diagram shows the forecast increase in passenger demand flow from London to key destinations from a base year of 2007 in all scenarios. The diagrammatic maps in Figures 8.6, 8.8, 8.11, 8.13 and 8.16 also show current level of passengers travelling between two points on a daily basis.

The Global Responsibility and Continued Profligacy scenarios are forecast to have much higher growth than under the Local Awareness or Insularity scenarios reflecting the higher levels of economic growth assumed. Under the Global Responsibility scenario, growth of 100 percent or more in each flow is forecast between London and large regional centres such as Plymouth, Norwich, Leeds, Manchester and Sheffield. Significant growth is also forecast to Cardiff and Edinburgh.

Southampton flows are forecast to have lower growth than those of some other cities. This largely reflects the proportion of long distance commuting, which is assumed to have a lower growth rate.

8.3.2 Sources of additional passenger growth not reflected by the forecasts

The method used to produce the rail passenger forecasts has been developed to model 'background growth' only. It is intended that the forecasts will be used in long-term rail planning studies such as the next generation of RUSs and high speed line studies. When the forecasts are used, it will be in conjunction with conventional techniques to establish the impact of specified interventions.

There will clearly be increases in the forecasts reported in a number of circumstances:

- when account is taken of the impact of interventions, for example, schemes improving rail performance or journey time
- when account is taken of additional demand arising from 'softer' service quality initiatives, for example investment in personal security, or increased marketing of passenger services
- when estimates are made of the release of any demand currently suppressed by crowding
- if higher economic growth is assumed for a specific reason, for example, if sustainable technologies are believed to drive higher growth than currently anticipated by the scenarios.

In any future modelling, these interventions could be dealt with using sensitivities in the forecasting calculations.

8.4 Long distance passenger demand forecasts by strategic national corridor

8.4.1 West Coast

The West Coast strategic national corridor includes London, Manchester, Liverpool, Birmingham and Glasgow, five of the largest conurbations in the UK. Figure 8.5 gives a breakdown of forecast demand by scenario for the West Coast strategic national corridor.

Figure 8.5 – Growth in long distance passenger rail demand for the West Coast corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	89% (2.2%)	36.5%	4.4%
Business	141% (3.1%)	35.2%	6.3%
Commute	24% (0.7%)	45.4%	5.2%
Other	77% (2%)	36.2%	3.8%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	45% (1.3%)	37.2%	5.1%
Business	65% (1.7%)	35.4%	6.5%
Commute	21% (0.7%)	45.9%	5.8%
Other	39% (1.1%)	36.6%	4.3%

GLOBAL PLAYER / **DECENTRALISATION**

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	88% (2.2%)	32.9%	0.8%
Business	147% (3.2%)	32.1%	3.2%
Commute	18% (0.6%)	42.2%	2.0%
Other	72% (1.9%)	32.0%	-0.3%

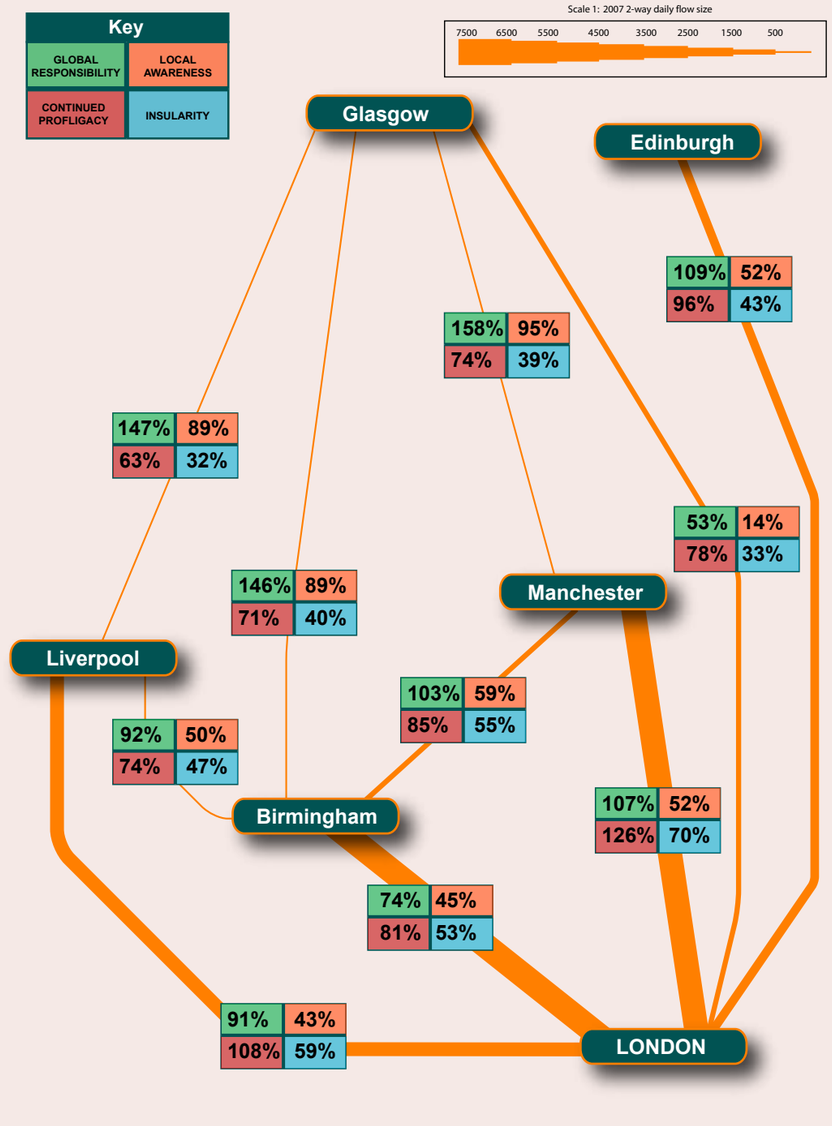
	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	47% (1.3%)	33.1%	1.0%
Business	77% (2.0%)	31.9%	2.9%
Commute	16% (0.5%)	42.7%	2.6%
Other	38% (1.1%)	32.1%	-0.2%

UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 80,000 trips per day; 33% Business; 17% Commuting; and 50% Other

Figure 8.6 shows growth in long distance rail trips for a selection of flows to and from major cities on the West Coast strategic national corridor. The influence of a sustainable agenda on market share is particularly evident on non-London Flows.

Figure 8.6 – Growth in long distance rail demand by scenario for conurbation flows on the West Coast



On flows where there is a significant market for rail yet to capture, growth in long distance rail is forecast to be very high. For example, passenger demand from Liverpool to Glasgow is forecast to rise by 63 percent in the Continued Profligacy scenario and 147 percent in the Global Responsibility scenario.

Long distance business demand accounts for a relatively high proportion of total long distance demand on the West Coast strategic national corridor (33 percent) and commuting accounts for a low proportion (17 percent).

Given the relative growth expected in these markets, total growth in demand is high compared to other strategic national corridors. However, forecasting background growth from a 2007 base, the RUS forecast does not take account of the growth which will arise from the major service changes implemented in December 2008.

8.4.2 East Coast

The East Coast strategic national corridor links Scotland with the North East, Yorkshire & the Humber and Greater London; and includes major regional conurbations such as Newcastle-upon-Tyne, Leeds, Glasgow, and Edinburgh. Figure 8.7 gives a breakdown of forecast demand by scenario for the East Coast strategic national corridor.

Total forecast rail demand is highest in the Continued Profligacy scenario with 78 percent forecast growth in long distance rail trips to 2036.

Figure 8.7 – Growth in long distance passenger rail demand for the East Coast corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	74% (1.9%)	35.9%	2.4%
Business	128% (2.9%)	39.8%	4.9%
Commute	18% (0.6%)	52.4%	2.2%
Other	70% (1.9%)	29.6%	2.1%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	34% (1.0%)	36.4%	3.0%
Business	55% (1.5%)	40.1%	5.2%
Commute	12% (0.4%)	52.3%	2.1%
Other	32% (1.0%)	29.9%	2.4%

GLOBAL PLAYER — DECENTRALISATION

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	78% (2.0%)	33.0%	-0.5%
Business	140% (3.1%)	37.0%	2.0%
Commute	20% (0.6%)	50.4%	0.2%
Other	69% (1.8%)	26.6%	-0.9%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	41% (1.2%)	33.4%	-0.1%
Business	73% (1.9%)	37.0%	2.0%
Commute	14% (0.5%)	50.4%	0.2%
Other	35% (1.0%)	26.7%	-0.7%

UNABATED CONSUMPTION

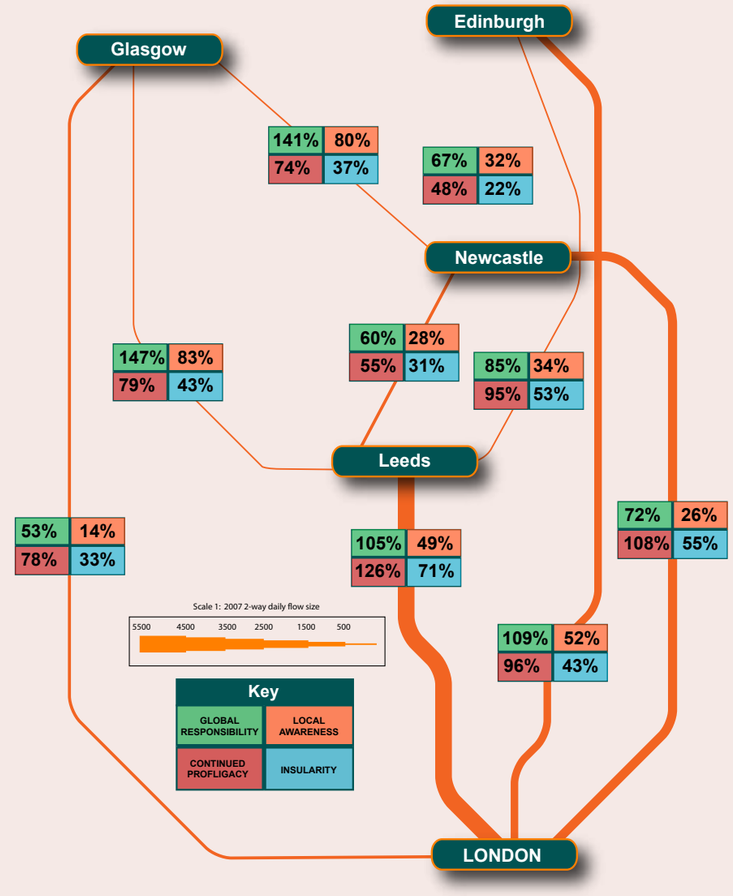
Growth in long distance trips (>50 miles)
From a base of 79,000 trips per day; 30% Business; 26% Commuting; and 45% Other

The Global Responsibility scenario implies slightly less forecast growth (74 percent).

As in other national corridors, the gain in rail market share in a sustainable agenda scenario drives overall growth in long distance rail demand. The gain in rail market share is strongest on those flows where rail has a relatively low market share at present.

Figure 8.8 shows forecast growth in long distance rail trips to and from major conurbations on the East Coast strategic national corridor. The market share influence of a Sustainable Agenda is less pronounced for East Coast flows than shown for the West Coast in Figure 8.6. Forecast demand from Leeds to Glasgow is significantly higher in the Sustainable Agenda scenarios than in the Unabated Consumption scenarios. The impact of increased market share on this flow is sufficient to offset a smaller total long distance market such that forecast growth is higher in the Local Awareness scenario than the Continued Profligacy scenario.

Figure 8.8 – Growth in long distance rail demand by scenario for conurbation flows on the East Coast



Newcastle to London is an example of a flow where rail already has a high market share and further addition to the attractiveness of rail would account for relatively small changes in market shift.

Around 30 percent of long distance journeys made on the East Coast strategic national corridor are business trips, compared to 33 percent for the West Coast. The East Coast also carries a higher proportion of commuting trips. Therefore, total growth in demand is slightly lower than on the West Coast strategic national corridor.

8.4.3 Midland

The Midland strategic national corridor links major urban centres such as Leicester, Nottingham, Derby, Sheffield and London.

Figure 8.9 gives a breakdown of forecast demand by scenario for the corridor. 36 percent of long distance rail trips made on the Midland Strategic National Corridor are commuting trips. This is more than the East Coast and West Coast corridors. Forecast growth is higher for all journey purposes than forecast growth in the East Coast corridor, with forecast business trips driving total demand. Therefore total forecast growth in long distance trips is similar to that on the East Coast strategic national corridor.

Figure 8.9 – Growth in long distance passenger rail demand on the Midland corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	71% (1.9%)	28.8%	0.3%
Business	135% (3.0%)	29.1%	3.3%
Commute	23% (0.7%)	51.6%	1.1%
Other	75% (2.0%)	22.4%	0.9%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	36% (1.1%)	29.8%	1.3%
Business	61% (1.7%)	29.3%	3.6%
Commute	17% (0.5%)	51.3%	0.8%
Other	37% (1.1%)	22.8%	1.3%

GLOBAL PLAYER — DECENTRALISATION

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	77% (2.0%)	27.2%	-1.3%
Business	151% (3.2%)	27.8%	2.1%
Commute	24% (0.7%)	49.9%	-0.6%
Other	79% (2.0%)	20.9%	-0.6%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	45% (1.3%)	27.9%	-0.6%
Business	83% (2.1%)	27.8%	2.1%
Commute	18% (0.6%)	49.6%	-0.9%
Other	45% (1.3%)	21.2%	-0.3%

UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 37,000 trips per day; 25% Business; 36% Commuting; and 40% Other

Total forecast rail demand is highest in the Continued Profligacy scenario with 77 percent forecast growth in long distance rail trips to 2036. The Global Responsibility scenario implies slightly less forecast growth (71 percent).

8.4.4 Trans-Pennine

The trans-Pennine strategic national corridor links major conurbations on the West Coast to the East Coast, including Manchester, Liverpool, Sheffield, Newcastle, Leeds, Bradford and Hull. Figure 8.10 gives a breakdown of forecast demand by scenario.

Other trips accounts for 54 percent of all rail trips on the trans-Pennine strategic national corridor. This is relatively high compared with other corridors and forecast growth for other long distance rail trips is also relatively low, this pushes down the forecast rate of growth in all scenarios.

Rail in the trans-Pennine corridor has a low market share of long distance trips (13.8 percent) compared with other corridors. There is significant market share that rail has yet to gain. Therefore, total forecast rail demand is highest in the Global Responsibility scenario with 79 percent forecast growth in long distance rail trips to 2036, and 69 percent in the Continued Profligacy scenario.

The gain in rail market share is strongest on those flows where rail's share is currently low.

Figure 8.10 – Growth in long distance passenger rail demand on the trans-Pennine corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	79% (2.0%)	14.6%	0.8%
Business	144% (3.1%)	11.0%	2.1%
Commute	18% (0.6%)	17.4%	0.8%
Other	65% (1.7%)	18.7%	0.7%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	36% (1.1%)	15.1%	1.2%
Business	67% (1.8%)	11.0%	2.2%
Commute	13% (0.4%)	17.7%	1.1%
Other	28% (0.8%)	18.9%	0.9%

GLOBAL PLAYER — DECENTRALISATION

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	69% (1.8%)	13.0%	-0.8%
Business	127% (2.9%)	9.6%	0.7%
Commute	11% (0.4%)	15.6%	-0.9%
Other	58% (1.6%)	16.9%	-1.1%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	38% (1.1%)	13.3%	-0.6%
Business	73% (1.9%)	9.6%	0.7%
Commute	7% (0.2%)	15.9%	-0.7%
Other	31% (0.9%)	17.0%	-1.0%

UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 10,000 trips per day; 28% Business; 18% Commuting; and 54% Other

Figure 8.11 shows forecast growth in long distance rail trips to and from major conurbations on the trans-Pennine strategic national corridor.

Liverpool to Bradford, Liverpool to Hull and Sheffield to Newcastle all have forecast growth in the Sustainable Agenda scenarios that is significantly higher than in the Unabated Consumption scenarios.

8.4.5 Cross-country

The cross-country strategic national corridor links together the South West, West Midlands, Yorkshire and the Humber and the North East, and includes major cities such as Birmingham, Bristol, Sheffield, Leeds and Newcastle-upon-Tyne.

Figure 8.11 – Growth in long distance rail demand by scenario for conurbation flows on trans-Pennine

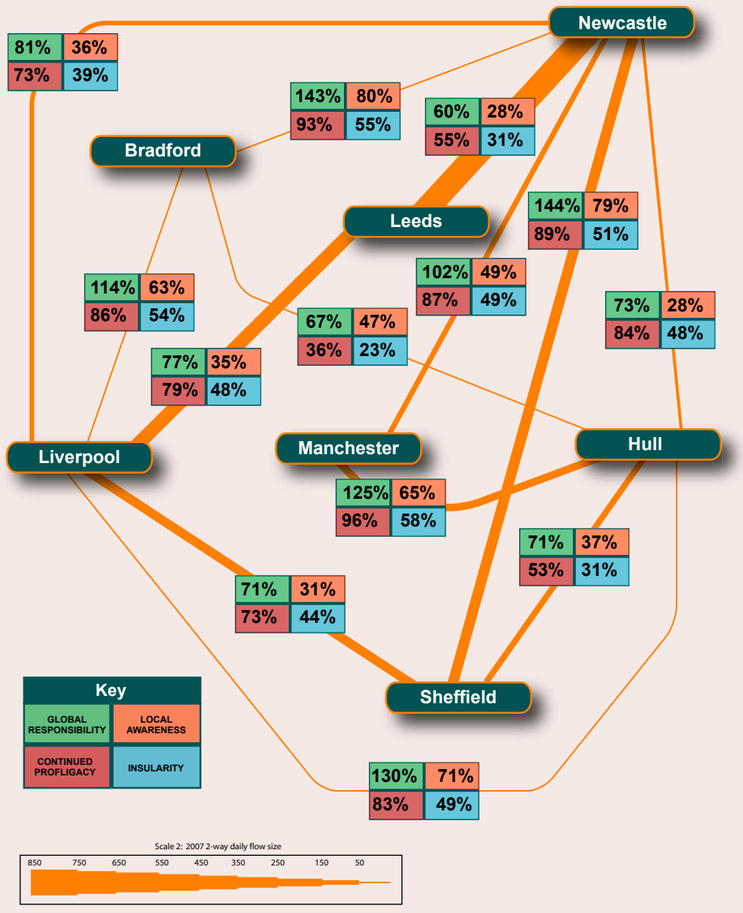


Figure 8.12 gives a breakdown of forecast demand by scenario. Long distance rail trips are forecast to increase by 95 percent by 2036 in the Global Responsibility scenario. Other trips account for a relatively high proportion of all long distance rail trips on the corridor and are relatively high compared with other corridors.

Rail in the cross-country corridor has a very low market share of long distance trips (9.3 percent) compared with other corridors. This implies that there is significant market share that rail has yet to gain. The impact of market share gains is significant on many of the major flows on the cross-country corridor because of the relatively low base market share of rail on each flow.

Figure 8.12 – Growth in long distance passenger rail demand on the cross-country corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	95% (2.3%)	9.3%	1.2%
Business	174% (3.5%)	7.4%	2.0%
Commute	24% (0.7%)	10.7%	1.0%
Other	77% (2.0%)	11.5%	1.1%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	48% (1.4%)	9.7%	1.6%
Business	87% (2.2%)	7.5%	2.2%
Commute	19% (0.6%)	11.0%	1.3%
Other	36% (1.1%)	11.8%	1.4%

GLOBAL PLAYER — **DECENTRALISATION**

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	78% (2.0%)	7.8%	-0.3%
Business	146% (3.1%)	6.0%	0.7%
Commute	12% (0.4%)	9.2%	-0.5%
Other	63% (1.7%)	9.7%	-0.7%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	43% (1.2%)	8.0%	-0.1%
Business	84% (2.1%)	6.1%	0.7%
Commute	9% (0.3%)	9.4%	-0.3%
Other	32% (1.0%)	9.9%	-0.5%

UNABATED CONSUMPTION

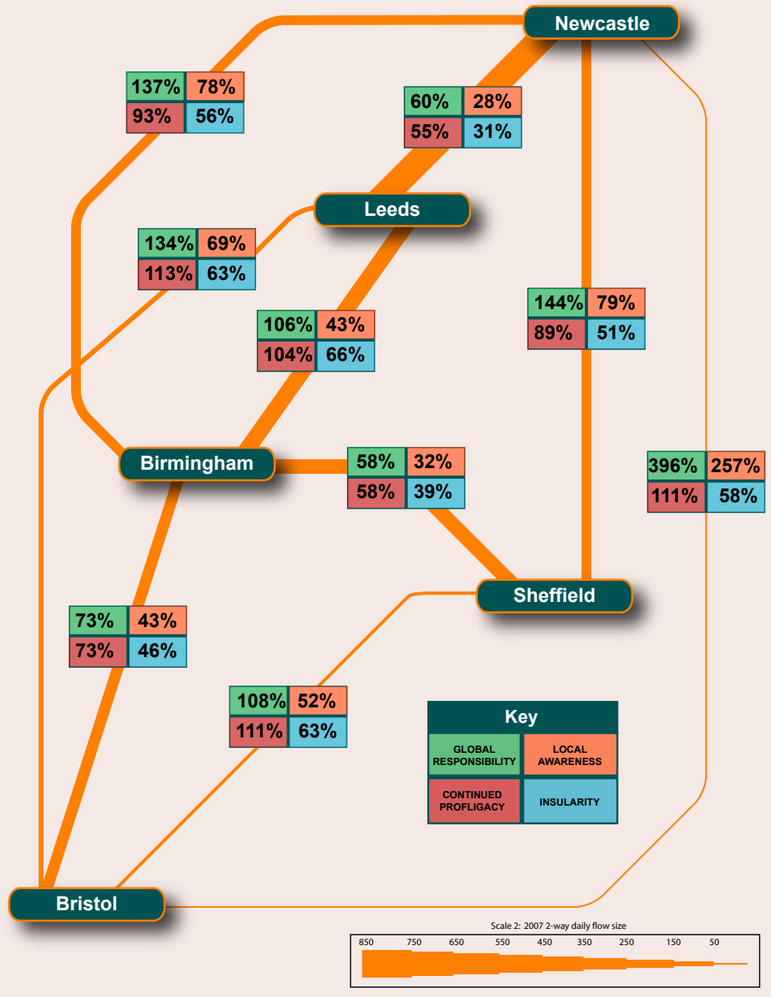
Growth in long distance trips (>50 miles)
From a base of 14,000 trips per day; 29% Business; 18% Commuting; and 54% Other

Figure 8.13 shows forecast growth in long distance rail trips to and from major conurbations on the cross-country strategic national corridor.

Forecast growth in the Global Responsibility scenario is higher than the Continued Profligacy scenario for nearly all flows shown.

At first glance, growth in the number of long distance rail passengers travelling between Bristol and Newcastle appears high, but this is actually a small number of extra trips made by rail on a very small base.

Figure 8.13 – Growth in long distance rail demand by scenario for conurbation flows on cross-country corridor



8.4.6 London to Hampshire/Dorset

The London to Hampshire/Dorset strategic national corridor links Southampton and Bournemouth to the capital and is particularly important because of the high proportion of long distance commuting. Despite the corridor's relatively short length in relation to other strategic national corridors, this corridor sustains roughly the same number of long distance trips as the cross-country and trans-Pennine corridors combined. Figure 8.14 gives a breakdown of forecast demand by scenario.

Figure 8.14 Growth in long distance passenger rail demand on the Hampshire/Dorset corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	62% (1.7%)	27.6%	0.2%
Business	143% (3.1%)	22.5%	4.1%
Commute	17% (0.5%)	50.8%	1.5%
Other	69% (1.8%)	23.8%	1.2%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	28% (0.9%)	29.0%	1.7%
Business	60% (1.6%)	22.6%	4.3%
Commute	12% (0.4%)	50.8%	1.4%
Other	29% (0.9%)	24.0%	1.5%

GLOBAL PLAYER — **DECENTRALISATION**

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	74% (1.9%)	25.3%	-2.1%
Business	176% (3.6%)	20.7%	2.3%
Commute	15% (0.5%)	48.6%	-0.7%
Other	85% (2.1%)	22.1%	-0.4%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	36% (1.1%)	26.5%	-0.9%
Business	82% (2.1%)	20.7%	2.4%
Commute	11% (0.4%)	48.6%	-0.8%
Other	38% (1.1%)	22.2%	-0.3%

UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 26,000 trips per day; 20% Business; 17% Commuting; and 40% Other

Commuting trips account for 41 percent of total long distance rail trips made on the corridor, and business trips account for a relatively low proportion of total long distance demand than the larger corridors. Forecast demand is highest for business trips in all scenarios, and is significantly higher in the continued profligacy scenario compared to the global awareness scenario (176 percent and 143 percent respectively). Forecast growth in demand for commuting is particularly low in all scenarios.

Total forecast rail demand is highest in the Continued Profligacy scenario with 74 percent forecast growth in long distance rail trips driven by a high rate of forecast growth in business trips.

Growth in the Global Responsibility scenario is expected to be lower (62 percent). This is a function of a high share of commuters on the corridor and low business growth compared to the Continued Profligacy scenario.

8.4.7 Western

The Western strategic national corridor links South Wales to the West and South West of England and London. The corridor includes Swansea and Cardiff, the two most populous cities in Wales, also Bristol and Plymouth. Figure 8.15 gives a breakdown of forecast demand by scenario.

Figure 8.15 – Growth in long distance passenger rail demand on the Western corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	79% (2.0%)	28.2%	1.6%
Business	152% (3.2%)	29.1%	5.4%
Commute	22% (0.7%)	45.8%	2.0%
Other	78% (2.0%)	23.5%	1.4%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	39% (1.1%)	29.0%	2.5%
Business	67% (1.8%)	29.4%	5.7%
Commute	19% (0.6%)	46.1%	2.3%
Other	36% (1.1%)	23.7%	1.5%

GLOBAL PLAYER — **DECENTRALISATION**

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	83% (2.1%)	25.0%	-1.6%
Business	176% (3.6%)	26.4%	2.7%
Commute	15% (0.5%)	42.0%	-1.8%
Other	78% (2.0%)	20.5%	-1.7%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	41% (1.2%)	25.6%	-1.0%
Business	87% (2.2%)	26.5%	2.8%
Commute	13% (0.4%)	42.3%	-1.5%
Other	36% (1.1%)	20.5%	-1.6%

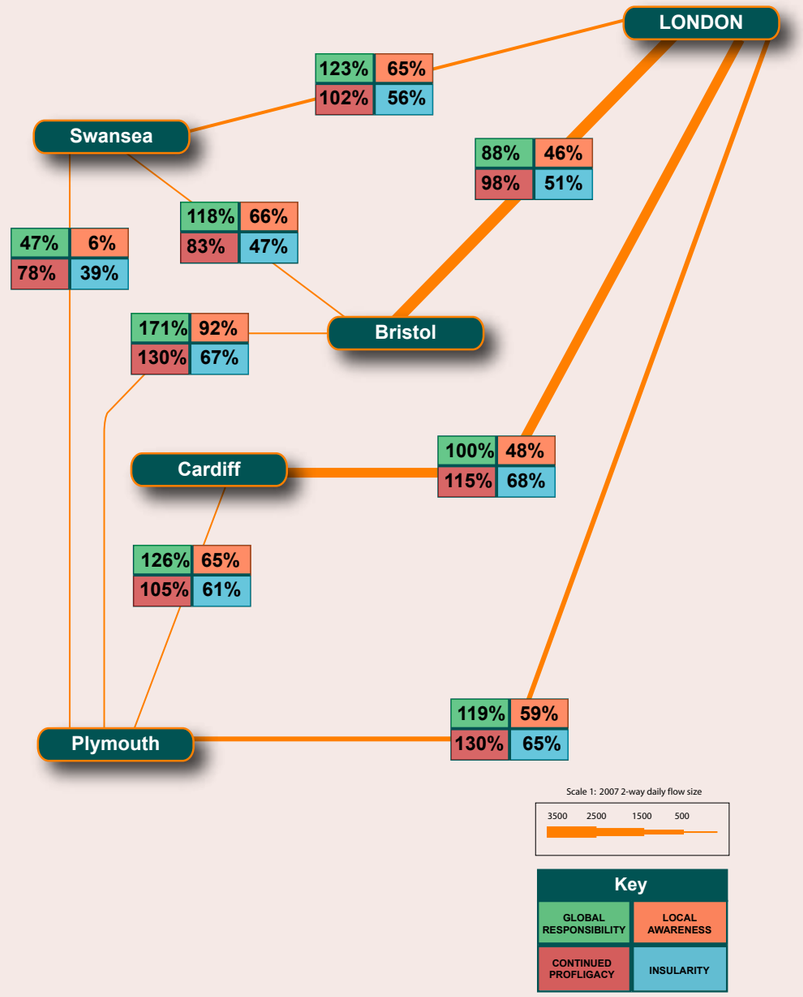
UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 57,000 trips per day; 33% Business; 30% Commuting; and 45% Other

Long distance rail trips are forecast to increase by 79 percent by 2036 in the Global Responsibility scenario, and 83 percent in the Continued Profligacy scenario. In the Unabated Consumption scenarios rail's share of the total long distance market is forecast to reduce by 1.6 percent to 2036 in the Continued Profligacy scenario and 1 percent in the Insularity scenario.

A Sustainable Agenda would imply that rail's market share in long distance trips would increase by 1.6 percent in the Global Responsibility scenario and 2.5 percent in the Local Awareness scenario. This implies that growth in the Continued Profligacy scenarios is driven by market growth, so rail has a smaller share of a larger market.

Figure 8.16 Growth in long distance rail demand by scenario for conurbation flows on Western



In the Global Responsibility scenario rail has a larger share of a smaller market.

In all scenarios the share of long distance business trips made by rail is forecast to increase.

The impact of market share gains in a sustainable agenda scenario depend on rail's relative market position in the base.

Figure 8.16 shows forecast growth in long distance rail trips from and to cities on the Western strategic national corridor. The effect of increasing the attractiveness of rail compared to road is strongest for flows like Bristol to Swansea and Plymouth where rail has a relatively low market share but small changes in rails competitive advantage lead to large changes in market share.

Swansea to Plymouth is an example of a flow where rail's competitive position is so poor that even large changes in the attractiveness of rail have little impact on rail's market share.

8.4.8 Anglia

The Anglia strategic national corridor links Norwich, Ipswich, Colchester and London. The corridor is relatively short but has roughly the same number of long distance rail trips as the cross-country corridor. Figure 8.17 gives a breakdown of forecast demand by scenario.

Figure 8.17 – Growth in long distance passenger rail demand on the Anglia corridor

SUSTAINABLE AGENDA

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	70% (1.9%)	21.4%	1.2%
Business	131% (2.9%)	26.1%	3.3%
Commute	18% (0.6%)	29.7%	1.1%
Other	72% (1.9%)	16.7%	0.9%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	29% (0.9%)	21.5%	1.3%
Business	52% (1.5%)	26.1%	3.3%
Commute	9% (0.3%)	29.4%	0.8%
Other	30% (0.9%)	16.7%	0.9%

GLOBAL PLAYER **DECENTRALISATION**

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	79% (2.0%)	20.1%	-0.1%
Business	155% (3.3%)	25.1%	2.2%
Commute	20% (0.6%)	28.2%	-0.4%
Other	78% (2.0%)	15.3%	-0.5%

	% Growth 2007 – 2036 (CAGR)	Market Share 2036	Change in share 2007– 2036
Total	40% (1.2%)	20.0%	-0.2%
Business	78% (2.0%)	24.7%	1.9%
Commute	11% (0.4%)	27.9%	-0.7%
Other	38% (1.1%)	15.2%	-0.6%

UNABATED CONSUMPTION

Growth in long distance trips (>50 miles)
From a base of 14,000 trips per day; 25% Business; 31% Commuting; and 43% Other.

Rail's share of the total long distance market is relatively small (20.2 percent). Rail's competitive advantage is for long distance trips into London. Flows within the corridor are heavily polarised between a small set of flows where rail dominates and a large number of flows where rail has only a small market share. This limits the impact of changing the attractiveness of rail, and is the reason why forecast growth in long distance rail demand is highest in the Continued Profligacy scenario.

8.5 Freight demand forecasting methodology

As with passenger modelling, development of freight forecasts is no exact science and forecasts are dependent on many factors.

A two-stage process was followed to provide forecasts for each commodity under each scenario. The starting point for the forecasts was the Great Britain Freight Model, which is designed to forecast freight moved within Great Britain, including freight to and from the ports and the Channel Tunnel. It covers different modes such as road and rail and produces a matrix of all forecast freight flows.

This provided a 'top down' view based on economic modelling. In common with the method adopted in the Freight RUS, this perspective was complemented by a 'bottom up' view of the markets provided by a review of the forecasts by the industry group which oversees the development of the Strategic Freight Network.

The freight operators applied their specialised knowledge of operating in the market to propose modifications to the forecasts, particularly to the intermodal and bulk market to reflect their market knowledge.

These modified forecasts then formed a set of "central" forecasts by commodity from which the forecasts for the scenarios were developed.

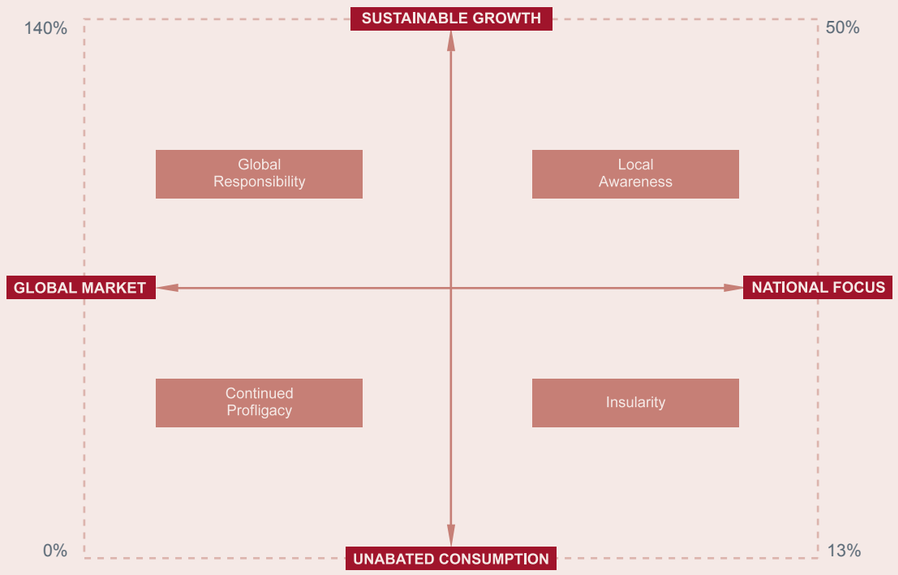
The second stage was to identify for each commodity the effect of the conditions represented by each scenario.

The key determinants were the key to which the UK trades with other countries (ie. the Global Player/Decentralisation axis) the levels of economic growth assumed and assumptions on energy surplus. This process involved looking both at the overall level of traffic, and also the pattern of traffic. The forecasts for the individual commodities are described below.

The individual flows were amalgamated to form an area to area matrix, and based on an average train weight which varies by commodity, the forecasts of tonnes lifted were converted to a forecast of numbers of trains per annum. These aggregated flows, where of a long distance nature, were allocated to the corridors considered in the RUS.

The percentage changes in commodities throughout this section relate to the forecast change in freight tonne kilometres. An overview of the forecasts taking all routes and commodities into account is illustrated in Figure 8.18.

Figure 8.18 – Forecast long distance growth in tonne kilometres, across all commodities on all corridors to 2031



8.5.1 Solid fuel (Coal)

The solid fuel market is made up almost entirely of coal movements to provide raw materials for the Electricity Supply Industry (ESI). However, non-ESI coal and bio fuels make up a small but growing proportion of the commodity lifted.

The rate of economic growth and the amount of energy consumed (therefore energy generation required) in Britain are closely linked. The sustainability scenarios will include a significant move away from coal and other fossil fuels towards cleaner methods of electricity generation. A shift to more protectionism within the national economy (ie. the Decentralisation scenarios) may lead to lower coal imports and increased domestic coal mining which would have considerable effects on the amounts of coal lifted and the distances moved. Figure 8.19 shows how the various scenarios affect coal.

Unlike other commodities, the drivers of change in the solid fuel market do not directly affect rail mode share of the commodity as virtually all coal transported on the UK mainland is moved by rail.

The Global Responsibility scenario predicts relatively high growth for the coal market as demand for generation and therefore consumption increases. Faced, however, with a policy shift away from coal, the forecast is for a 30 percent reduction in coal traffic.

Long distance coal flows decrease significantly, with a greater emphasis on imports through the Humber Ports travelling a short distance to Yorkshire and East Midlands Power Stations.

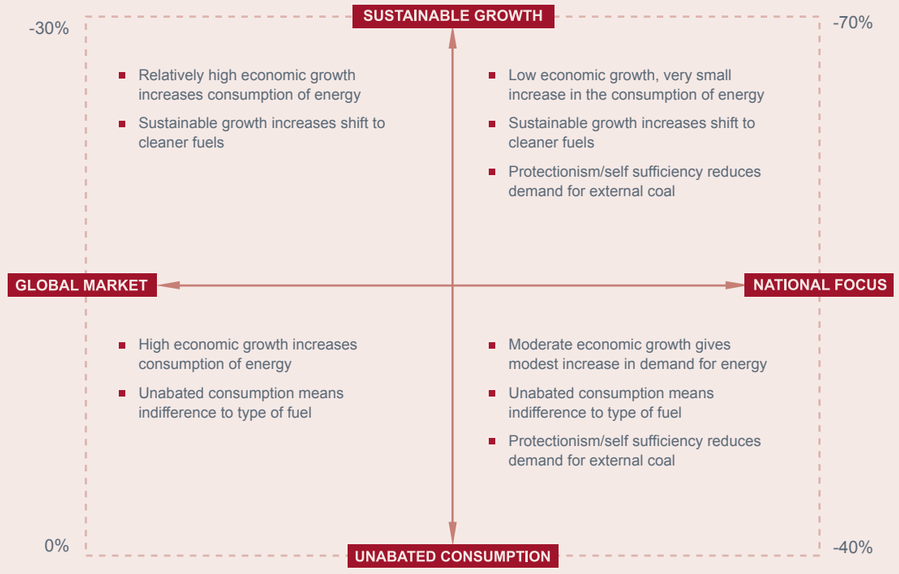
In a Local Awareness scenario protectionism and self-sufficiency reduces the demand for imported coal and the sustainable element of growth leads to a further shift to cleaner fuels. Low economic growth reduces demand further and the forecast predicts a 70 percent drop in coal traffic.

The pattern of coal flows change, with a great emphasis on domestically sourced coal, and a reduction in imported coal.

The Continued Profligacy scenario would lead to high economic growth and therefore energy consumption, however, the unabated consumption element of the scenario would lead to an indifference by generators in the type of fuel used for energy generation.

This scenario forecasts no change in the level of coal lifted in 2030/31 compared to 2006/07, and a similar pattern of coal flows with significant volumes of long distance traffic between Scottish ports and English power stations. The Insularity scenario would provide moderate economic growth and a modest increase in demand for energy. The effect of indifference in fuel type choice in energy generation is also relevant in this scenario. The protectionism element contributes to a scenario forecast of a 40 percent reduction in coal traffic. Again, an emphasis on domestic production will cause a reduction in overall imports and a cessation of long distance flows from Scotland.

Figure 8.19 – Forecast growth in coal



8.5.2 Deep sea intermodal

The Deep sea intermodal market is directly linked to the level of trade the UK has with the international market.

Consequently, the demand is considerably higher in the global player scenarios than the national focus scenarios.

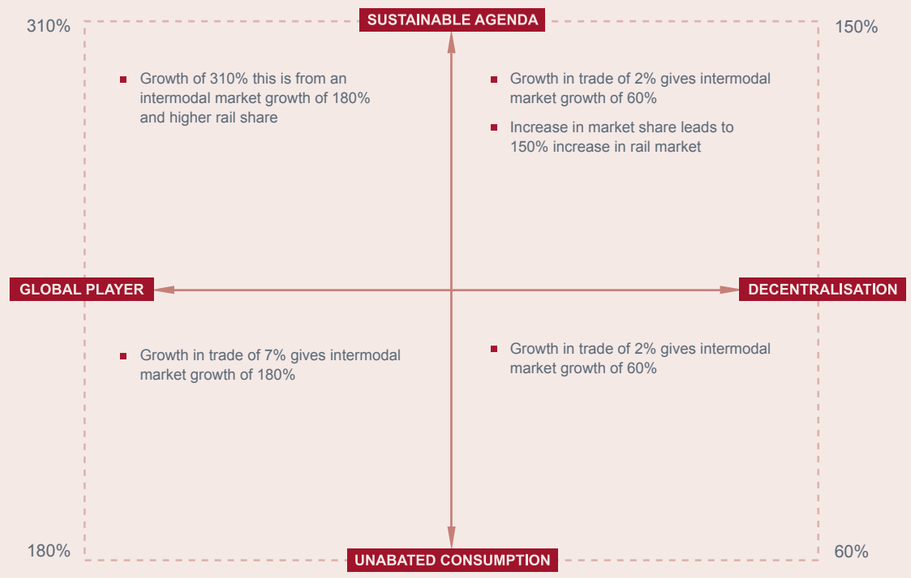
Figure 8.20 shows that this ranges from a trade growth of 2 percent increase in the Insularity scenario leading to a 60 percent growth in the intermodal market to 7 percent increase in trade leading to a 310 percent increase from the base year level by 2031.

Rail market share for international intermodal traffic shifts with changes to generalised costs for both rail and road as current existing costs are internalised. The market size for rail increases from 2007 levels by 180 percent in 2030/31.

The routes with the heaviest traffic are forecast to be those between Southampton, Haven Ports and the Channel Tunnel and between the West Midlands and the North West.

The largest levels of growth occur on the West Coast Main Line and on the Felixstowe to West Midlands route.

Figure 8.20 – Forecast of deep sea intermodal traffic



8.5.3 Domestic intermodal

Movements of containers within the mainland UK constitute the domestic intermodal rail freight market. This traffic has been growing in recent years, albeit from a very small base and Figure 8.21 illustrates this. The market, however, is still very small.

The main drivers for growth in this market are the level of economic growth and the development of domestic intermodal terminals. Government policy is to encourage the development of terminals. However, it currently does not have a policy on where these should be developed. Following advice from the DfT, the forecasts presented here provide an estimate of the market that may be attainable if a series of terminals are developed. Freight operators believe that terminal development is crucial for further growth of this market. This uncertainty over future terminal development obviously leads to a particularly high degree of uncertainty in this sector.

The level of growth in the individual scenarios is related to in the effects of the levels of self-sufficiency and/or protectionism on the domestic market.

The lowest levels of growth for domestic intermodal would be experienced in the Insularity scenario but would still reach 200 percent increase on 2006/07 figures with moderate economic growth and increased self-sufficiency.

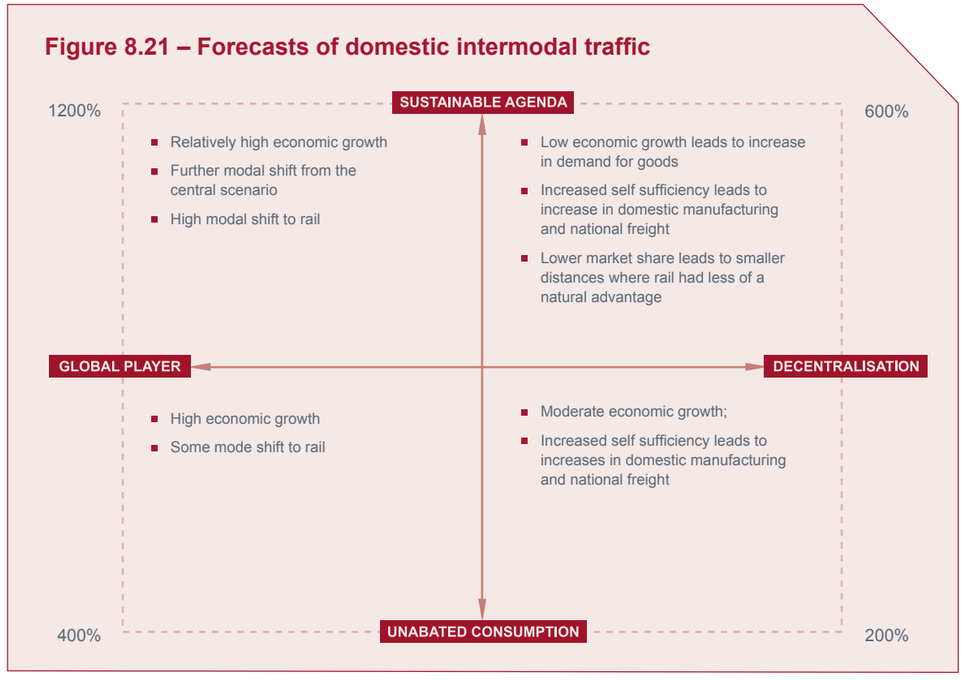
The Continued Profligacy scenario would see this growth increase to 400 percent as road congestion encourages modal shift to rail in stronger economic conditions.

The scenario under a Local Awareness society also has low economic growth and increased self-sufficiency but a lower market share too, as this leads to goods travelling shorter distances.

The highest predicted freight growth for any commodity is forecast for domestic intermodal Global Responsibility scenario. Higher economic growth than other scenarios coupled with high modal shift could lead to 1200 percent growth.

Rail market share of domestic intermodal goods will change with the internalisation of external

Figure 8.21 – Forecasts of domestic intermodal traffic



costs. In all scenarios, the routes which are forecast to experience the highest increases in domestic intermodal traffic are those which serve large centres of population, particularly the North West, West Midlands and also both east and west Scotland on the WCML and to a lesser extent the ECML.

8.5.4 Construction

The demand for construction materials is highly correlated to UK economic growth per capita. Levels of natural population growth and migration are pertinent to the amount of growth in construction.

Major building projects can also affect specific route-based demands, such as the construction of the Olympic park in east London although under all scenarios the level of market share to rail remains static as rail stays extremely competitive at moving long-distance aggregate and building materials. This is shown in Figure 8.22.

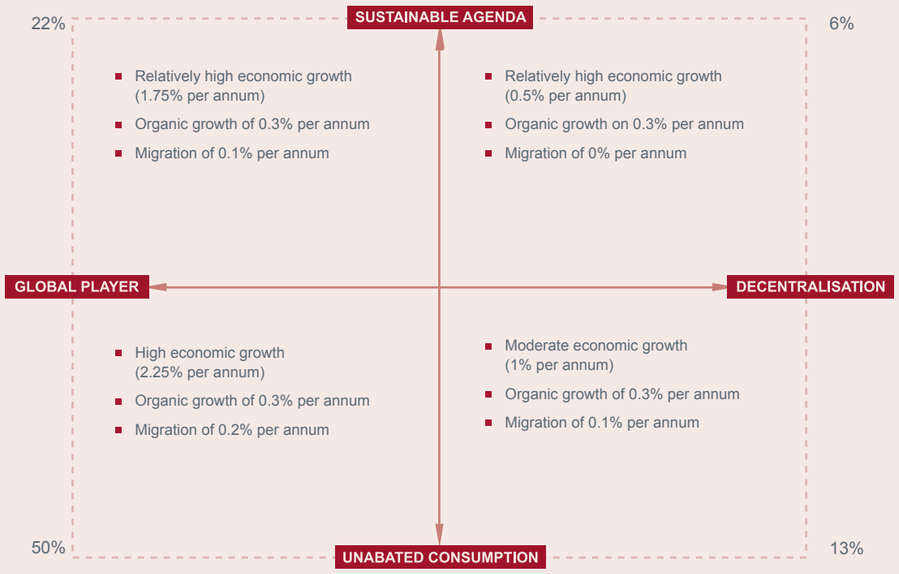
The most modest growth is experienced in the Local Awareness scenario, forecast at 6 percent. This is a result of zero migration, the standard 0.3 percent organic growth (as across all scenarios), a move towards recycling and re-using building materials and 0.5 percent economic growth per annum.

In an Insularity scenario, migration will be small at 0.1 percent but annual growth experienced at a rate of 1 percent a year.

This leads to an estimated construction growth rate of 13 percent by 2030/31. The Global Responsibility scenario has identical rates of growth as Insularity except that the economic growth is forecast at an even higher rate of 1.75 percent. Total forecast growth under this scenario is 22 percent.

The highest growth – forecast at 50 percent is in a Continued Profligacy scenario where economic growth is at its highest rate for this commodity at 2.25 percent and migration levels are 0.2 percent growth. The largest long distance flows are from the Mendips Quarries to London. There are also significant flows from East Midlands and Peak District Quarries to the South East and Yorkshire.

Figure 8.22 – Forecasts of construction traffic



8.5.5 Metals

The consumption and purchase of metals is very closely linked to the fluctuating price of world steel and this varies independently of whether the scenario is global or nationally focused, as illustrated in Figure 8.23. However, sustainability will have more effect. In the more sustainable scenarios, there would be more re-use and recycling of metals where possible. Further uncertainty is added as business comes from one major industry supplier.

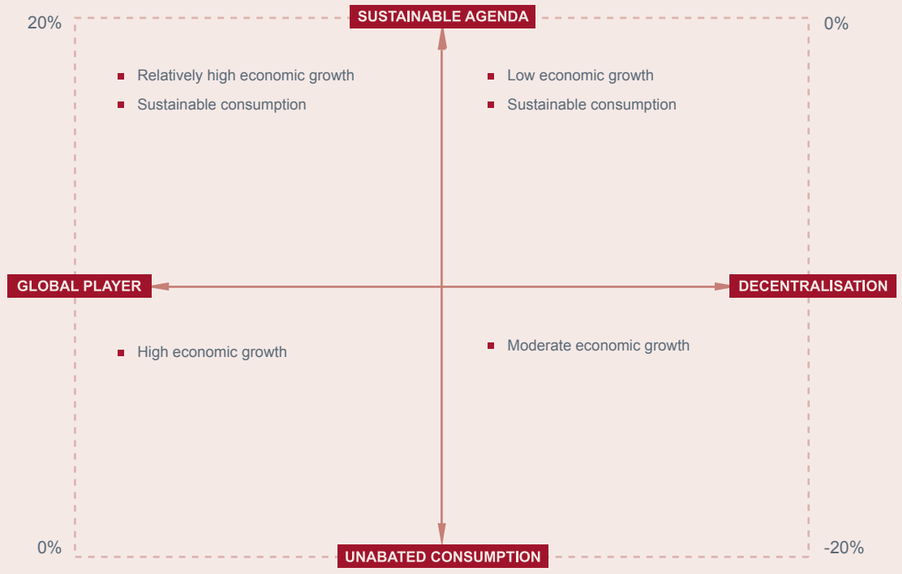
Insularity and Continued Profligacy scenarios both forecast no change in levels of metal carried and moved by 2031.

In Insularity, lower levels of economic growth see the forecast shrink by 20 percent on 2006/07 levels. Conversely, Global Responsibility predicts a rise of 20 percent over the same period to 2030/31. This is predicated on higher economic growth and also policies of sustainable consumption.

The most significant routes where forecast growth in metals affects the total number of trains is along the Great Western from South Wales, and along the East Coast from the North East. Two-way flows between these two areas are significant although growth from the Humber Ports and elsewhere in Yorkshire is also significant. Shorter flows from South Wales to the West Midlands are also significant. Moderate flows will also be carried on ECML, WCML and cross-country routes to Scotland, North Wales and Merseyside.

As identified above, the levels of growth for metals movements are identical for Local Awareness and Continued Profligacy, real growth is only forecast in a Global Responsibility scenario. Where forecast traffic is expected to drop by 20 percent in an Insularity scenario, the only routes carrying significant metals traffic would be the Great Western and East Coast Main Lines on flows between South Wales and the North East.

Figure 8.23 – Forecasts of metals traffic



Summary of changes by route

Across the network, the majority of routes would experience an increase in daily freight trains operating both ways under all scenarios, although one route – trans-Pennine – is forecast to see a reduction in freight traffic to 2031 in two of the four suggested scenarios.

The scenario where most growth is forecast is the Global Responsibility where all flows increase to 2031. Substantial increases of over 350 percent are experienced on some routes. This is due largely to the increase in container traffic on the main routes from ports at Felixstowe and Southampton and through the Channel Tunnel.

In a Local Awareness scenario the growth in freight traffic is not nearly as marked. Substantial growth is, however, again experienced on the container routes but growth is more modest, although still up to 200%. Over the 30-year period, trans-Pennine and Great Eastern routes experience a small forecast drop in estimated freight traffic by 7 and 3 percent respectively.

More significant drops in freight carried are forecast by 2031 in the Insularity scenario.

Trans-Pennine and Great Eastern routes experience forecast falls in traffic with the latter dropping by 40 percent. Birmingham – Bristol and Birmingham to the North East remain almost constant. In this scenario, as national industries and domestic productivity increase, imports would be reduced. Growth from container ports would be relatively modest compared to the internationally focused scenarios, at 30 to 90 percent.

Under the Continued Profligacy scenario growth forecast for freight traffic is strong to 2019 and 2031 on all routes with the exception of Great Eastern which stays static at a 2031 level. This, as explained above, is simply due to changes in routeing when the Felixstowe – Nuneaton route is cleared for a wider gauge.

9. Consultation process and overview

9.1 Draft for Consultation

The draft for consultation was published in March 2009. The document set out the suggested approach to long term planning using scenarios. It also published long-term freight and passenger forecasts for a selection of flows on Strategic National Corridors to 2031.

The document was published on the Network Rail website. Rail and wider transport industry stakeholders were invited to respond, as were regional and devolved government organisations, transport partnerships in Scotland and Wales and county/unitary transport authorities in England.

9.2 Consultation responses

33 responses to the consultation document were received and respondents have approved the publication of their comments on the Network Rail website. Those who responded fell into four broad categories. Formal responses were received from:

- Network RUS SMG and Working Group Members:
  - Department for Transport
  - Freightliner Group Limited
  - Office of Rail Regulation.
- national transport and rail industry stakeholders:
  - DPTAC
  - Campaign for Better Transport
  - Freight Transport Association
  - Living Streets (West Midlands)
  - Railfuture.
- local, regional and devolved government organisations:
  - Bournemouth Borough Council
  - Cambridgeshire & Peterborough Rail Group
  - County Surveyors' Society
  - Cornwall Council
  - East of England Regional Assembly
  - Hull Chamber of Commerce
  - Gloucestershire County Council
  - GMPTE
  - Milton Keynes Council
  - Northwest Development Agency
  - The Northern Way
  - Nottingham City Council
  - Plymouth City Council
  - SESTran
  - Sewta
  - Sheffield City Council
  - South East England Regional Transport Board
  - South West Regional Development Agency and South West Regional Assembly
  - Somerset County Council
  - West of England Partnership
  - West Sussex County Council
  - Wiltshire Council.
- train operating companies and owning groups:
  - CrossCountry
  - National Express Group.

A consultation response was also recieved from one member of the public.

9.3 Key themes and issues in the consultation responses

9.3.1 Scope of response

All consultation responses were well considered although some were received after the closing date. Many gave full consideration to a variety of issues raised in the document.

We have not detailed every response here, however all responses received are available to view on the Network RUS section of the website at **www.networkrail.co.uk**.

9.3.2 Key themes

The key themes raised in responses were as follows:

- strong support for the methodology used and the approach to scenario planning
- queries over assumptions made for inputs into the model are too high/low/varied and comments on particular inputs to demand variables
- observations that the forecasting addresses background growth and not interventions such as differential pricing, variation in service offer and other softer factors
- requests that additional corridors and flows should also be considered
- questions of how the outputs will be updated, and how outputs will be used to develop policy or further developed within the route RUSs.

9.3.3 Specific issues

Some consultees correctly pointed out that only background growth was being modelled and that interventions (both local and strategic) had not been taken into account. It was also noted that the level of service on offer, newer marketing practices and other interventions (such as potential electrification, service pattern improvements or new trains) had also not been considered. This has been entirely intentional. The scenario approach enables alternative background growth forecasts to be produced which can subsequently be used in conjunction with conventional forecasting tools to assess the affect of interventions. It was agreed to make this clearer in **Chapter 10** of the RUS. The benefit of scenario planning is that a variation of forecasts is provided to enable alternative futures to be considered.

A number of consultees suggested that inputs into scenarios should be based on recent evidence and trends. This particularly pertained to the levels of growth applied in the model. The nature of the scenarios-based planning approach, by definition, allowed the RUS to postulate the effects of differing levels of economic growth on passenger demand in circumstances quite different from those we have today. This is reflected in the spread of values presented for each route under each scenario. In standard forecasting GVA growth of around 2% would be used, and the scenarios approach allowed this to be varied as a sensitivity to reflect other potential outcomes, The fares regime was represented as RPI+1 percent for regulated fares and RPI+2.5 percent for unregulated fares until the end of CP4 only (it is not clear yet which formula will be used beyond 2014 and so from after this date it has been assumed that all fares will rise at the rate of inflation).

Some respondents questioned whether other flows and destinations should be included in this work. Others suggested that certain corridors were excluded or curtailed, or that the London flows were being concentrated upon, to the exclusion of some non-London flows. The corridors featured in this RUS were a selection of those taken from the DfT's DaSTS White Paper. The corridors considered are not meant to reflect railway geography as such (although in most instances they do), but general strategic flows across Great Britain.

The RUS provides forecasts for some of the most heavily used flows. The methodology can be applied to other routes and flows as well. Again, it was agreed to emphasise this in the 'next steps' chapter.

In response to consultation requests, **Chapter 8** now includes base (2007) data. This also allows for 'actual' flow data to be interpreted, in terms of real passenger numbers, as suggested in responses by stakeholders.

Various responses suggested greater clarification of how the forecasts will be used in future and what may trigger a review of the work in future. **Chapter 10** explains the way forward in greater detail.

10. Next Steps

10.1 Introduction

The RUS will become established 60 days after publication unless the ORR issues a notice of objection within this period.

The recommendations of an RUS – and the evidence of relationships and dependencies revealed in the work to meet them – form an input into strategic investment decisions made by the industry's funders.

The scenarios developed in this document will be recommended for use in future long-term planning work. To date they have been applied in the development of certain long distance forecasts only.

The next logical development will be to use the long distance forecasts in conjunction with techniques to look at specific interventions in forthcoming studies and apply the approach to the analysis of further long distance flows and to flows less than 50 miles in length.

10.2 The use of scenarios in long-term planning

One of the key outputs of this RUS is a set of industry-agreed scenarios which can be used for forward planning. The scenarios have been developed to be equally applicable for application in multi-modal planning or in rail planning. As discussed in **Chapter 6**, they have been used in this RUS to consider the total long distance market by all modes and rail's share of that market.

The scenarios provide a framework which can be applied to provide forecasts of growth in demand for long-term planning horizons. As discussed in **Chapter 7**, the scenarios are each linked to drivers of change which can then be used to derive estimates of demand, based on a considered view of what is important in each scenario.

Once this RUS has been established, the scenarios will be recommended for use as a tool in all long-term rail planning work. Applications currently envisaged are the next generation of RUSs which will take a long-term view and the DfT's emerging DaSTS work stream.

This RUS has developed a forecasting tool which can be used to forecast long distance demand in each of the scenarios.

10.3 Long distance demand forecasts

A further key output of this RUS is a set of agreed forecasts of long distance freight and passenger growth under each of the identified scenarios. The techniques developed were applied to key exemplar routes. These forecasts, supplemented where appropriate by forecasts for additional long distance flows, are recommended for use in:

- the next generation of RUSs, maintenance of established geographical RUSs and those ongoing geographical RUSs which are yet to produced demand forecasts
- the on-going development work of the Strategic Freight Network Steering Group
- assessment of the potential for new lines.

It is envisaged that the forecasts presented in this document could be used as estimates of future base demand. Each individual study would then estimate the effect of specific interventions over and above the background growth. This may involve interventions as diverse as the construction of a high speed line, gauge clearance of routes to allow the carriage of larger containers, journey time improvements, and the introduction of new trains or pricing interventions.

10.4 Short distance demand forecasts

The scenarios developed in this RUS have been used to develop forecasts for long distance flows. The next logical development will be to apply the approach to the forecasting of further long distance flows and to flows less than 50 miles in length. In particular, the nature of the scenarios – given their basis in the dichotomy between a globalised London-centric economy and a more decentralised economy – will be helpful for forecasting commuter flows.

10.5 Reviewing the strategy

Network Rail is obliged to maintain an RUS once it has been established. This requires a review using the same principles and methods used in the RUS:

- when circumstances have changed
- when so directed by the ORR
- when (for whatever reason) the circumstances may no longer be valid.

The SMG has agreed to continue to meet on a twice yearly basis. This will allow the group to monitor the use of the scenarios and, if appropriate, suggest further development.

11. Glossary

Term	Meaning
ATOC	Association of Train Operating Companies. The trade body for passenger rail operators.
CAGR	Compound annual growth rate.
CP4	Control Period 4 (rail funding period 2009-2014).
CP5	Control Period 5 (rail funding period 2014-2019).
DaSTS	Delivering a Sustainable Transport System. Published by DfT, November 2008.
DfT	Department for Transport.
ESI	Electricity Supply Industry.
FOC	Freight Operating Company.
GAD	Government Actuary Division.
GBFM	Great Britain Freight Model. Forecasting tool to used to predict future changes in freight traffic.
GVA	Gross Value Added. Measure of economic growth, taking into account subsidies and taxation. (Per capita = GVA per head of population).
HSAM	Heathrow Surface Access Model. Passenger forecasting tool designed to predict rail passenger access to Heathrow Airport.
HLOS	High Level Output Specification. Submitted by DfT and Transport Scotland to determine what governments require to be delivered for a control period.
NTS	National Travel Survey. Continuous personal travel survey carried-out by the Department for Transport.
ONS	Office for National Statistics.
ORR	Office of Rail Regulation. Independent economic and safety regulator of railways in Great Britain.
PDFH	Passenger Demand Forecasting Handbook. A set of techniques and data for modelling passenger demand, including demand elasticities based on formal research.
PSM	PLANET Strategic Model. Passenger rail forecasting tool.
RoSCos	Rolling Stock Companies.
RSSB	Rail Safety and Standards Board.
SMG	Stakeholder Management Group. Steering group for the Network RUS.
STPR	Strategic Transport Projects Review. Transport strategy documents published by Transport Scotland, 2008.
TaSTS	Towards a Sustainable Transport System. Published by DfT, October 2007.
TEMPRO	Trip End Model PROgram. DfT source for demographic data.
TEU	Twenty foot Equivalent Units. Standard measure for comparing freight container lengths.
TfL	Transport for London.
TOC	Train Operating Company.
W10	Freight loading gauge which accommodates deep-sea 9’6” high-cube containers on standard freight wagons. This is part of a series of gauges numbered W6-W12. (Further detail of freight gauges are illustrated fully on p114 of the Freight RUS).
WAG	Welsh Assembly Government.
WebTAG	Web-based Transport Appraisal Guidance. DfT’s internet guide to assist transport planning business case developers.