MDS Transmodal

Local and Global Transport and Logistics Research

Impact of track access charge increases on rail freight traffic

FINAL REPORT

by

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EXECUTIVE SUMMARY

The Office of Rail Regulation has employed MDS Transmodal to assess the impact on rail freight volumes if Track Access Charges (TAC) were to increase in the next control period (2009 to 2014)..

In 2005, rail freight accounted for some 22 billion tonne km.. It is forecast that if TAC conditions do not change, this figure will rise to 28 billion tonne km by 2014.

The majority of the freight traffic moved by rail is bulk and demand is relatively inelastic. However, there are flows of other freight which is in a highly competitive environment and an increase in charges would lead to traffic loss.

In making these forecasts, we have employed our GB Freight Model, which has been validated by the Department for Transport. This included a calibrated transport cost model which is able to reproduce base year model split. The results of our analysis are that:

- An increase in TAC of 50% across the board would lead to a 7.9% fall in rail freight tonnes and a 9.2% fall in rail freight tonne km.

- The impact would vary significantly by commodity, having little impact on ore and coal but a significant impact on container traffics and construction goods.

- The overall impact of a 50% increase in TAC is estimated to raise an extra £39m in TAC revenue but also lead to an increase in Sensitive Lorry Mile costs (a measurement used by the DfT to assess environmental impact) of approximately £31m.

Overall, therefore, an increase in TAC would lead to an increase in revenue but also to an increase in lorry miles on the road, the environmental costs of which would almost equate to the revenue raised.

It should be noted that these TAC increase scenarios are hypothetical tests and none should be taken as representative of what charges are likely to be increased by.

1. INTRODUCTION

The Office of Rail Regulation has employed MDS Transmodal to assess the impact on rail freight volumes if Track Access Charges (TAC) were to increase in the next control period (2009 to 2014). This study will inform ORR's review of freight charges which it is undertaking as part of the Periodic Review. The study is in parallel to Network Rail's own examination of the variable cost causation associated with freight traffic and the costs of maintaining freight only lines.

In order to conduct this exercise, MDS Transmodal is employing:

- the GB Freight Model (see appendices) for cases where there is direct competition between road and rail modes
- A model developed in a recent study for the Department for Transport on competition between ports for container traffic
- A model written specifically for this study to assess competition between ports for coal traffic

Detailed generic cost models have been updated for both road and rail modes, taking into account how TAC changes as a function of commodity and wagon type.

The results from these models are then aggregated to portray a comprehensive picture of how different levels of TAC increase may reduce rail freight volumes.

Outputs show:

- The overall volume of tonnes and tonne km by rail, broken down by cargo/commodity type
- The sensitive lorry mile value of goods diverted to the road network
- The additional revenue generated from higher TAC

A number of scenarios are considered based upon different levels of TAC increase, all tested against forecast flows for 2014.

Further sensitivity tests are carried out in the event of a 20% increase in TAC as follows:

- Intermodal terminal costs £5 per lift higher than the 2014 base case
- Locomotive utilisation (hours worked per year) increased by 10%
- HGV wages held constant (in real terms)

2. THE MODELS EMPLOYED

Rail freight operates in a competitive environment in competition with other modes of transport and between rail traction suppliers. It is therefore important that the modelling approach adopted reflects the ‘real world’ experience of shippers (the owners of goods and therefore the clients of the transport industry) in selecting mode and route, because it is their decisions, based on the relative prices and levels of service on offer for typical services, that will determine modal choice.

Forecasting models

The study is based on projected freight tonnages for 2009 and 2014. To arrive at these figures, we have adopted a similar approach to that adopted by the Rail Freight Group and the Freight Transport Association (RFG and FTA) in their contribution to the estimation of rail freight tonnages for the Department for Transport High Level Output Specification (HLOS). The forecasts are based on the GB Freight Model and have been incorporated in Network Rail's Freight Route Utilisation Strategy (FRUS) consultation document published in September 2006 (described as the 'top down' approach). A parallel exercise conducted by the Rail Freight Operators Association (RFOA) arrived at similar growth forecasts (the 'bottom up') approach.

The GB Freight Model seeks to explain and to then forecast road and rail freight flows by origin, destination, commodity group and, for international cargo, port and/or ferry route chosen. It is based upon a comprehensive description of road, rail and port flows using a wide range of data, including the Continuing Survey of Road Goods Traffic, Network Rail billing data and UK Maritime Statistics. Mode and route choice are based upon transport cost models and a mode choice function which is calibrated to reproduce base year flows. Forecasts are then based upon a range of assumptions (GDP growth, energy prices and so forth). The model has been independently validated by the DfT and now forms part of the National Transport Model. Further methodology details can be found on the DfT’s website:
http://www.dft.gov.uk/stellent/groups/dft_econappr/documents/page/dft_econappr_610411.pdf
The independent audit of GBFM report can also be found on the DfT’s website:
http://www.dft.gov.uk/stellent/groups/dft_econappr/documents/page/dft_econappr_610499.pdf

Output from the model is at a detailed level, including assignments to the strategic road network and growth rates by mode at a detailed origin and destination level. This permits rail freight volumes to be forecast by reference to existing train movements, which can then be adjusted up or down to reflect forecast changes for the rail mode by origin, destination and commodity. In this way, a comprehensive forecast can be built up of rail freight and train movements based upon existing route choice and tonnages carried per train. Table 1 describes the 2005 base year, 2009 and 2014 forecast year rail freight tonnes and tonne kilometres.

In the case of Power Station coal, the forecast shown is of the same tonnages forecast by the RFG/FTA in their contribution to the FRUS (taking into account the impact of different station closures). Forecast tonne-km are based on the distribution of traffic in the FRUS Base Case scenario, which assumes the east coast ports of Immingham, Hull, Redcar, Tyne and Blythe pick up the future shortfall in domestic English ESI coal production for Aire and Trent Valley power stations. This is explained in more detail in chapter 4.

Table 1: Rail freight traffic, 2005 and forecast 2009 and 2014

Commodity	**2005**		**2009**		**2014**	
	m tons	**b tn km**	**m tons**	**b tn km**	**m tons**	**b tn km**
Maritime containers *	11.1	4.03	13.6	4.90	16.7	5.99
- deep sea	*10.5*	*3.85*	*12.8*	*4.66*	*15.7*	*5.68*
- short sea	*0.7*	*0.18*	*0.8*	*0.24*	*1.0*	*0.31*
Coal	47.0	7.75	45.3	7.51	43.1	7.22
- power stations	*43.1*	*7.34*	*41.4*	*7.10*	*39.2*	*6.81*
- other	*3.9*	*0.42*	*3.9*	*0.41*	*3.9*	*0.41*
Metals	10.5	2.04	11.1	2.05	11.8	2.07
Ore	6.3	0.26	6.2	0.25	6.0	0.24
Other minerals	21.6	3.48	26.0	3.92	31.5	4.47
Auto	0.3	0.11	0.4	0.14	0.6	0.17
Petroleum & Chemicals	6.7	1.39	6.8	1.42	7.0	1.46
Waste	2.0	0.23	2.1	0.23	2.3	0.23
Domestic intermodal *	2.7	0.99	5.3	1.84	8.5	2.90
-of which Nuclear	0.1	0.02	0.1	0.03	0.1	0.03
Mail/Prem logistics	0.0	0.01	0.0	0.02	0.1	0.03
Own Haul (Network Rail)	7.8	1.48	7.8	1.47	7.7	1.46
Channel Tunnel	1.8	0.54	3.9	1.23	6.5	2.10
Grand Total	**117.9**	**22.30**	**128.5**	**24.98**	**141.8**	**28.33**

* Including tare weight of containers

Note: To give a more meaningful split between sectors, “Maritime containers” only includes those intermodal containers to/from ports. This is in contrast to the RFG/FTA forecasts of February 2006, where all Network Rail traffic of commodity “Containers” was included. The remainder (e.g. Daventry – Mossend / Coatbridge) have now been added to the domestic intermodal category.

That is, in the event of no change in TAC, we believe that overall rail freight tonne km would grow by 27% between 2005 and 2014 and total tonnes lifted by 20%. Excluding power station coal, these projected growth rates would be 44% and 37% respectively.

Particular note needs to be taken of two rail borne traffics which have changed radically over recent years and may continue to change to a degree which has important ramifications for the rail freight industry and the network.

Power Station coal traffic has grown very considerably since rail privatisation in 1994, largely because a large proportion of the UK mining industry has closed and its output replaced by imported coal. This has led to a significant increase in length of haul, adding, particularly, to the amount of coal carried on longer distance trunk routes. The need for high sulphur content domestic coal to 'find' suitable markets further exacerbated this trend.

The volume of power station coal likely to be carried by rail in the future will mainly depend upon:

- The Government's energy policy
- The power stations that invest (in flue desulphurisation equipment) to remain open
- The possibility of new stations being opened
- The choice of port
- The existing mines likely to remain open
- Macroeconomic and geopolitical factors

These issues are largely exogenous to the railway industry. The choices made are unlikely to be significantly influenced by the 'railway offer'. However, it is most important to establish a base case view if a sensible debate is to be conducted on the impact of a change in track access charges.

The Government's latest forecast on the source of energy to generate electricity (July 2006) describe 4 different scenarios, being:

1. a high fossil fuel price
2. a central fossil fuel price, favouring gas
3. a central fossil fuel price, favouring coal
4. a low fossil fuel price

These four scenarios led to the DTI forecasting that coal would be responsible for the generation of 79, 100, 116 and 126 Terra Watt Hours (TWh) per annum respectively. This very wide range of possibilities clearly leads to very considerable difficulties for forward planning for the railway industry. In order to be able to move forward, we have assumed that the mean of these four scenarios will apply: 105.25 TWh per annum.

This figure can be compared with that for coal generated electricity in 2005 (source UK Energy Statistics, DTI) of 130.00 TWh. The implication of the DTI's projection would be that coal consumption in power stations would fall by 19% between 2005 and 2015.

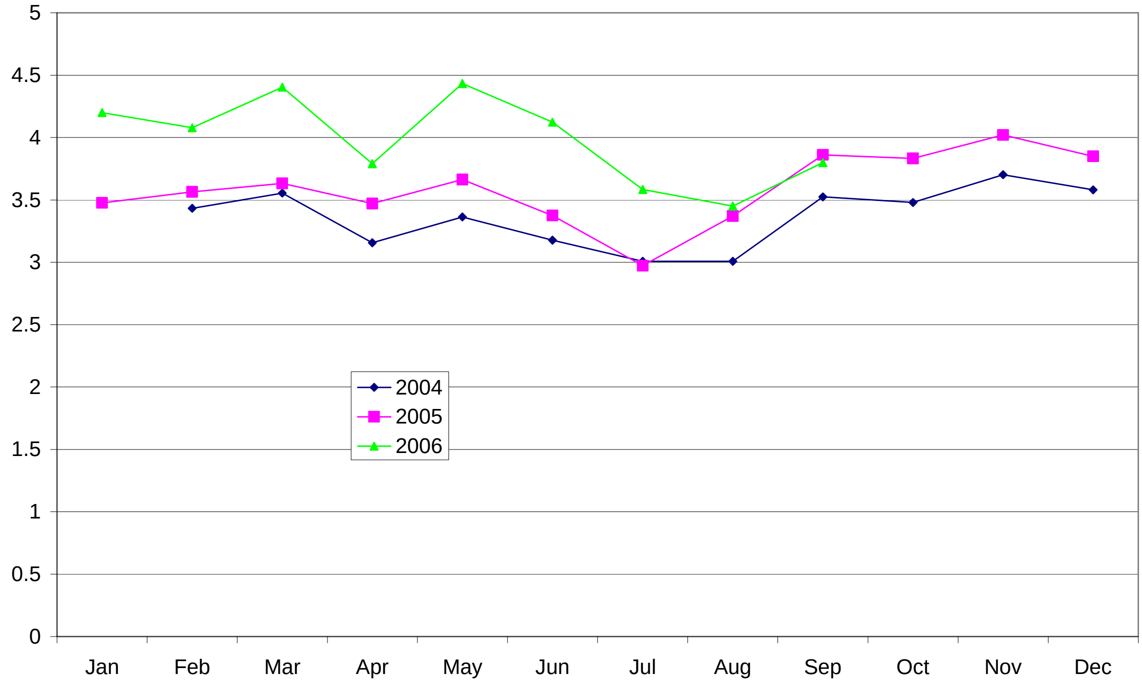
This decline will be moderated as far as rail traffic is concerned because the two power stations fed only by water (on the Thames and on the Medway) are not fitting flue gas desulphurisation equipment (FGD) (which represent 10.7% of GB coal fired power station capacity), and will therefore close. Those stations not fitting FGD equipment are limited to only 20,000 hours burn between 2008 and 2016, which effectively limits their consumption to around 40% of that they would otherwise use. We have taken this factor into account in arriving at our overall conclusions on power station coal consumption.

Overall, therefore, one can assume, as a base case, that there will be a decline of around 9% in total power station coal carried by rail by 2014/15. That would reduce the 2005 figure of 42.5m tonnes of rail freight to 38.9m tonnes in 2014. Our subsequent calculations are based upon this figure. This figure has been used in the most recent RFG forecasts and are compatible with the forecasts of port traffic made (by MDST) for the DfT (published May 2006). There is around half a million tonnes of power station coal that doesn't go direct from origin to destination and is therefore counted more than once between original origin and final destination. For completeness these are included in the total traffics but not in our analysis of coal origins and destinations.

The two principal operators and MDST have made projections as to how this tonnage of power station coal will be distributed. The introduction of additional port capacity on the east coast (Tyne, Tees, potentially Hull and Immingham) and flue gas desulphurisation equipment that allows power stations to choose more widely the source of coal they burn will tend to reduce length of coal haul. The degree to which this process takes place, reducing overall tonne km by rail, is difficult to determine. In this exercise, we have assumed for 2014 the forecast distribution of trains made in the FRUS base case (East coast ports) scenario, but reduced, pro rata the implied tonnages to 38.9m tonnes of rail borne coal to power stations.

For the first half of 2006 power station coal tonnes by rail were around 20% higher than in the same period in the previous 2 years (see figure 1). However in more recent months (August and September 2006) coal volumes have been back down around their 2005 levels. There are a number of possible causes for this recent decline but there should not be too much significance drawn from just a couple of months of data.

Figure 1: Million Net tonnes of power station coal by month and year (Feb 2004 - Sept 2006)



Deep sea container traffic growth has also played an important role in raising rail freight volumes over the last decade. Growth has been such that the existing port terminals are reaching capacity.

New terminals are planned and planning consent gained already at Felixstowe South and at Bathside Bay (Harwich). The Government has issued a 'minded to approve' letter to the promoters of the London Gateway scheme at Shellhaven on the Thames. There is potential to expand deep-water capacity considerably at the Port of Southampton. The Port of Liverpool's plans for two new 'post panamax' berths have already been tested at a public inquiry. There are also proposals to construct new terminals at Bristol, the Tees, Hunterston and Scapa Flow.

The impact of some of these schemes on the overall carriage of containers by rail could be considerable. If, for example, the extra capacity required was to be built outside of South East England then the volume of container traffic by rail would probably fall significantly as the lengths of haul within Britain fall. However, the general view within the shipping industry is that port expansion is more likely to be supported in the south-east. We have, accordingly, taken as a base case for 2014 that port capacity will be initially expanded in the Haven ports as it is there that planning consent has already been gained.

Accordingly, the generic output of GBFM for 2014 has been modified for both power station coal and deep-sea containers to take the above factors into account. Channel Tunnel railfreight is modelled on the basis of the charges described in Eurotunnel's network management statement of 2003 and that the quality and reliability of rail services onto the Continent would match that experienced in Britain. Intermodal terminal charges are assumed to decrease by £5 per lift due to increased competition. Domestic intermodal freight is expected to continue to expand supported by the development of around 2.2m m^2 of warehousing on rail linked sites, reflecting around 20% of all new large warehouses expected to be built by 2015 and thereby reducing the cost of rail based supply chains by eliminating the road delivery leg to the distribution centre (DC).

Other minerals traffics are very responsive to changes in relative costs (road versus rail). As the 2014 forecast includes an increase in HGV wages of 20%, this encourages a large shift to rail.

Apart from the power station coal distribution, these assumptions are the same as those used in the RFG/FTA forecasts done in February 2006.

Cost models

GBFM includes a number of cost models, for rail (intermodal and bulk), for road and for ferry services (in competition with Channel Tunnel rail).

The **rail cost** model employed distinguishes between:

- Time based costs for locomotive and crew and wagons
- Distance based costs for fuelling and maintaining locomotives, maintaining wagons and track access charges based on gross tonne kilometres.

The price paid by clients (which is the principal determinant of modal choice) is moderated by what are currently known as 'Company Neutral Revenue Support Grants'. These grants are justified by the amount of road traffic removed, which is, in turn, valued by 'Sensitive Lorry Miles'. The mean net value of a Sensitive Lorry Mile (SLMs) is £0.317 per kilometre according to the SRA's document 'Sensitive Lorry Miles'. SLMs are the only measure currently available from Government that allows the social or environmental value of transfers of traffic between road and rail to be compared with cash costs.

Track Access Charges

Track access charges themselves vary as a function of both wagon type and commodity. Different wagons are believed to cause different levels of track damage, as a consequence of both different suspension systems and different absolute axle loadings. The current track charging regime accounts for this and attaches different rates to different wagons, and much lower rates for empty wagons. Different rates also apply for different locomotives.

It is normally the case that the commodity 'selects' the wagon through its design characteristics. To simplify the exercise, we have examined the use of wagons (by commodity) for the whole of 2005 to determine mean charges. We have classified track access charges on the basis of the 6 cargo categories defined by Network Rail. These 6 categories were then cross referenced to GBFM's rail cost model.

We have cross-validated these track access charge costs against freight operator payments.

Table 2: Average variable track access charge (£ per 1000 gross tonne km) paid for wagons in each commodity group (2005 prices)

Automotive & Intermodal	1.34
Bulk & Neo-Bulk	1.65
Coal ESI	2.48
Iron Ore	2.21
General Conventional	1.55
Mail & Premium Logistics	1.74
Nuclear	1.64

The above costs take into account empty running. Gross weights include the tare weights of containers. Thus, for example, if we assume the mean weight of goods per container is 10 tonnes, plus 3 tonnes container tare weight, and a mean of 25 containers is carried on a train of 15 twin-megafret wagons (555 tonnes tare weight) then the mean gross weight of the train will be as follows:

	Gross train weight in tonnes
Locomotive (type 66)	126
Wagons, 15 @ 37 tonnes	555
Containers, 25 @ 3 tonnes	75
Cargo, 25 units @ 10 tonnes	250
Total gross weight	**1006 tonnes**

TAC is typically charged at a higher rate per Tkm for locomotives. A class 66 is charged at £2.62 per 1000 gross tonne km for intermodal traffic.

Wagon variable TAC: 0.880 * £1.34	£1.18
Loco variable TAC: 0.126 * £2.62	£0.33
Total variable TAC	£1.51
Variable TAC per container km	**£0.061**

Similar calculations can be made for different cargoes, normally on a per tonne km. basis.

Tables in the appendix describe our assumptions on rail costs overall for the 6 cargo categories considered. The other commodity groups follow the same cost model as the bulk & neo bulk cost model but with different track charges:

Table 3: Track Access Charges per tonne of cargo moved.

Commodity group	**Wagon variable TAC (£/kGTkm)**	**Locomotive (class 66) variable TAC (£/kGTkm)**	**Variable TAC (£/ 1000 cargo Tkm)**
Bulk & Neo Bulk	1.65	2.27	£3.33
Coal ESI	2.48	2.55	£4.84
Iron Ore	2.21	2.55	£4.37
General Conventional	1.55	2.56	£3.21
Mail & Premium Logistics	1.74	3.47	£3.72
Nuclear	1.64	1.96	£9.10
Automotive & Intermodal	1.34	2.62	4.66 *
Overall weighted mean	1.84	2.45	4.08

* This £4.66 includes the weight of the container

Model results correspond reasonably well to the overall variable TAC revenue to Network Rail.

Bulk rail costs

Similar exercises have been undertaken in the bulk sector.

The ESI coal cost model implies a rail cost of £1.33 per tonne lifted pus £0.013 per tonne km. It follows that, for example, a haul of 400 km (Hunterston to the Aire Valley power stations) would be expected to cost some £6.53 per tonne.

The bulk cost model has a higher fixed charge (£2.33 per tonne) but a lower per tonne km value of £0.012 due to lower TAC.

The cost model, using a generic approach and assuming relatively well laden trains (e.g. 18 x 102 gross tonne wagons) do produce realistic rail costs which can be realistically compared with road haulage rates.

Intermodal costs

The cost model employed is necessarily generic and based upon mean levels of productivity and train speed. Table 4 describes an illustrative haul of containers, based upon the mean distance travelled by rail in 2005 for deep sea maritime containers. The distance chosen for this illustration (368 km) is the mean distance derived from Network Rail data. It also corresponds closely to the distance between Southampton and the North West intermodal terminals at Garston, Ditton and Trafford Park. The number of containers assumed per train (28) reflects the mean from Felixstowe and Southampton in 2005, based on a '250 day' operating year.

Table 4: Illustrative rail freight cost model: 368 km haul of containers

	£
Locomotive time, 7.36 hours @ 50 kph, plus 2 hours mobilisation: 9 hours @ £146.13	1368
Wagon time, 7.36 hours @ 50 kph plus 10 hours turnaround: 12 wagons (twin platforms) @ 17 hours @ £2.40	500
Variable locomotive maintenance, 368 km @ £0.15/km	55
Locomotive fuel, 368 km @ £1.31 per km (4.4 litres @ 30p at 2005 prices Including tax, assuming $600 per tonne)	482
Track access charge Gross train weight of 1000 tonnes x 368 km @ £1.51	556
Total	**2961**
Rail cost per container (28 carried)	106
Handling cost in port (typical)	35*
Handling cost inland	31
Admin overhead	8
Total cost per container	**180**
Typical grant per container	(20)
Net price in the market	**160**
Road haulage (depending on destination)	**100-150**
Door-to-door cost	**260-310**
Net rail price per TEU (1.6 per unit) exc. port handling	**78**

* handling in port may be conducted entirely by the port or be shared (and charged for accordingly) between the port or stevedore and the train operating company.

Cross checks with rates charged by rail traction companies to shipping lines confirm these prices reflect rates charged in the market place.

Most Intermodal journeys require a local road haul to/from the inland rail terminal which adds significantly to costs – typically a minimum of around £100 and rising as the distance from the terminal is extended.

The 'deal' between the train operating company and its client can lead to charges being levied in several different ways. The client (typically the shipping line) may pay separately for handling in the port (where it is also a client). A line may contract for the whole capacity of train including handling or buy slots on a train for individual containers.

Similar calculations were conducted for a range of different commodity/cargo groups to develop a comprehensive matrix of rail freight costs.

A similar approach was adopted to estimate the costs of **road haulage**. The generic cost structure employed is shown below, and is based upon the intensive use of road haulage equipment for the trunk haul (10 shifts per traction unit per week) – see appendix.

Table 5: Illustrative road haulage cost model: 368 km haul of a container

		Cost
Speed	60 kph	
Fixed costs 368 km @ 60 kph		
= 6.13 hours @ £21.55		£132
Running Costs per km 368 km @ £0.3639		£134
Repositioning & reloading time (25 km diversion and 150 mins)		£63
Total		**£329**

Further detail on the road cost model is given in the appendix.

These cost structures have been employed together with the GB Freight Model to produce estimates of the volume of rail freight to be expected for each origin and destination pair. The model is populated with all available officially collected data on freight, including the Continuing Survey of Road Goods Transport, Network Rail data, port data from UK Maritime Statistics, and from the ferry industry. Double counting is eliminated and a 'base year' matrix of freight tonnages determined.

The model is then calibrated to reproduce base year modal choice by commodity group. Any exogenous changes between the base year and the forecast year (e.g. trade growth, fuel price changes etc.) can then be factored in and the model rerun to produce forecasts determined by such exogenous factors.

Competition with the maritime sector

Where rail is, in effect, in competition with the maritime mode a different approach was required. There are a number of such examples and include:

- The option for deep sea lines of serving northern Britain by feeder ship from Rotterdam instead of rail from a south-east English port. There is every chance that the same ocean going ship will call at both Rotterdam and a SE England port in any given voyage. If TAC was to rise, there would be a corresponding fall in volumes of containers moved by rail in favour of feeder services as lines seek to minimise their unit costs.

- The option of delivering coal to a power station, particularly those along the M62 corridor, from a number of different ports.

In each case, the price elasticity for rail freight services is likely to be greater where domestic origins and destinations are not fixed.

For example, given the large number of ports serving Great Britain and where final destinations are inland several ports may be in active price competition, which will result in a relatively elastic market place for rail freight. Variation in TAC will lead to a corresponding variation in the level of charges ports are able to make.

Where the cost of rail traction constitutes a significant proportion of the transport cost from ‘ships hold’ to delivery to ‘stockpile’ for a given port then a relatively small change in rail costs may lead to a switch in port, and, as a result a loss (or gain) in either a whole rail flow or the length of that flow. Our modelling attempts to take such issues into account.

3. FORECASTING ASSUMPTIONS TO 2014

The study took into account foreseeable changes to 2014. These changes are the same as those assumed by the Rail Freight Group and the Freight Transport Association in their forecasts to the DfT in the context of the High Level Output Specification (HLOS) and incorporated by Network Rail into its Freight Route Utilisation Strategy, with the exception of power station coal traffic (see chapter 5). They are:

- Overall growth in bulk and semi-bulk, non coal domestic cargo kms (all modes) of around 0.8% per annum to 2014/15
- Growth in domestic manufactured, consumer and food goods (cargo kms) of around 1.2% per annum to 2014/15
- Growth in international unit load cargo tonnes of around 4% per annum to 2014/15 (total TEU of containers to grow at approximately 5% per annum).
- Decline in coal volumes (to Power Stations and Industrial users) of around 9% in total to 2014/15 (see above. Industrial users are expected to maintain existing demand)
- A 19.5% growth in drivers' wages from 2005 to 2014 (equivalent to 2% per annum) but no change in fuel duty for road or rail
- £5 reduction in intermodal terminal charges due to increased competition.
- The construction of 2.2m m^2 of additional distribution buildings on rail linked sites
- A reduction of around 50% in the marginal level of Channel Tunnel through rail freight charges.
- That the amount of money distributed in grants to encourage intermodal traffic to use rail continues to run at £16.5m per annum, despite a growth in the overall volume of eligible containers, leading to a reduction in the mean value of grant offered by around 40% over 10 years.

In addition, to take into account the particular issues concerning the capacity of coal fired power stations to burn fuel and expansion in port coal terminals and container terminals, the following were assumed:

- That by 2014/15, those power stations that have not already declared that they are fitting flue gas desulphurisation equipment will be approaching closure and operating at only 40% of existing output.

- That domestic coal production will continue to fall

- That sufficient additional container terminal capacity will have been built in south-east England to ensure that the south-east ports' share of deep-sea container traffic will be retained, initially through the development of Felixstowe South and Bathside Bay terminals.

Those assumptions were used to inform both the GB Freight Model and the subsidiary models concerning transhipment containers and flows of coal to the Power Stations in 2014/15.

4. MODEL RESULTS

Our base forecast is that overall rail freight volumes will grow from 117.9m tonnes in 2005 to 141.8 tonnes in 2014. Volumes other than coal will grow from 70.9m to 98.7m, at current levels of TAC. Overall mean length of haul will increase from 189 km to 200 km. We assume that the mean cargo carried per train, and its routing, remain the same as in 2005.

Raising TAC will inevitably lead to a fall in rail freight volumes as road haulage, or transhipment via Continental ports to northern Britain, becomes more attractive. However, the impact of an increase in TAC should not be exaggerated. TAC will typically constitute around 20% of the total rail freight cost excluding onward road collection or distribution. That is, even a doubling of TAC will only add around 20% to overall rail costs. If onward road collection or distribution is included as part of the overall rail cost, doubling TAC has even less percentage increase effect on the overall rail cost. However, the transport industry is highly competitive and relatively elastic. For some commodities, the model suggests that such an increase could lead to a 30% loss of market share.

It will be evident that elasticity's vary considerably. This is largely a consequence of different levels of 'rail connectivity'. For example, few flows of aggregates are rail connected at both ends of a trip so that a road distribution leg is normally involved. Given that road is already used for part of the journey a relatively small increase in TAC may lead to a significant switch from rail to road. The opposite is the case, however, for inter steel plant movements, where the fact both ends of the journey are rail connected provides a greater commercial resilience. The following table describes the current importance of TAC.

These TAC-increase model results effectively represent an equilibrium situation: where the market has fully reacted to the TAC increases. In reality it would probably take time for some flows to shift from rail to road due to existing contracts etc.

It should be noted that these TAC increase scenarios are hypothetical tests and none should be taken as representative of the likely change in track access charges.

Table 6: The importance of Track Access Charges

Commodity	**Mean length of haul (km)**	**TAC per tonne (£)**	**TAC % of rail cost ***	**Elasticity: Tkm wrt rail cost**	**Elasticity: Tkm wrt TAC**
Maritime containers to/from ports	362	1.29	*12% (8%)*	**-2.5**	-0.32
- of which deep sea ports	*368*	*1.31*	*13% (8%)*	**-2.6**	*-0.32*
- of which short sea ports	*270*	*1.01*	*11% (6%)*	**-2.3**	*-0.24*
Coal	165	0.78			
- of which power station coal	*170*	*0.81*	*25%*	**-0.1**	*-0.02*
- of which other coal	*106*	*0.38*	*11%*	**-0.3**	*-0.03*
Metals	195	0.70	15%	**-0.7**	-0.11
Ore	41	0.19	7%	**0.0**	0.00
Other minerals	161	0.58	14%	**-4.1**	-0.55
Auto	328	1.23	15%	**-1.0**	-0.15
Petroleum & Chemicals	208	0.74	16%	**-1.2**	-0.19
Waste	112	0.40	11%	**0.0**	0.00
Domestic intermodal/wagonload	364	1.35	13% (8%)	**-1.8**	-0.23
-of which Nuclear	307	2.79	9%	**0.0**	0.00
Mail/Prem logistics	530	2.46	24%	**-1.2**	-0.28
Own haul (Network Rail)	189				0.00
Channel Tunnel	306	1.15	11% (7%)	**-1.0**	-0.12
Grand Total	**189**	**0.71**	**17%**	**-1.3**	**-0.21**

* Percentages in brackets show the TAC % if the rail cost includes the cost of one local road haul in the case of intermodal traffics. All other TAC % and elasticities do *not* include road hauls. Rail costs include handling/terminal costs.

The following tables describe the impact of different levels of increase in TAC that our modelling indicates would occur, expressed in tonnes and tonne km by rail.

Table 7: Forecast impact of TAC increase on rail tonnages, 2014

		TAC increases					
TAC increase Commodity	Tonnes (million)	+ 10%	+ 20%	+ 30%	+ 50%	+ 75%	+ 100%
Maritime containers *	16.7	-3.4%	-6.4%	-9.3%	-15.2%	-21.8%	-28.4%
- deep sea	*15.7*	*-3.4%*	*-6.5%*	*-9.4%*	*-15.4%*	*-22.1%*	*-28.7%*
- short sea	*1.0*	*-2.6%*	*-4.9%*	*-7.1%*	*-11.7%*	*-16.9%*	*-22.3%*
Coal	43.1	-0.2%	-0.4%	-0.6%	-1.1%	-1.6%	-2.1%
- power station	*39.2*	*-0.2%*	*-0.4%*	*-0.6%*	*-1.0%*	*-1.5%*	*-2.0%*
- other	*3.9*	-0.3%	-0.7%	-1.0%	-1.6%	-2.5%	-3.3%
Metals	11.8	-0.9%	-1.9%	-3.4%	-6.3%	-10.3%	-14.2%
Ore	6.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other minerals	31.5	-7.0%	-10.5%	-13.5%	-17.7%	-23.3%	-31.8%
Auto	0.6	-1.6%	-3.2%	-4.8%	-8.5%	-13.8%	-35.4%
Petroleum & Chemicals	7.0	-1.0%	-1.8%	-3.2%	-5.9%	-8.7%	-10.6%
Waste	2.3	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.4%
Domestic intermodal *	8.5	-2.4%	-5.4%	-8.5%	-13.5%	-19.6%	-25.9%
-of which Nuclear	0.1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mail/Prem. Logistics	0.1	-1.5%	-2.3%	-3.5%	-5.8%	-8.2%	-10.9%
NR own haul	7.7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Channel Tunnel	6.5	-1.0%	-2.1%	-3.2%	-5.0%	-7.2%	-9.2%
Grand Total	141.8	-2.3%	-3.9%	-5.4%	-7.9%	-11.1%	-14.9%

* Including tare weight of containers

Note the percentage response to increasing TAC in 2009 will be approximately the same as in 2014.

Table 8 compares the impact of different levels of TAC on the different commodity groups for 2014 in terms of tonne km.

Table 8: Impact of TAC increases for 2014, rail tonne km.

		TAC increases					
TAC increase Commodity	Tonne kms (billion)	+ 10%	+ 20%	+ 30%	+ 50%	+ 75%	+ 100%
Maritime containers *	5.99	-3.2%	-6.3%	-9.3%	-15.5%	-22.9%	-30.4%
- deep sea	*5.68*	*-3.2%*	*-6.3%*	*-9.5%*	*-15.7%*	*-23.2%*	*-30.7%*
- short sea	*0.31*	*-2.4%*	*-4.8%*	*-7.1%*	*-12.0%*	*-18.1%*	*-24.4%*
Coal	7.22	-0.2%	-0.4%	-0.6%	-1.0%	-1.6%	-2.1%
- power station	*6.81*	-0.2%	-0.4%	-0.6%	-1.0%	-1.5%	-2.0%
- other	*0.41*	-0.3%	-0.7%	-1.0%	-1.6%	-2.5%	-3.3%
Metals	2.07	-1.1%	-2.5%	-4.1%	-7.9%	-12.8%	-18.2%
Ore	0.24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other minerals	4.47	-5.5%	-9.3%	-12.0%	-16.6%	-22.7%	-32.7%
Auto	0.17	-1.5%	-3.0%	-4.6%	-8.5%	-13.5%	-31.7%
Petroleum & Chemicals	1.46	-1.9%	-3.8%	-5.6%	-9.9%	-14.7%	-18.4%
Waste	0.23	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%
Domestic intermodal *	2.90	-2.3%	-5.2%	-8.8%	-14.2%	-19.9%	-25.5%
-of which Nuclear	0.03	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mail/Prem. Logistics	0.03	-2.8%	-4.4%	-7.9%	-11.6%	-23.1%	-27.9%
NR own haul	1.46	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Channel Tunnel	2.10	-1.2%	-2.3%	-3.4%	-5.4%	-7.6%	-9.7%
Grand Total	28.33	-2.1%	-4.0%	-5.8%	-9.2%	-13.2%	-17.9%

* Including tare weight of containers

Note the percentage response to increasing TAC in 2009 will be approximately the same as in 2014.

In the case of **maritime containers** flows from deep sea ports are of increasing importance as an ever higher proportion of UK consumer demand is satisfied by imports. There is fierce competition between road and rail modes, particularly as overnight trunking by road is developed. An increase in TAC will add directly to costs and would logically require compensation in the form of Company Neutral Revenue Support grant where net environmental benefits exceed any cost difference between road and rail. There is, furthermore, increasing competition from North Sea feeder services. Deep Sea lines will generally schedule their deep sea vessels to call at 4 ports in N.W.Europe; typically Le Havre, a Benelux port, a North German port and a UK port. Around 75% of deep sea vessels make a UK call. However, the option is always available for a line to substitute a feeder vessel service from (usually) Rotterdam to a northern port instead of a train service from such ports as Southampton or Felixstowe to a northern inland railhead. An increase in TAC would have some impact on this relationship.

Accordingly, we have developed a model which also allows this trade off between rail and feeder services to be considered (the model was also used in the study for the DfT on transhipment traffics in 2006). The origin-destination matrices that emerge are described in the appendices.

Our overall conclusion is that an increase in TAC of 50% would lead to a 15.7% fall in total tonne km for deep-sea traffics. The routes which would be most sensitive would be to the West Midlands and to the North East. The great majority of maritime container traffic to Scotland has already switched to feeder services.

In the case of short-sea traffic, the issue of competition with feeder traffic does not arise, but lengths of haul are relatively short. We conclude that a 50% increase in TAC would reduce tonne km by 12%.

We would not anticipate the largest element of **non power station coal**, coal for Corus between Immingham and Scunthorpe, to be sensitive to an increase in TAC. We would expect some sensitivity to an increase in TAC on other industrial coal flows (e.g. to cement works) because the volumes involved are relatively modest, and scale economies less easy to exploit. We forecast, overall, a 1.6% loss of non-power-station coal traffic for a 50% increase in TAC.

Power Station coal (ESI) constitutes the largest sector of all UK rail freight business. Measured by tonne km, it has benefited considerably by the decline in UK coal production and the drive for power stations to burn low sulphur fuel. Long hauls from remote ports have developed, particularly where those ports are able to exploit economies of scale through accommodating very large ships. The mean length of haul over which power station coal now travels by rail in Britain has reached 170 km.

Several related factors may reduce total tonne km of power station coal carried by rail in the future.

Firstly, the requirement that power stations reduce sulphur emissions means that to remain open, they have to fit flue gas desulphurisation equipment to remain open after 2016. This will increase the range of coal that they can burn and allow, particularly, domestic coal to be burned in any power station rather than ‘some’ stations.

Secondly, east coast ports are expanding their ability to handle coal. This will be assisted by the increasing proportion of coal now being supplied from the Baltic and Russia, using smaller vessels for whom depth of water is less of an issue. This means that the power stations on the Trent and in the Aire Valley are more likely to import through the Humber, Tees or Tyne.

Thirdly, Government energy policy and the closure of some power stations is likely to reduce the tonnage of coal consumed in any event.

Competition between ports is also an important factor in determining the volume of coal likely to move by rail over longer distances. We have examined the gap in shipping costs to different ports from South Africa (Richards Bay) when account is taken for both maritime distance and ship size employed – see appendix 2. The implication is that a port call at Hunterston can reduce costs per tonne by £2.69 per tonne as compared with Immingham on the Humber, largely because of the ability to handle larger ships, and assuming that that benefit is not captured elsewhere within the supply chain (e.g. by the owners of the larger vessels themselves through higher charter rates).

All else being equal, on the basis of distance, one would expect rail costs to be £4.33 per tonne lower via Immingham as compared with via Hunterston (333km @ £0.013), wiping out the maritime advantage of £2.69 and leaving a margin of £1.64 for a Humber routing. The considerable increase in port capacity available through Immingham can therefore be expected to reduce Anglo – Scottish coal traffic in any event, regardless of TAC rising. An increase in TAC would add further to that cost differential, a 50% increase in TAC would raise the cost differential from £1.64 to £2.05 per tonne.

In all these circumstances, we forecast that traffic by rail to power stations will fall from 43m tonnes in 2005 to 39m tonnes in 2014. There may additionally be some rationalisation of coal flows to reduce inland rail haulage costs. At present, the power supply industry will be spending some £140m on rail haulage and can be expected to seek to reduce this cost. Whether an increase in TAC would constitute a catalyst in this process is difficult to determine, particularly as other actors in the supply chain; coal producers and ports in particular, could also vary their charges as a consequence of an increase in TAC.

Our approach has been to adopt as an initial reference point a matrix of coal trains forecast for 2014/15 as per the 2014 base case scenario in the FRUS, factored to reflect total coal moved by rail to power stations of 38.9m tonnes.

We have assumed that an increase in TAC would have a small impact on overall coal burn as it would raise coal prices relative to alternative fuel (particularly gas). A study by the DTI in 2006 arrived at the conclusion that depending on a range of fossil fuel prices, the electricity generated by coal would fall by 2020 between 3% and 39% as compared with 2005. Very approximately, for every 1% reduction in the price of gas, the DTI expected a 1% fall in the demand for coal. As a benchmark, coal prices were taken as being £33.6 per tonne at Continental ports, which would equate to around £40 per tonne delivered to UK Power Stations. On that basis, one can estimate that if TAC was to double for mean length of level of around 170 km, that would add some £0.80 to the delivered cost to a Power Station, equivalent to a 2% increase in delivered costs. We have, in consequence, built in an overall assumption that a doubling of TAC would reduce coal carried by rail by 2%, irrespective of its distribution pattern.

For some power stations, increased rail costs could encourage a modal switch away from rail to barge or road-served local pits. However we believe this would be at the margin with a maximum total impact of around 1 million tonnes; only reached if rail were to become very unattractive. Our results do not include any such modal switch.

The most substantial barge opportunity is probably between Immingham (ABP) and the Aire and Calder canal to serve Ferrybridge power station. This station was served by barge for many years through a short journey from local pits using a barge lift to tip coal into hoppers and then by conveyor. This fell into disuse when the source of coal switched to imports. It would be perfectly feasible to operate a similar tug and barge system along the estuary, although the original equipment would have to be replaced by more powerful tugs. It might also be more practical to use self discharging barges of (say) 600 tonnes capacity which could be moved in groups to Goole, another ABP port. Individual barges could then be towed along the Canal to the Power Station.

Given a dedicated loading berth at Immingham, such a system could probably handle several million tonnes per annum. A ‘push tow’ of 6 x 600 tonne barges could handle 3,600 tonnes. A pair of push tows could operate on each tide, which would equate to an annual capacity of some 4m tonnes. Within the enclosed water of the Canal, a barge load could then be delivered at hourly intervals. From the point of view of the client (the generating company), this approach would suffer from a lack of flexibility. The entire investment would depend upon traffic via Immingham remaining on a long term basis. However, we understand that ABP has, infact, signed long term contracts with a number of power generators so that may not be a problem.

A perhaps more serious problem would be that of the power stations local to Immingham, only Ferrybridge could be so readily served by barge. The current volume of coal moving from Immingham to Ferrybridge is 1.6 million tonnes per annum. This would mean that the potential volume that a barge system could offer, loading and discharging a 600 tonne barge every hour, could not be fully exploited.

There would, clearly, be a point at which an increase in TAC would tip the balance and make such a system viable. However, even a 50% increase in TAC would add only around 25p to a tonne of coal moved to Ferrybridge by rail, which is unlikely to address the very significant barriers to entry that a barge system would face.

There are many other factors beyond track access charges that will influence whether further rationalisation occurs beyond that in the 2014 base case FRUS. As these are difficult to quantify, for the figures in this report we have taken a conservative approach and assumed that increased TAC has no effect – i.e. not resulting in further rationalisation. We therefore assume that doubling TAC would also reduce rail tonne *kilometres* by 2%.

It maybe that the fitting of flue gas desulphurisation equipment, effectively required by legislation for stations to remain open after 2015, will allow the electricity generating industry to achieve transport economies by widening its choice of coal supply. However, this matter will have already have been taken into account by the rail freight train operators in arriving at their own projections. We estimate that the distribution of coal traffics projected in the FRUS base case for all coal moved by the industry (at our forecast level of coal burn in 2014) will cost the generating industry around £33m more in rail transport charges than under a totally rationalized supply network whereby power stations were sourced from nearby pits (including only those presently open) or ports. It must therefore follow that the train operators have identified important factors that do constrain the power generators from returning, effectively, to the pre-privatization position whereby almost all power station coal was delivered from local pits or ports.

Even a significant increase in TAC of 50% would only raise that figure from £33m to £39m p.a. and is therefore unlikely to tip the balance in encouraging the power generating industry to revert to a predominantly locally sourced approach. Further evidence would be required to change such a view.

The majority of **metals** traffic by rail is between industrial plant or are deliveries to rail linked depots. Such depots form a key component in the supply chain for the steel industry. Where depots play a local 'logistics' role, delivering cargo to receivers on a 'call off' basis then rail is in a relatively strong position versus road. The flow is effectively rail linked at both ends of the journey. Import flows may be more sensitive but represent only a small proportion of total traffic. Our modelling suggests that a 50% increase in TAC would lead to a loss of only 7.9% of metals tonne kms.

Iron ore traffic is now limited to just one flow; from Immingham to Scunthorpe for Corus. An increase in TAC is unlikely to have any impact on demand as the rail service is effectively integral to an industrial process. Rail is particularly well suited to such high volume traffics and therefore a shift to road is unlikely.

Other minerals traffic is dominated by the movement of aggregates. Our forecasts are that the steady increase in road haulage costs is likely to divert more traffic to rail given that (a), the industry is already used to making considerable use of rail and (b), an increase in TAC would have the effect of cancelling out the impact of higher road haulage costs and therefore lose a proportion of the cargo otherwise gained.

Existing railheads will become more cost effective against direct road deliveries as the radii over which they are competitive extend. It will therefore follow that an increase in TAC will frustrate and then reverse that trend. Our forecast is that a 50% increase in TAC would reduce construction tonnes by rail by 18% relative to our forecast for 2014.

In the case of the **automotive** trade, the majority of rail traffic is moved directly from plants and/or through ports, both of which are rail linked. However, rail's competitive advantage over road is limited; a train operating in UK conditions cannot substitute for more than around 20 HGVs (200 cars per train), and that ratio is usually less. The practice of holding imported cars in dock estates until called off by dealers for immediate delivery does not play to rail's traditional strengths. Several UK plants, particularly those near Derby (Toyota) and Sunderland (Nissan) are not rail connected. Modelling suggests that a 50% increase in TAC would reduce rail traffic by 8.5%.

Petroleum and Chemicals traffic by rail is generally between rail linked sites. While, logically, there will always be a 'tipping point' between road and rail, that point is most likely to be dictated by a periodic need for reinvestment in terminal equipment.

Almost all chemical flows by rail have an origin in one of the major petrochemical plants or are highly specific to rail such as the flow from North Walsham to Harwich. We estimate that a 50% increase in TAC will lead to a 5% fall in tonnages carried.

Rail borne petroleum traffic is between refineries and inland terminals, such as from Immingham to Kingsbury (near Birmingham) and from Grangemouth to Carlisle. While direct delivery by road will always prove a threat, the major flows are associated with deliveries to terminals which are also fed by pipeline (for lighter fuels more easily moved by pipe). Rail therefore plays a complementary role.

We estimate that a 50% increase in TAC would lead to a 6% loss of petroleum and chemicals tonnes by rail.

Waste flows are generally containerised and operating in the context of disposal to landfill sites by local authority contractors. Deliveries are to 4 landfill sites, at Dunbar (from Edinburgh), Appleford (from Brentford), Calvert (from Bath, Bristol, Cricklewood, Dagenham and Northolt) and Roxby near Sunderland (from Greater Manchester). All the schemes are based on long term contracts and involve considerable commitment on the part of the client. Refuse is consolidated at the railhead into containers. In effect, cargo is moving between rail linked sites. We do not anticipate an increase in TAC leading to a significant loss of traffic. The existing rail flows are supported by long-term investments in handling facilities which the owners would be reluctant (commercially and politically) to abandon. There could be some threat to rail freight when these facilities require replacement.

We have grouped together **non bulk domestic cargo** and **domestic intermodal** into a single group which includes intermodal flows such as the above mentioned container services for supermarkets from Daventry to Scotland as well as conventional wagon traffics such as glass bottles, paper and white goods. These rail flows are in active competition with road. The higher the costs by rail, the smaller the radius from the terminal over which rail will be competitive. Our forecast is that a 50% increase in TAC, reflecting a £1.50 increase in trunk rail costs between the Midlands and Scotland, would reduce tonnages carried by 13%.

Mail and Premium logistics traffic operates in a highly competitive market. However, TAC is proportionately low in comparison with overall warehouse to warehouse costs. For example, a cargo of 200 tonnes (say 250 pallets) carried in 10 vans might contribute around £1.50 in TAC per pallet over a 500 km journey. Competing trunk road haulage costs would be some £15 per pallet. It follows that a 50% increase in TAC would add only 5% to the rate which rail is competing against. We forecast that a 50% increase in TAC would reduce tonnages by 6%.

Transport of **nuclear materials** is almost inelastic with respect to TAC due to public relations and security requirements. Traffic is therefore unlikely to move from rail, even with a substantial increase in TAC. However in the future it is possible that nuclear decommissioning waste may be transported by rail which is likely to be more sensitive to increased TAC levels. This potential decommissioning waste traffic has not been included in our forecasts.

Network Rail's own traffic would not be affected by a change in TAC.

Channel Tunnel traffic would only be marginally affected by an increase in TAC, as the majority of the length of the rail haul takes place on the continent and Channel Tunnel tolls themselves are more significant than the track charges in any case. For example, a train carrying 30 x 20 tonne container loads of goods from Milan to Birmingham would pay ten times more in Channel Tunnel tolls than in TAC to Network Rail. A 50% increase in TAC would add only £10 to a northbound container consignment which would pay an overall freight rate of more than £1,000. We estimate that a 50% increase in TAC would lead to a 5% loss of Channel Tunnel traffic.

Overall, a 50% increase in TAC is forecast to lead to an 8% fall in tonnes of freight moved by rail in 2014.

We have assumed that Freight Operating Companies (FOCs) make no change to their operating practices. However it is possible that they may adapt to mitigate the effects of increased TAC. For example

- the optimum length of a train may become slightly longer
- operators may make more effort to get backloads rather than going straight back empty
- they may opt to purchase more rail-friendly wagons

We have tested an increase of TAC of 20% against other scenarios:

Table 9: Differences in forecast rail tonnages under other cost-change scenarios. These percent changes shown are relative to the 20% increase in TAC 2014 scenario.

Commodity	**2014 Million tonnes. TAC + 20%**	**Intermodal Terminal costs £5 above forecast base case**	**Loco utilisation + 10%**	**No HGV wage increases**
Maritime containers *	15.6	-9.8%	4.2%	-14.0%
- deep sea	*14.7*	*-9.8%*	*4.2%*	*-14.0%*
- short sea	*0.9*	*-9.8%*	*4.2%*	*-14.0%*
Coal	42.9	0.0%	0.0%	-0.1%
- power station	*39.0*			
- other	*3.9*	*0.0%*	*0.5%*	*-1.6%*
Metals	11.6	0.0%	2.5%	-16.5%
Ore	6.0	0.0%	0.0%	0.0%
Other minerals	28.2	0.0%	12.7%	-25.6%
Auto	0.6	0.0%	5.6%	-11.6%
Petroleum & Chemicals	6.8	0.0%	2.0%	-13.0%
Waste	2.3	0.0%	0.1%	-14.3%
Domestic intermodal *	8.0	-12.1%	6.4%	-9.9%
-of which Nuclear	0.1	0.0%	0.0%	0.0%
Mail/Prem. Logistics	0.1	0.0%	5.6%	-19.5%
NR own haul	7.7	0.0%	0.0%	0.0%
Channel Tunnel	6.4	-1.5%	2.1%	-1.2%
Grand Total	136.2	-1.9%	3.9%	-9.9%

* Including tare weight of containers

Table 10: Differences in forecast rail tonne kms under other cost-change scenarios. These percent changes shown are relative to the 20% increase in TAC 2014 scenario

Commodity	**2014 Billion tonne kms. TAC + 20%**	**Intermodal Terminal costs £5 above forecast base case**	**Loco utilisation + 10%**	**No HGV wage increases**
Maritime containers *	5.61	-7.3%	3.8%	-12.9%
- deep sea	*5.32*	*-7.3%*	*3.8%*	*-12.9%*
- short sea	*0.29*	*-7.3%*	*3.8%*	*-12.9%*
Coal	7.19	0.0%	0.0%	-0.1%
- power station	*6.78*			
- other	*0.41*	*0.0%*	*0.5%*	*-1.6%*
Metals	2.02	0.0%	2.8%	-8.4%
Ore	0.24	0.0%	0.0%	0.0%
Other minerals	4.05	0.0%	10.8%	-16.2%
Auto	0.17	0.0%	5.1%	-10.4%
Petroleum & Chemicals	1.40	0.0%	3.4%	-8.1%
Waste	0.23	0.0%	0.1%	-3.4%
Domestic intermodal *	2.75	-10.8%	5.8%	-7.7%
-of which Nuclear	0.02	0.0%	0.0%	0.0%
Mail/Prem. Logistics	0.03	0.0%	4.8%	-7.8%
NR own haul	1.46	0.0%	0.0%	0.0%
Channel Tunnel	2.05	-1.5%	2.3%	-1.3%
Grand Total	27.20	-2.8%	3.6%	-7.2%

* Including tare weight of containers

We conclude that :

- An increase in Intermodal terminal costs of £5 per container would so reduce ***Intermodal*** rail tonnages in 2014 by 9%

- An increase in locomotive productivity (thereby reducing rail costs to users) would raise rail tonnages in 2014 by 4%

- If real HGV wage costs do not rise with GDP growth by 2% per year as forecast then rail tonnages would fall by 10%. Rail competitively is sensitive to the cost structure of road haulage.

The choice of assumptions for the 2014 base case has little impact on the percentage response of tonnes carried to increased TAC. Table 11 shows the percentage responses to a TAC increase of 20% under our standard 2014 assumptions, along with the responses under the 3 alternative base case scenarios. Each of the columns show a broadly similar response.

Table 11: 20% increase in TAC. Impact on rail tonnes under different base assumptions

Commodity	Standard forecast	Terminal costs NOT reduced by £5	Loco utilisation up 10%	No HGV wage increase
Maritime Containers	-6.4%	-5.9%	-5.3%	-6.2%
Metals	-1.9%	-1.9%	-2.3%	-3.2%
Ore	0.0%	0.0%	0.0%	0.0%
Other Minerals	-10.5%	-10.5%	-4.9%	-7.6%
Auto	-3.2%	-3.2%	-2.6%	-4.6%
Petroleum & Chemicals	-1.8%	-1.8%	-2.4%	-1.8%
Waste	-0.1%	-0.1%	0.0%	-0.2%
Domestic intermodal / wagonload	-5.4%	-5.7%	-5.1%	-6.8%
-of which Nuclear	0.0%	0.0%	0.0%	0.0%
Mail / Prem Logistics	-2.3%	-2.3%	-1.2%	-3.4%
Own Haul (Network Rail)	0.0%	0.0%	0.0%	0.0%
Channel Tunnel	-2.1%	-2.1%	-2.0%	-2.4%

5. MODAL SHARES AND ENVIRONMENTAL IMPACTS

The impact of an increase in TAC would be to increase the volume of goods moved by road, although a proportion of the goods lost by rail would, in effect, transfer to sea (e.g. on container feeder ships).

Table 12 below describes forecast modal share in 2014 as a consequence of increases in TAC.

Table 12: Modal share under TAC increase scenarios in 2014

	2005	**2014 with TAC increase scenarios**						
		0%	**10%**	**20%**	**30%**	**50%**	**75%**	**100%**
Maritime containers	18.9%	25.5%	24.7%	23.9%	23.2%	21.8%	20.1%	18.5%
- deep sea	*25.0%*	*32.4%*	*31.3%*	*30.3%*	*29.4%*	*27.4%*	*25.3%*	*23.1%*
- short sea	*11.2%*	*14.9%*	*14.5%*	*14.2%*	*13.9%*	*13.2%*	*12.4%*	*11.6%*
Coal	70.2%	70.2%	70.2%	70.2%	70.2%	70.2%	70.1%	70.1%
Metals	25.8%	29.6%	29.4%	29.0%	28.6%	27.7%	26.5%	25.4%
Ore	18.6%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%
Other minerals	5.3%	7.7%	7.1%	6.9%	6.6%	6.3%	5.9%	5.2%
Auto	1.7%	3.8%	3.7%	3.7%	3.7%	3.5%	3.4%	3.3%
Petroleum & Chemicals	8.8%	10.1%	10.0%	9.9%	9.8%	9.5%	9.2%	9.0%
Waste	6.7%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%
Domestic intermodal	0.2%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%
Mail/Prem. Logistics	0.6%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%	1.6%
Total	7.7%	9.3%	9.1%	9.0%	8.9%	8.7%	8.4%	8.1%

The switch of some traffic from rail to road would raise the value of Sensitive Lorry Miles, the DfT's measure of the value of transferring goods from the road network. In order to assess this matter, we have used GBFM to assign HGV traffic to the road network to determine which roads are affected, and to what extent in terms of vehicle kilometres.

Table 13: Sensitive Lorry Mile (SLM) cost if all rail traffic lost due to TAC increases were transferred to the road network (2014) £ thousand.

TAC increases

Increase in TAC	0%	+10%	+20%	+30%	+50%	+75%	100%
Maritime containers	-	3,445	6,841	10,229	16,977	25,276	33,520
- deep sea	-	*3,351*	*6,655*	*9,950*	*16,509*	*24,569*	*32,566*
- short sea	-	*94*	*186*	*279*	*469*	*707*	*954*
Coal	-	34	69	103	172	257	343
- power station	-	-	-	-	-	-	-
- other	-	34	69	103	172	257	343
Metals	-	294	650	1,064	2,121	3,418	4,849
Ore	-	-	-	-	-	-	-
Other minerals	-	3,686	5,695	7,233	9,860	13,325	19,129
Auto	-	38	76	113	207	327	778
Petroleum & Chemicals	-	333	656	990	1,748	2,527	3,135
Waste	-	0	3	4	6	9	13
Domestic intermodal *	-	766	1,768	3,059	4,848	6,856	8,837
-of which Nuclear	-	-	-	-	-	-	-
Mail/Prem. Logistics	-	8	12	19	31	45	58
NR own haul	-	-	-	-	-	-	-
Channel Tunnel	-	300	600	886	1,414	1,991	2,572
Grand Total	-	8,905	16,370	23,700	37,384	54,031	73,234

This analysis shows that increasing TAC by 50% would lead to a transfer to road goods traffic with an SLM cost of £37m in 2014.

However it is not the case that all rail traffic would be directly transferred to the road network. This is particularly true for deep sea maritime containers where we are assuming there will be an increase in transhipment at continental ports for GB regional ports. This means that instead of the alternative to Felixstowe to Leeds by rail being Felixstowe to Leeds by road, the alternative might be e.g. Immingham to Leeds by road: a much shorter journey with lower SLM cost.

We estimate that in total, using alternative source locations will reduce the SLM cost on the road network by around £6 million.

Therefore increasing TAC by 50% would lead to a transfer to road goods traffic with an SLM cost of £31m in 2014.

6. TAC REVENUE

An increase in TAC will lead to an increase in TAC revenue, but not on a pro rata basis because demand elasticity will lead to a loss of some traffic.

Table 14: Growth in TAC revenue, 2014, if TAC increases

		TAC increase					
Increase in TAC	Revenue. £m	+10%	+20%	+30%	+50%	+75%	100%
Maritime containers	24.7	6.5%	12.5%	17.9%	26.8%	34.8%	39.2%
- deep sea	*23.4*	*6.5%*	*12.4%*	*17.7%*	*26.5%*	*34.4%*	*38.6%*
- short sea	*1.3*	*7.4%*	*14.3%*	*20.7%*	*32.0%*	*43.3%*	*51.1%*
Coal	34.3	9.8%	19.5%	29.2%	48.5%	72.3%	95.9%
- power station	*32.9*	9.8%	19.5%	29.2%	48.5%	72.4%	96.0%
- other	*1.4*	9.6%	19.2%	28.7%	47.5%	70.7%	93.4%
Metals	6.9	8.8%	17.0%	24.7%	38.1%	52.7%	63.6%
Ore	0.8	10.0%	20.0%	30.0%	50.0%	75.0%	100.0%
Other minerals	14.9	3.9%	8.8%	14.4%	25.1%	35.3%	34.5%
Auto	0.7	8.3%	16.3%	24.0%	37.3%	51.4%	36.5%
Petroleum & Chemicals	4.8	7.9%	15.5%	22.8%	35.1%	49.3%	63.3%
Waste	0.8	10.0%	19.9%	29.9%	49.7%	74.6%	99.3%
Domestic intermodal *	12.0	7.5%	13.8%	18.6%	28.7%	40.1%	49.0%
-of which Nuclear	0.2	10.0%	20.0%	30.0%	50.0%	75.0%	100.0%
Mail/Prem. Logistics	0.1	7.0%	14.7%	19.7%	32.6%	34.6%	44.3%
NR own haul	-						
Channel Tunnel	8.7	8.7%	17.2%	25.6%	41.8%	61.7%	80.6%
Total TAC revenue	108.7	7.7%	15.3%	22.5%	36.3%	51.9%	64.3%

Our estimate for total TAC revenue in the event that TAC increases by 50% is that an extra £39m of revenue would be raised annually (2014). This can be compared with our estimate that the environmental cost, as measured in SLMs for the same year would be around £31m.

The value of increased SLMs is therefore only slightly less than the additional TAC revenue that would be derived from a 50% increase in charges.

Whether the TAC revenue should be regarded as simply a transfer payment between users and Network Rail, or a payment for actual resources consumed will depend, of course, on whether the long run marginal cost of freight train operation by an efficient network provider is found to be les than or equal to current TAC revenue.

We have assumed no change in port charges. It may be open for some ports to cut their charges in step with increases in TAC.

7. CONCLUSIONS

The impact by Network Rail of raising track access charges (TAC) would be to reduce the overall volume of cargo moving by rail.

The impact will vary considerably by commodity, because of the alternatives available to shippers. In the case of power station coal, the impact of an increase in TAC would be negligible with respect to rail tonnages. In the case of containers, the immediate options of being able to forward containers by road or to use feeder services from Continental ports to GB regional ports lead to a fall in traffic.

An across the board 50% increase in TAC would reduce total rail tonne kms by 9.2% from 28.3 billion Tkms to 25.7 billion Tkms, compared to the current level of 22.3 billion Tkms. We also forecast that that would lead to a 36% increase in TAC payments.

APPENDIX 1

Generic rail costs assumed by cargo category
Automotive & Intermodal

Productivity			
Train Speed	Kph	50	
Cargo Speed	Kph	40	slower due to waiting in sidings etc
Maximum Trailing Length	Metres	550	
Load Factor	Percentage	83%	
Wagon Preparation Time	Hours	8	
Weight Per Wagon	Tonnes	37	
Weight Per Loco	Tonnes	126	Class 66
Gross Weight Per Unit	Tonnes	13	
HQ Overhead Costs	£/Unit	8	
Interest rate	Percentage per Annum	7%	
Maximum Wagons	Per Train	15	each wagon is a twin megafret
Average Load	FEU per Train	25	
Gross Train Weight	Tonnes	1006	
Traction			
Capital Cost	One off Cost (£)	1,600,000	Type 66 Locomotive
Depreciation	£s Per Annum	51,200	Over 25 Years (20% Residual)
Interest	£s Per Annum	112,000	7% Per Annum
Crew	£s Per Annum	120,000	3 @ £40000
Fixed Maintenance	£s Per Annum	50,000	
Insurance	£s Per Annum	48,000	Assume 3% of Capital Cost
Cost Excluding Overheads	£s Per Annum	381,200	
Overheads	£s Per Annum	57,180	Assume 15% of Cost Excl. OH
Cost per Annum	£s Per Annum	438,380	
Hours Worked	£s Per Annum	3,000	250 Days * 12 Hrs Per Day
Cost per Hour	£s Per Hr	146.13	CostPA/HrsWkd
Variable Maintenance	£s Per Km	0.150	
Fuel	£s Per Km	1.310	Taken from the REPS cost models
Cost per Train per Km	£s Per Km	1.460	
Loco track charge	Per 1000 Gross T.Kms	2.617	class 66
Wagons			
Capital Cost	One off Cost (£)	70,000	Megafret Wagon twin
Depreciation	£s Per Annum	3,150	Over 20 Years (10% Residual)
Interest	£s Per Annum	4,900	7% Per Annum
Maintenance	£s Per Annum	3,200	4 Bogies*0.5p*160000km
Annual Cost	£s Per Annum	11,250	
Days used Per Annum	£s Per Annum	300	Assume 300: 6 Days*50 Weeks
Cost Per Wagon Day	£s Per Day	37.50	
Cost Per Unit Day	£s Per Day	22.50	Units Per Wagons Using Load Factor
Cost Per Unit Hr	£s Per Unit Per Hr	0.938	

Wagon track charge	Per 1000 Gross T.Kms	1.340	Average based on wagons used
Track			
Track Charge (variable)	Per 1000 Gross T.Kms	1.51	13% loco. 87% wagon
Track Capacity charge	Per 1000 Gross T.Kms	0.08	fix at 5% of 2005 figure
Maximum Trailing Weight	Tonnes	1,006	
GB Track Charge	Per Train Km	1.5908	
Track Charge	Per Unit Train Km	0.0636	
Terminals			
Sidings	One Off	962,500	3850 metres @ £250
Turnouts	One Off	600,000	12 @ £50000
Paving	One Off	2,400,000	60000 sqm @ £40
Fencing & Security	One Off	500,000	Assume £500000
Connection (Signalling)	One Off	1,000,000	Assume £1000000
Land Costs	One Off	3,500,000	7 hA @ £500000
Total Construction Cost	One Off	8,962,500	
Depreciation	£s Per Annum	218,500	On Total Const Cost (Excl land)/25 Yrs
Interest	£s Per Annum	717,000	At 8% on Total Const Cost
Maintenance	£s Per Annum	100,000	Assume £100000
Labour	£s Per Annum	400,000	8 people * 2.5 shifts @ £20000
Reachstackers	£s Per Annum	280,000	4@£70,0000
Overheads	£s Per Annum	150,000	Assume £150000
Total Cost	£s Per Annum	1,865,500	
Productivity	£s Per Annum	60,000	4 Trains/Day * FEU *2*300
Full Cost Per Lift	£s Per Lift	31.09	
Marginal Cost Rate	£s Per Lift	18.49	Less Depr&Int on all except Cranes
Rate to Carry Forward	£s Per Lift	31.09	
Intermodal Cost Summary			
Traction - Variable	£ Per Unit Km	0.1753	
Traction - Fixed	2 Hrs Per Unit	11.69	
Wagons	£ Per Unit Per Hour	0.9375	
Track	£ Per Unit Km	0.0636	
Terminals (2 lifts)	£ Per Unit	62.18	
HQ Overheads	£ Per Unit	8.00	
Cargo Speed	Kph	40.00	
Wagon Preparation Time	Hrs	8.00	
Channel Tunnel Toll	£ Per Unit	130.00	

Bulk & Neo-Bulk and Coal ESI

Productivity			
Train Speed	Kph	50	
Cargo Speed	Kph	35	slower due to waiting in sidings etc
Maximum Trailing Length	Metres	550	Linked to IM
Load Factor	Percentage	50%	Out Full, Back Empty
Wagon Preparation Time	Hrs	8	
Weight Per Wagon	Tonnes	28	
Maximum Wagons	Wagons	18	
Weight Per Loco	Tonnes	126	Linked to IM
Interest Rate	% Per Annum	7%	Linked to IM
Tonnes of Cargo/Wagon (average for out and back)	Tonnes	37	74 Tonnes * Load Factor
Average Cargo Load (average for out and back)	Tonnes	666	Loaded Cargo Weight * Load Factor
Gross Train Weight (average for out and back)	Tonnes	1296	Engine Plus Wagons+Cargo
Traction			
Capital Cost	One off Cost	1,600,000	Type 66 Locomotive
Depreciation	Per Annum	51,200	Over 25 Years (20% Residual)
Interest	Per Annum	112,000	7% Per Annum
Crew	Per Annum	120,000	3 @ £40000
Fixed Maintenance	Per Annum	50,000	
Insurance	Per Annum	48,000	Assume 3% of Capital Cost
Cost Excluding Overheads	Per Annum	381,200	
Overheads	Per Annum	57,180	Assume 15% of Cost Excl. OH
Cost Per Annum	Per Annum	438,380	
Hours Worked	Per Annum	3,000	250 Days * 12 Hrs Per Day
Cost per Hour	Per Hr	146.13	CostPA/HrsWrkd
Fixed Cost Per Km	Per Km	2.92	At Constant Train Speed
Variable Maintenance	Per Km	0.15	
Fuel	Per Km	1.70	
Cost per Km	Per Km	1.85	
Total Cost Per Train Km	Per Km	4.77	
Loco track charge Bulk & Neo Bulk	Per 1000 Gross T.Kms	2.27	class 66
Loco track charge Coal ESI	Per 1000 Gross T.Kms	2.55	class 66
Wagons			
Capital Cost	One off Cost	70,000	Bulk Wagon
Depreciation	Per Annum	3,150	Over 20 Years (10% Residual)
Interest	Per Annum	4,900	7% Per Annum
Maintenance	Per Annum	1,600	2 Bogies*0.5p*160000km
Annual Cost	Per Annum	9,650	
Days used Per Annum	Per Annum	300	Assume 300: 6 Days*50 Weeks
Cost Per Wagon Day	Per Day	32.17	Annual Cost/DaysPA

Cost Per Tonne Per Hour	£s Per Tonne Per Hr	0.04	
Wagon track charge Bulk & Neo Bulk	Per 1000 Gross T.Kms	1.65	Average based on wagons used
Wagon track charge Coal ESI	Per 1000 Gross T.Kms	2.48	Average based on wagons used
Track			
Track Charge Bulk & Neo Bulk	Per KGTKm	1.71	10% loco. 90% wagon
Track Charge Coal ESI	Per KGTKm	2.49	10% loco. 90% wagon
Track Capacity charge Bulk & Neo Bulk	Per KGTKm	0.09	fix at 5% of 2005 figure
Track Capacity charge Coal ESI	Per KGTKm	0.12	fix at 5% of 2005 figure
Track Charge Bulk & Neo Bulk	Per Cargo Tonne Km	0.0035	
Track Charge Coal ESI	Per Cargo Tonne Km	0.0051	
Terminals			
Market Rate/Tonne	£s Per Tonne	0.75	Just one lift. Needs to be doubled fo
Bulk Rail Cost Summary			
Traction - Variable	£ Per Cargo T.Km	0.0072	
Traction - Fixed	2 Hrs Per Tonne	0.44	
Wagons	£/Cargo Tonne Per Hr	0.0362	
Wagon prep time	hours	8.00	
Track (Bulk & Neo Bulk)	£/Cargo Tonne Km	0.0035	
Track (Coal ESI)	£/Cargo Tonne Km	0.0051	
Terminals (Bulk & Neo Bulk)	£/Cargo Tonne	0.75	
Terminals (Coal ESI)	£/Cargo Tonne	0.25	Coal's merry-go-round cheaper than bulk
Cargo Speed	Kph	35.00	

Generic road haulage costs assumed

6x2 Tractor Unit and 3 Axle Semi Trailer

44 tonnes gross vehicle weight

Basic Assumptions			**Comment**
Capital Cost - Tractor Unit	£65,000		Source: Motor Transport Cost Tables/RHA cos
Capital Cost - Trailer	£22,000		Source: Motor Transport Cost Tables/RHA cos
Depreciation Tractor	6	yrs	
Depreciation Trailer	10	yrs	
Residual Cost Tractor	£16,250		25% of new price
Residual Cost Trailer	£1,000		Scrap Value
Average Speed	60	km/h	
Annual distance	241,920	km	
Fuel Cost	£0.74	£ per litre	
Fuel Rate	2.55	km/l	Source: Motor Transport Cost Tables/RHA cos
Maintenance Interval Basic	6 weeks	or 15,000km	
Number of Inspections Basic pa	8		Fixed Cost

No Additional Inspections - extra km	8		Running Cost
Maintenance Cost per Inspection - Tractor	£750		Source: Motor Transport Cost Tables/RHA cos
Maintenance Cost per Inspection - Trailer	£280		Source: Motor Transport Cost Tables/RHA cos
Number Tyres - Tractor	8		
Cost per Tyre - Tractor	£260		Source: Motor Transport Cost Tables/RHA cos
Tyre Life - Tractor	115,000	km	Source: Motor Transport Cost Tables/RHA cos
Number Tyres - Trailer	6		
Cost per Tyre - Trailer	£260		Source: Motor Transport Cost Tables/RHA cos
Tyre Life - Trailer	115,000	km	Source: Motor Transport Cost Tables/RHA cos
Number Drivers per Vehicle per day	2		
Shift Length per Driver	11	hours	
Driving Time per Driver per shift	8	hours	
Days per week working	5	days	
Vehicle Operating Time per Day	22		
Weeks pa working	50.4	weeks	52 Weeks - 8 days statutory holidays
Weeks per year	52	weeks	
Basic Wage per hour - 8 hours per shift	£7.55		Source: RHA/IDS Pay Survey
Overtime - after 8 hours	£11.33		Basic + half
Drivers Annual Wage - 8hrs basic+3hrs OT	£24,538		
Employer NIC Rate	12.8%		Inland Revenue: 12.8% of wage above £5,044
Interest Rate pa	8.00%		
Rate of Return on Assets	20.00%		20% of mid life value of asset

Operating Costs

Fixed Costs	*Tractor*	*Trailer*	Comments
Interest Charges	£5,200	£1,760	
Depreciation	£8,125	£2,100	Straight line
Maintenance Basic (Fixed)	£6,000	£2,240	
Insurance	£8,600	£0	Source: Motor Transport Cost Tables, 3rd Par
Vehicle Excise Duty	£1,200	£0	Source: DVLA, Band E
Drivers Wage	£49,075	£0	
Employer NIC	£4,990	£0	
Driver Costs	£500	£0	Uniform, gloves, hard hats etc…
Cabphone	£840	£0	£70 per month
Wash	£520	£0	£10 per wash one wash per week
Overheads and Office Costs	£18,000	£0	Source: Motor Transport Cost Tables/RHA cos
Return on Assets	£8,125	£2,201	
Total Fixed Costs	**£111,175**	**£8,301**	

Running Costs			
Fuel per km	£0.2902	£0.0000	
Oil per km	£0.0080	£0.0000	Source: Motor Transport Cost Tables/RHA cos
Tyres per km	£0.0181	£0.0136	
Maintenance Additional (Running) per km	£0.0248	£0.0093	
Distance Based Road Charging	£0.0000	£0.0000	

Total Running Costs per km	**£0.34**	**£0.02**	
Fixed Cost per Operating Hour	**£21.5505**		11 hours/shift*Shifts/day* 5 days/week*50.4 we
Total Running Costs per km	**£0.3639**		

For repositioning to find a return load

25 kms and 150 mins are assumed for port traffic

50 kms and 240 mins are assumed for domestic traffic

APPENDIX 2: Estimated differences in shipping costs of coal from Richards Bay, South Africa

Port	Relative cost per tonne*
Rotterdam (base cost)	£0.00
Port Talbot	-£0.26
Hunterston	-£0.01
Tees	£0.16
Bristol	£1.19
Immingham	£2.67
Liverpool	£3.65

* based on potential ship size and maritime distance

APPENDIX 3: Deep sea port maritime container distribution by TAC increase

2005. Tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	52	50	1	1	103
E. Mids	96	1	-	0	97
N. West	1,611	1,360	289	321	3,581
North	386	60	-	-	446
S. East	171	235	106	94	606
S. West	-	-	-	-	-
Scotland	223	246	46	254	769
W. Mids	1,245	718	233	224	2,420
Wales	128	138	2	3	271
Yorks&H	919	831	178	257	2,186
Grand Total	4,830	3,639	856	1,154	10,479

2014 Base case. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	58	63	1	1	123
E. Mids	192	1	-	0	193
N. West	2,825	1,624	342	423	5,214
North	709	71	-	-	780
S. East	771	335	158	122	1,386
S. West	-	-	-	-	-
Scotland	401	325	54	305	1,085
W. Mids	1,822	970	297	269	3,359
Wales	240	185	3	4	432
Yorks&H	1,672	930	214	309	3,124
Grand Total	8,691	4,504	1,068	1,433	15,696

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 10%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	46	62	1	1	110
E. Mids	187	1	-	0	187
N. West	2,785	1,600	338	417	5,139
North	702	71	-	-	773
S. East	722	266	125	97	1,210
S. West	-	-	-	-	-
Scotland	361	292	48	275	977
W. Mids	1,784	940	291	261	3,277
Wales	237	181	3	4	425
Yorks&H	1,635	911	210	302	3,058
Grand Total	8,460	4,324	1,016	1,356	15,156

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 20%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	40	61	1	1	102
E. Mids	181	1	-	0	182
N. West	2,746	1,576	333	410	5,065
North	694	70	-	-	764
S. East	674	231	109	84	1,098
S. West	-	-	-	-	-
Scotland	321	260	43	244	868
W. Mids	1,747	911	286	253	3,196
Wales	234	177	3	4	417
Yorks&H	1,598	893	206	295	2,991
Grand Total	8,235	4,178	980	1,291	14,684

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 30%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	34	59	1	1	95
E. Mids	176	1	-	0	177
N. West	2,706	1,552	329	403	4,991
North	686	70	-	-	755
S. East	626	197	92	71	986
S. West	-	-	-	-	-
Scotland	281	227	38	214	760
W. Mids	1,709	881	280	246	3,116
Wales	231	172	3	4	410
Yorks&H	1,561	874	202	288	2,925
Grand Total	8,010	4,033	944	1,226	14,214

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 50%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	22	56	1	1	80
E. Mids	166	1	-	0	166
N. West	2,628	1,505	320	390	4,843
North	669	69	-	-	738
S. East	530	129	61	47	767
S. West	-	-	-	-	-
Scotland	201	162	27	153	543
W. Mids	1,634	823	269	230	2,956
Wales	225	164	3	4	395
Yorks&H	1,489	838	193	275	2,795
Grand Total	7,564	3,746	873	1,098	13,282

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 75%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	16	53	0	0	70
E. Mids	152	1	-	0	153
N. West	2,531	1,446	310	374	4,660
North	648	67	-	-	716
S. East	413	95	45	34	587
S. West	-	-	-	-	-
Scotland	100	81	13	76	271
W. Mids	1,542	751	255	211	2,759
Wales	218	153	3	3	376
Yorks&H	1,401	793	183	258	2,635
Grand Total	7,022	3,440	809	957	12,227

Note: Bathside Bay is included in the Felixstowe figures

2014 Base case with TAC up 100%. Thousand tonnes (including weight of container)

	Deep sea port				
NUTS region	Felixstowe	Southampton	Thamesport	Tilbury	Grand Total
E. Anglia	11	49	0	0	61
E. Mids	140	1	-	0	140
N. West	2,435	1,388	299	358	4,479
North	628	66	-	-	694
S. East	297	62	29	22	411
S. West	-	-	-	-	-
Scotland	-	-	-	-	-
W. Mids	1,451	680	241	191	2,564
Wales	210	142	2	3	358
Yorks&H	1,314	749	173	242	2,479
Grand Total	6,485	3,137	745	817	11,185

Note: Bathside Bay is included in the Felixstowe figures