



Assessing mark-ups for rail freight market segments - Demand elasticity analysis.

For Network Rail

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1. INTRODUCTION

Great British Railways (GBR) will be responsible for the development, calibration, and setting of the industry's new access charges framework. As a result, the Office of Rail and Road (ORR) will no longer be responsible for discharging this role. Network Rail (NR) therefore wish to identify and define freight **market segments** that will reflect the traffic operating on the network between 2029 and 2034, and assess which of these freight market segments are likely to have sufficient ability to pay a track access charge (TAC) mark-up, using demand elasticity analysis.

There are various ways of grouping traffic into freight market segments, including commodity sector, journey distance, traffic volumes and terminal type.

In this report we discuss various options for such segment definitions and arrive at a suggested categorisation. For each of those segments, we have investigated the impact of increasing TAC on traffic volume to give some indication of the ability to pay a mark-up. Each segment is then classified as:

- A - Strong candidate for mark-ups (low elasticity)
- B - Marginal candidate for mark-ups (mixed or sensitive results)
- C - Not a suitable candidate for mark-ups (high elasticity).

Ideally most of the traffic movements within any one segment would have similar responses to increases in TAC, such that conclusions based on the average impact would represent most traffic in the segment.

It is important to have a good understanding of the costs involved in using rail and competitor modes (principally road) to be able to estimate how likely it would be for traffic to switch away from an efficiently operated rail service if the prices were increased.

- Section 2 describes the Reference case traffics.
- Section 3 gives Network Rail's new commodity sector groups.
- Section 4 shows the structure and results of our cost models, along with a discussion on the impact of whether an operator is efficient.
- Section 5 explains how we have investigated the impact of TAC increases.
- Section 6 describes various market segmentation options, and our estimates of the variation of impact within those segments.
- Section 7 takes the results from the segmentation options and brings them together into a suggested definition of the segmentation.
- Section 8 shows how rail costs do impact significantly on rail volumes, but that once a choice of reference case costs has been made, the % impacts of increased TAC are similar.
- Section 9 discusses how additional track charges have been phased in, in the past.

- Section 10 compares these outputs to previous work.
- Appendix 1 defines the new commodity sector market segments.

An accompanying spreadsheet is provided showing all origin, destination by commodity rail freight traffics and our estimate of the impact of TAC increases.

2. REFERENCE CASE TRAFFIC

The objective is for us to conduct this investigation into the impact of TAC increases, on traffic representing the **whole Funding Period (FP1)** (beginning of April 2029 to end of March 2034).

We have recently produced rail freight forecasts for Network Rail with a base year of 2025 (calendar year) and a forecast year of 2033/34 (the final year of FP1). Details of how the base year traffics were established and the forecasts were made for the 2033/34 Central case (scenario E; that we have used here) are provided in the report for Network Rail[1].

The two sets of forecast results presented in that forecasting report are

- *after* re-routing has been applied,
- and then after capacity constraint has been applied.

However the results used here are those ***prior*** to any re-routing, and NOT subject to capacity constraint. The 2033/34 re-routing has little, but not zero impact on tonne kms, therefore the results used here are very slightly different from those in the forecasting report. See the discussion in section 5.3.1. on capacity.

This work is intended to be representative of the whole of FP1, so we have straight-line interpolated between 2025 and 2033/34 to the middle year of the FP1 period: 2031/32. I.e. taking:

- 6.25 / 8.25 of the 2033/34 forecast
- plus 2.0 / 8.25 of the 2025 traffic

Section 4 (Cost models) describes this further, and explains how VUC increases are dealt with.

The base year and forecast traffics are in cargo tonne kms and gross tonne kms by:

- Origin terminal
- Destination terminal
- Commodity sector

The accompanying spreadsheet shows these traffics.

[1] "Rail Freight Forecasts for Funding Periods 1 and 2", MDS Transmodal. October 2026. Reference: 225074r.docx

3. DEFINITION OF THE COMMODITY SECTOR GROUPS

Network Rail are planning to re-define the commodity sector groupings. These new commodity sectors (market segments) are similar to the current groups, but they aggregate some commodities, disaggregate some and introduce new commodity sectors.

Figure 1: Network Rail's emerging view on market segments

Biomass	Domestic Waste	Light Locomotives
Carbon Capture, Usage & Storage	European Automotive	Mail and Premium Logistics
Chemicals	European Other	Maritime Intermodal
Coal	European Intermodal	Nuclear & MOD
Construction Materials	Hydrogen	Passenger Stock Moves
Domestic Automotive	Industrial Minerals	Petroleum
Domestic Intermodal	Iron Ore	Steel
	Wagon Maintenance	

Green boxes represent new commodity types (i.e., not currently listed by NR today) and orange boxes represent slight amendments to existing commodities. Those with no coloured boxes are the same as previous definitions.

"Carbon Capture, Usage and Storage" (the movement of CO_2 from emitter to user or storage site), and "Hydrogen" are potential new markets for rail freight as those industries develop. Separately categorising them allows targeted TAC rates to be applied.

Coal ESI is no longer carried by rail, so there is little merit in maintaining the previous distinction between "Coal ESI" and "Coal Other", so "Coal" can now encompass any coal movement.

"European Other" replaces "European Conventional" to ensure that all European movements that are not Intermodal or Automotive are unambiguously categorised.

"Domestic Intermodal" previously referred to any intermodal traffic that was not through the Channel Tunnel. This could be confusing because imported intermodal containers travelling by rail from the ports to inland terminals would not normally be thought of as domestic, even though the train services that they were travelling on were within Great Britain. Splitting this category into "Maritime

Intermodal" (where at least one end of the journey is a port) and defining the rest as "Domestic Intermodal" is clearer. They typically have distinct characteristics, which could be helpful in choosing appropriate TAC rates: Containers from or to the ports are often not in a hurry because the inland GB journey is just a small part of an overall journey that could take several weeks, whereas domestic intermodal services are often carrying Fast Moving Consumer Goods (FMCGs) that are in a hurry to get to a supermarket. One downside of this category splitting is that when referring to old statistics, it may not always be clear which definition of "Domestic Intermodal" is relevant. Perhaps using a new name would avoid this ambiguity, such as "Non-port Intermodal".

"Nuclear" and "MOD" traffics were previously both classified as "Other". Nuclear traffics already have a large Freight Specific Charge (FSC) applied, so it makes sense for them to be separately classified when choosing TAC levels. MOD traffics would have different characteristics and do not have an FSC applied, so it may be preferable to separate MOD from Nuclear as a new separate category.

Movements of "Wagon Maintenance", "Passenger Stock" and "Light Locomotives" (locomotives not hauling any wagons) were previously not separated out, but they are now proposed as separate categories. The reasons for such movements are very different from regular cargo movements, so it is reasonable for them all to be considered separately.

Another likely new traffic in the coming years is scrap metal to Port Talbot's electric arc furnace. This is likely to be a significant traffic for rail and will have different characteristics to other Steel movements. We therefore believe it reasonable to separate out "Scrap metal" from other Steel.

There is only a very small quantity of cargo categorised as "Chemicals". In 2025 it was associated with oil refineries. We therefore suggest that cargo currently classed as "Chemicals" could be absorbed into "Petroleum".

We agree that with the addition of the new commodity groups; all rail freight that is likely to be operating in FP1 is represented.

We suggest that further consideration of our proposed changes described above would be worthwhile:

- Splitting Nuclear & MOD
- Splitting Scrap metal from Steel
- Aggregating Chemicals with Petroleum

For new and modified commodity sectors, assumptions have been made as to how to categorise these sectors based on existing movements. These assumptions are presented in the Appendix.

4. COST MODELS

We have modified our existing road and rail cost models to represent each commodity sector. The approach is to consider each component of cost involved in providing a freight service, add them up, and split that cost between the tonnes carried. For each commodity sector, this is made up of several cost components including:

- TAC
- Loco and wagon capital cost, and the equivalent for HGVs
- Depreciation
- Interest rates
- Crew/driver wages, NIC and pension contributions
- Insurance
- Overheads
- Fuel
- Maintenance

Assumptions are made regarding:

- Tonnes per wagon or HGV
- Wagons per train
- Average speed
- Dwell times in terminals for locos and wagons, along with similar assumptions for road: unloading time, loading time and repositioning for the next journey
- Terminal charges (e.g. for lifting a container to/from a train)
- Port and SRFI shunt charges (transporting a container between port stack or on-site warehouse and rail terminal)
- For rail journeys, road costs for carrying the cargo from its origin to the origin rail terminal (and from the destination rail terminal to the cargo's final destination) are included where relevant.

The result is a cost model formula per tonne carried for the rail component of a journey:

$$Cost = F + V \times D$$

Where:

- F = Fixed cost irrespective of distance; representing the typical dwell time taken in terminals for wagons and locomotives, and terminal lift charges.
- V = Cost per kilometre
- D = one-way journey distance (km)

An equivalent cost formula is calculated for road too. There are various different classes of road vehicle from 2-axle rigids to 6-axle 44-tonne gross-vehicle weight articulated HGVs – with cargo carrying capacity of around 28 tonnes. The cargo movement market where rail might be considered

is typically for large volumes of cargo, where if road were to be chosen, it would probably be the largest HGVs.

Some of the assumptions in the 2033/34 forecasts involved changing various cost model inputs. These changes have been applied to the base year cost models, and then scaled back to represent 2031/32. The Variable Usage Charge (VUC) component of TAC is treated slightly differently because the Network Rail Track Usage Price List gives specific values for 2028/29. For example, intermodal VUC is due to rise by 4.73% from 2025/26 to 2028/29, based on tonne kms weighting by the wagons and locos used. The 2033/34 forecasts were for an 8.60% VUC growth beyond 2028/29. Straight-line interpolating gives a 5.16% growth from 2028/29 to 2031/32, giving an overall 10.13% growth from 2025/26 to 2031/32.

The resultant cost model formulae for each commodity sector are described below, assuming no local road haul is required (i.e. the cargo origin and cargo destination are both rail-served):

Table 1: Cost per cargo tonne moved by RAIL, by commodity sector in 2031/32. 2025/26 price base

Commodity Sector	Fixed cost irrespective of distance £	Cost £ per km	Cost £ per km of which is VUC	Cost £ per km of which is FSC
Biomass	£1.390	£0.0216	£0.0064	£0.0023
Chemicals	£1.333	£0.0181	£0.0053	-
Coal	£1.312	£0.0224	£0.0076	£0.0016
Construction Materials	£1.300	£0.0197	£0.0066	-
Domestic Automotive	£5.578	£0.1245	£0.0120	-
Domestic Intermodal	£11.556	£0.0284	£0.0037	-
Domestic Waste	£3.784	£0.0319	£0.0069	-
European Automotive	£5.578	£0.1245	£0.0120	-
European Intermodal	£11.556	£0.0312	£0.0065	-
European Other	£1.288	£0.0181	£0.0050	-
Industrial Minerals	£1.312	£0.0197	£0.0065	-
Iron Ore	£1.312	£0.0223	£0.0075	£0.0017
Maritime Intermodal	£11.196	£0.0268	£0.0042	-
Petroleum	£1.333	£0.0164	£0.0037	-
Steel	£1.518	£0.0216	£0.0059	-

Bulk rail journeys are typically loaded in one direction, with the train returning empty. This empty return is accounted for in these costs. For bulk journeys we make the assumption that the cost of using a terminal would be broadly similar whether the cargo is travelling by road or rail, and we therefore do not include a terminal cost in either the road or rail costs.

For intermodal services, typically containers are transported in both directions, so there is no need to account for empty returns. For intermodal containers travelling to a rail-served warehouse, the container has to be lifted at the rail terminal and transported to the on-site warehouse. If the container arrives by road, this lift and on-site transport are not required. Therefore we do include it in the rail costs because it is additional to what the equivalent road journey would have to pay.

Table 2: Cost per cargo tonne moved by ROAD, by commodity sector in 2031/2032. 2025/2026 price base

	Road costs per tonne		Comparing road to rail costs	
Commodity Sector	**Fixed cost irrespective of distance £**	**Cost £ per km**	**Fixed road cost *divided by* Fixed rail cost**	**Road cost per km *divided by* Rail cost per km**
Biomass	£3.575	£0.0864	2.573	4.004
Chemicals	£3.575	£0.0864	2.683	4.770
Coal	£3.575	£0.0864	2.724	3.866
Construction Materials	£3.575	£0.0864	2.749	4.389
Domestic Automotive	£5.747	£0.1457	1.030	1.170
Domestic Intermodal	£6.627	£0.0762	0.573	2.681
Domestic Waste	£3.575	£0.0864	0.945	2.707
European Automotive	£5.747	£0.1457	1.030	1.170
European Intermodal	£6.627	£0.0762	0.573	2.441
European Other	£3.575	£0.0864	2.775	4.779
Industrial Minerals	£3.575	£0.0864	2.724	4.388
Iron Ore	£3.575	£0.0864	2.724	3.869
Maritime Intermodal	£6.627	£0.0762	0.592	2.842
Petroleum	£3.575	£0.0864	2.683	5.256
Steel	£3.575	£0.0864	2.355	4.009

For road haulage in this market, it is a similar picture, with bulk cargoes being fully loaded in one direction, and then travelling empty. Including these empty movements, this averages out at around 14 tonnes per HGV.

HGVs carrying intermodal containers typically pick up a container when they drop one off, so are rarely travelling without a container. On average intermodal containers are much lighter than their maximum tonnage, such that the average tonnes per HGV is also 14 tonnes per HGV.

Automotive cargoes (cars) are less dense than bulk commodities, and therefore the cost per tonne is higher.

The calculated cost per tonne for road and rail is given for each origin to destination cargo movement in the accompanying spreadsheet. Having the calculated road and rail costs gives an indication of the likelihood of road taking some mode share if rail costs were to increase. For commodities deemed unlikely to have road and rail competition (as they are unlikely to change modes) the costs have not been included. For Nuclear & MOD the Nuclear FSC charge is shown even though currently this charge is only applied to spent nuclear fuel.

4.1. Representing an efficient operator

4.1.1. Analysing individual services or groups

The Railways Bill states that GBR cannot charge more than the amount that they consider that an efficient operator would be able to pay. An interpretation of this is that each individual rail freight service should be analysed, with an understanding of

- How an efficient rail service could be operated and how much that would cost, incorporating specifics on train length, average speed, terminal design etc
- What the modal alternatives would be (road, water or pipeline), and how much they would cost
- How that would change in future with different cost profiles (e.g. diesel costs changing or electrification)
- What would happen if transport costs rose due to increased TAC: would the traffic continue, or switch to alternative sourcing or destinations, or would the traffic reduce or cease.
- Even if there would be minimal impact in the short term, in the long-term choices on investing in new manufacturing locations or whether to upgrade existing sites could be affected.

That information would indicate how much an efficient operator would be able to pay for a specific service without significantly losing traffic in the short and long term.

It is not practical to be able to conduct such an analysis for every individual service and therefore averages have to be taken for groups of representative services, such that as TAC is increased, there is expected to be a gradual loss of traffic across the various services in any group, thus giving rise to elasticities.

4.1.2. Would higher costs encourage an inefficient operator to become more efficient?

To operate a particular service, an efficient operator could charge a certain price and make a profit. A less efficient operator could charge the same price and make a smaller profit or perhaps barely break even. There is always the financial incentive for an inefficient operator to become more efficient if that is practical.

FOCs frequently experience changes in their input costs or traffic volumes that they have to respond to. Changes that make their operations more challenging will often result in services being curtailed or reduced. This rarely has the impact of making the operator more efficient.

Similarly increased TAC would be unlikely to encourage higher efficiency. Therefore even if an efficient operator could absorb some extra cost by reducing profit, an inefficient operator would not, and such traffic would decline.

4.1.3. Cost models for each commodity sector

The rail freight characteristics assumed in the cost models are shown in the table below for each commodity sector.

Table 3: Rail freight characteristics assumed in the 2031/2032 cost model (2025/2026 price base)

Commodity Sector	Trailing length (metres)	Gross trailing weight of loaded trains (Tonnes)	Average speed (kph)
Biomass	470	2,375	53
Chemicals	476	2,600	46
Coal	470	2,475	47
Construction Materials	403	2,428	47
Domestic Automotive	423	620	46
Domestic Intermodal	656	1,290	67
Domestic Waste	464	1,391	44
European Automotive	423	620	46
European Intermodal	656	1,290	67
European Other	335	2,381	47
Industrial Minerals	470	2,475	47
Iron Ore	470	2,475	47
Maritime Intermodal	560	1,480	53
Petroleum	476	2,600	46
Steel	349	2,161	45

Source: MDST analysis of Network Rail billing data.

Note: Intermodal and Domestic Waste are loaded in both directions (Domestic Waste empty return containers count as a loaded flow, hence the low average gross trailing weight)

4.1.4. 75th percentile (efficient operator)

The Railways Bill[2] states that GB Railways (GBR) cannot charge more than the amount that they consider that an **efficient operator** would be able to pay. This distinction between an efficient operator and an inefficient operator is made because there could be instances where for a particular service, in theory

[2] https://bills.parliament.uk/bills/4030. 11th June 2026. Section 64 (3):
"The [charging] scheme may provide for a higher amount to be charged in particular circumstances provided that it does not exceed the amount that Great British Railways considers is the amount that an efficient operator would be able to pay in those circumstances"

- an *efficient* operator could absorb more TAC and make less profit
- whereas an *inefficient* operator may be making minimal profit such that any increase in TAC would make the service unviable and it would cease to operate

However see section 4.1.7 for a wider discussion.

Because of the Railways Bill's focus on an efficient operator, these cost models (and modelled results in this report) are therefore intended to represent an efficient operator. There is no definition of what an "efficient operator" is in the Railways Bill. We have taken a benchmarking approach to some of the cost model parameters whereby we have considered an efficient operator as one where various quantifications of their operating characteristics are just in the best quarter of all movements (75th percentile). For example the median maritime intermodal train speed is 48 kph but the 75th percentile is 53 kph, so we have adopted this 53 kph in the cost model.

The characteristics of number of wagons per train and cargo weight per train have also been adapted in line with our understanding of an efficient operator.

Combining multiple parameters with efficient values

When 75th percentile values are calculated, that means a quarter of traffic will be above that value. But if the 75th percentile for 2 independent parameters A & B are calculated, then we could expect around a quarter of traffic to be above A's 75th percentile value, and an independent quarter of traffic to be above B's 75th percentile value, such that only around 1/16 of traffic was above *both* A *and* B's parameters' 75th percentile values. However traffic *above* A's 75th percentile, could still achieve the same overall operational cost if it was slightly below B's 75th percentile. Therefore much more than 1/16 of traffic could achieve the same overall operational cost as traffic satisfying *both* A & B's 75th percentile.

Trailing length, number of wagons and trailing weight are likely to be highly correlated within any one market segment. Speed would not be correlated. Therefore we could expect using 75th percentile for all three parameters would represent the top 10%-15% most efficient traffics.
However other parameters in the model are not so focussed on efficient operators. Therefore overall the cost model results are likely to be representing around the 75th percentile of traffic.

Does the 75th percentile really represent an efficient benchmark?

The 75th percentile parameter values are calculated and input into each market segment's cost model separately. However with us using a benchmarking 75th percentile approach, there is a risk that some market segments may be generally inefficient. In such circumstances, using the 75th percentile benchmark may actually not represent an efficient operator. Similarly if operators in a particular market segment were extremely efficient, that could over-exaggerate the performance of a "normal" efficient operator. To reduce the risk of this, we have grouped some of the segments together when calculating the parameter values:

- Petroleum and Chemicals

- Domestic and European Intermodal
- Domestic and European Automotive
- Coal, Industrial Minerals and Iron Ore

Elements outside a FOC's control vs inefficiency

Within any market segment, there will be variation in attributes such as speed, trailing length and terminal dwell times. Some of this variation will be due to differences in how efficiently the FOC runs each service. For example the turnaround time in terminals influences how long it takes to do a round trip, and therefore how many train sets are required to offer a particular service.

However much of the difference in apparent efficiency will be due to elements outside of the control of the FOC such as:

- Network capability: Some routes cannot accommodate long, heavy trains, or have limited loading gauge for high intermodal containers. There is significant variation in running speed
- Timetabling: On a busy route, freight paths often require waiting in passing loops or at junctions
- Terminal design: Some terminals can accommodate full length trains without breaking up the train. However some terminals are space-constrained such that the trains need to be broken up to be processed. There are various other attributes affecting terminal efficiency
- Easy options for alternative uses of locos and wagons while they are not being directly used in a terminal for a particular service

In order to fairly and consistently judge efficiency, every service would have to be individually considered, with the aim of understanding whether and how it could realistically be more efficiently operated.

This is not practical for an overall assessment such as this, and representative averages need to be taken that give a reasonable result for most cases, hence the market disaggregation. As discussed in section 4.1.7. (with results in section 8), the objective of this overall exercise is to understand the likely response to a defined increase in TAC. The results within a market sector group are likely to be broadly similar irrespective of slight differences in assumed costs in the reference case.

4.1.5. 50th percentile (median)

The 50th percentile (median) cost models are intended to represent the average median operator. An average median operator is one where various quantifications of their operating characteristics are the median of all movements.

For example, for intermodal the median speed is 89.6% of the 75th percentile speed.

The characteristics of the speed and trailing length have been factored in a similar way. Changes to the number of wagons per train and cargo weight per train are related to the trailing length.

Table 4: Applied factors to convert cost model values from an efficient operator to a standard (median) operator

Commodity	Trailing Length of the train	Average speed
Bulks	91.8%	85.0%
Intermodal	95.2%	89.6%
European	94.5%	78.9%

4.1.6. Road hauliers

The road haulage market is highly competitive, so we assume that the vast majority of road hauliers can already be considered efficient.

4.1.7. Impact of cost model choices on results

The GBFM modelling works by recreating the actual base year rail traffics (2025) based on:

- An overall all-mode cargo origin-destination matrix
- Applying road and rail cost models with a mode share algorithm (Logit model) to get a modelled estimate of origin terminal to destination terminal rail tonnages
- Calibrating each service's cost to recreate actual terminal-to-terminal rail tonnages
- Forecasting those traffics based on changes in the market and changes in costs to generate a 2031/32 reference case.
- Increased TAC is then applied to rail costs to find the impact on every modelled traffic.

It is possible that the cost modelling may not perfectly reflect all real-world costs, but the calibration process largely corrects for this, such that increased TAC costs impact on mode share through the Logit model irrespective of the starting cost assumptions.

Another way of thinking about the issue independent of the modelling is to consider all intermodal container origin terminal to destination terminal movements by rail, and to rank them in terms of their resilience to a small (say £0.10 / kgtm) increase in TAC. Given this £0.10 / kgtm increase, the most vulnerable containers would switch away from rail, because road would just become the preferred option. Given an additional £0.10 / kgtm increase, the next most vulnerable traffics would switch away from rail, and given a further additional £0.10 / kgtm increase, the next most vulnerable traffics would again switch away from rail.

Gradually increasing TAC would therefore gradually reduce rail traffics. This wouldn't necessarily be a smooth continuous loss of traffic because there would come a point where a particular service frequency could no longer be justified, or a whole service would become unviable and there would be a step-change reduction in traffic, but overall the trend would be broadly continuous. Focussing on particular step-changes at particular costs has little merit because those vulnerable traffics would also be subject to other unstable changes in cost such as fuel prices or other market changes such as

shipping lines changing their port calls which would change the cost at which those step-changes would happen.

It could be argued that some vulnerable routes may be able to improve efficiency to counteract the effects of increased TAC, but in theory the incentive is already in place to be efficient to accommodate other potential increases in costs on vulnerable services, and to retain profitability.

In summary the impact of increased TAC is likely to be broadly similar even if slightly different assumptions are made in the cost modelling, but it is still important for the cost models to reflect the costs experienced such that the scale of a defined £/kgtm increase is proportionately represented in the modelling. See section 8 for the results comparing different assumptions on costs.

5. INVESTIGATING THE IMPACT OF TAC INCREASES

5.1. Approach summary

The approach is:

- List out all rail freight traffics (origin, destination, commodity sector, annual traffic volumes in 2031/32)
- For each individual traffic, estimate the impact of various levels of TAC increase assuming an efficient operator, based on modelling and market experience.
- Group the traffics into various different potential market segments, based on commodity sector, journey distance and traffic volumes.
- For each segment, find the average impact on that sector, but also find how much that impact varies within the sector. High variance within any one sector could suggest that it may be beneficial to split up that sector into those traffics with high impact, and those with low impact.
- The benefits of fewer segments (simplicity) versus many segments (better representation of impacts on each traffic) are then weighed up with a suggested market segmentation.

5.2. Modelled impacts

For the 2033/34 and 2038/39 rail freight forecasts recently carried out for NR[3], the GB Freight Model (GBFM) was used as the means of forecasting rail traffic as explained in that report.

Similar GBFM-based modelling approaches are taken here. The reference case (2033/34 scenario E) is reproduced. Then 4 scenarios are run with additional TAC added to rail costs across all sectors (per 1,000 Gross Tonne Miles in 2025/26 prices):

- £0.30

[3] "Rail Freight Forecasts for Funding Periods 1 and 2", MDS Transmodal. October 2026. Reference: 225074r.docx

- £1.00
- £3.00
- £10.00

For each origin, destination, commodity tonne km movement, the GBFM modelled tonnes is taken for the 2033/34 reference case and the 4 increased-TAC scenarios to provide a modelled % impact. This % impact is applied to the 2031/32 reference case tonne kms traffic.

This results in a tonnes kms output for every traffic covered by the modelling after increased TAC has been applied.

See the next section for the traffics not covered by the modelling.

5.3. Adjustments to the modelling

The GB Freight Model (GBFM) represents road and rail movements and generalised-cost-based competition between those modes. For any origin-to-destination tonnage movement:

- The costs are calculated of
  - going direct by road
  - using rail (with local road hauls if necessary)
- a Logit model is applied to split the traffic between the modes based on these costs
- If rail becomes more expensive, that Logit model will increase road's mode share and reduce rail's mode share.

5.3.1. Adding real-world issues to modelled results

Using GBFM is our default method of quantifying the impact of changes in cost components. However there are many real-world issues that are not included within that simple Logit model-based approach, such as:

- **HGV count caps**. Some sites such as quarries can have restrictions on how many HGV movements are permitted. This reduces the likely response of increased TAC because rail traffics can't easily switch to road.
- **Port charges**. Container ports typically charge a fee for transporting a container within the port from the main container stack to the rail terminal. If rail became more expensive due to TAC increases, the ports may wish to mitigate this to avoid losing large volumes to road, and therefore could reduce their port charges slightly.
- **Maritime competition**. For most rail services, the principal modal competition is road but for some movements, the competition is shipping. For example if a container is travelling from China to the Scottish Central Belt, it could travel to Felixstowe and then choose either
  - rail to Coatbridge or Mossend
  - or travelling by ship to Grangemouth

  It could also travel via Rotterdam (or similar European port) instead of Felixstowe.

This increases the likely response of increased TAC because the rail traffic may not switch to road, but can switch to shipping.

A similar argument can be made for transport via pipeline.

- **Capacity**. Where there is capacity constraint, the least profitable routes should rationally be suppressed by the FOCs, thus leaving the more profitable routes running. These are the routes that could absorb higher costs and are therefore more captive to rail. I.e. a capacity constrained railway can absorb more cost without losing traffic. This reduces the likely response of increased TAC.

  However consider a practical example: London Gateway will probably be capacity constrained with some rail demand being suppressed in FP1 while Southampton will probably be less capacity constrained. Following the logic of charging more to those traffics that can bear the cost, additional TAC could be charged to London Gateway trains without losing traffic, while Southampton could not be charged more without traffic declining. This would be inequitable discrimination between direct competitors, and would exacerbate the existing unfairness that some ports have sufficient capacity and others do not. Because it would not be reasonable to discriminate based on Network-Rail-provided capacity, it is difficult to robustly calculate capacity and it can easily change with a new timetable, we have ignored railway capacity.
- **Land value**. The land owner of an industrial site with a well-used rail terminal is able to charge more to their tenants than if the site did not have a rail terminal on. However if increased TAC would make running rail services unviable, the site would no longer be more attractive than neighbouring sites without a rail connection. The tenant would therefore expect their rent to decrease as TAC increased. This would share the pain of increased TAC between the transporting company and the land owner and reduce the likely response of increased TAC
- **MSRS**. The theory behind the DfT's Mode Shift Revenue Support (MSRS) grant for intermodal traffic suggests that the grant is intended to compensate for rail being more expensive than road, where the net external costs of road versus rail (road congestion etc) justify the subsidy. If rail costs increased, the justified subsidy would increase. However it is unlikely that the overall budget would be increased, so any theoretical increases probably would not materialise[4].
- **Long term**. Some long-term effects would take some time to feed through into traffic on the network. Consider biomass; power stations (such as Drax) have been built that are largely dependent on the supply of biomass by rail. Suppose the operational costs easily justified it continuing to operate but rail then became significantly more expensive. Much of the tonnage would continue to arrive to Drax by rail, because of the sunk cost in infrastructure. However in the very long term, when the infrastructure had to be renewed, alternative solutions may be found that did not need rail, such as using the nearby waterway, or building a new site elsewhere instead. Similarly, if TAC was kept low, this would encourage long term investment in new infrastructure such as terminals. GBFM can largely be thought to represent the

[4] In the 2031/32 reference case, MSRS rates are assumed to continue at their current levels

medium-term equilibrium whereby the industry has mostly responded to changes in market conditions[5].

5.3.2. Applying adjustments sector by sector

Maritime Intermodal

Rail services carrying imports from the deep-sea South-East ports of Felixstowe, Southampton, London Gateway and Tilbury to Northern England and Scotland (and exports in the other direction) are subject to competition from shipping services

- from those ports to regional GB ports
- and transhipping via Continental ports to regional GB ports.

These shipping services take a substantial portion of the market. This should increase the modelled response. However services for shipping are typically slower and less frequent than for rail, so the markets are not necessarily in direct competition, and ports reducing their charges to transfer to rail could reduce the impact slightly. We therefore expect much less traffic to be lost to shipping than to that (modelled in GBFM) to be lost to road.

We have therefore increased by 30% the negative responses for traffic between these deep-sea South-East ports and Northern England-and-Scotland to reflect the competition with shipping services.

Construction materials

Some quarries have restrictions on how many HGV movements are permitted – which makes some traffics effectively captive to rail because they cannot switch to road. However alternative sourcing from:

- other nearby quarries
- sea dredged aggregates to nearby ports
- quarried rock arriving by sea from e.g. Glensanda

can mean that those HGV-limited quarries can be bypassed.

Even without HGV restrictions, if TAC were increased, long distance rail traffics to London (e.g. from the Mendips or Peak District) would become more expensive relative to sea-based alternatives arriving at a London quay.

For those long-distance construction materials movements to areas that could instead be served by sea (journey distance of more than 180 km and to destination terminals outside the West Midlands), we have increased the modelled loss of rail traffic by 50%. However in contrast, for shorter journeys (journey distance less than 80km), where road restrictions may limit the ability to switch from rail to

[5] It is not easy for GBFM alone to fully represent the long-term equilibrium state because (for example) the input rail freight service list is unchanged when we run the increased TAC scenarios. In reality in the long term, increased TAC could result in the withdrawal of only-just-viable services, and discourage the development of new rail-served warehousing.

road, we have halved the modelled response. These adjustment values are based on our judgement and experience of the market.

Steel

Many steel traffics are from rail-connected industrial site to rail-connected industrial site. These would be unlikely to switch to road. The modelled responses are therefore low. However future services carrying scrap metals to Port Talbot for the electric arc furnace are unlikely to be captive to rail, because for nearby origins, road would be an alternative, and for further afield origins, alternative sources could be chosen such as more nearby sourcing by road or even potentially incoming by sea. We have adopted the overall Maritime containers modelled response for these new Port Talbot traffics, because Maritime containers share the characteristics of having one end of the journey rail-connected, with the other end often likely not being rail-connected, such that using rail often involves a local road haul to/from the inland rail terminal, such that there is significant road/rail competition.

European categories

"Through traffic" through the Channel Tunnel (i.e. not including the Folkestone – Calais Eurotunnel HGV shuttle) is represented in GBFM as traffic between inland on the Continent and inland in Great Britain. It is in competition with Roro ferry, Lolo[6] and Eurotunnel shuttle services.

This traffic has always been a niche low-tonnage sector and has never taken off as was predicted. Several services have come and gone over the years. If the price of rail on the GB network is increased, that encourages the use of its competitors.

European Automotive, European Intermodal and European Other are all represented by GBFM's "through rail" response to increased TAC.

5.3.3. Traffics not well represented in GBFM

GBFM predominantly considers road versus rail competition. However where a particular market is dominated by or is entirely by rail, there is normally little scope for mode shift to road, so GBFM does not represent well the likely responses to increased TAC for those markets. Other factors beyond GBFM's scope are likely to be more relevant such as:

- Changing the source of cargoes (e.g. Drax using nearby Immingham instead of more-distant Liverpool to import biomass), or similarly changing the destination of cargoes.
- Industrial facilities reducing or ceasing production

For these sectors, it was understood that we would have to rely on other information or a judgement call. These estimates have been incorporated into the elasticity analysis.

[6] Roro means Roll On Roll Off. So called because the ships carry wheeled vehicles like cars and trucks which drive on and off the decks. Lolo means Load On Load Off. This refers to cargo ships which move containers that get loaded on and off the ships with cranes.

Iron ore and Coal

The vast majority of iron ore and coal traffic is from Immingham to the steelworks at Scunthorpe. This is relatively secure to rail given the high volumes and lack of a need for a road haul.

Biomass

The responses to changes in TAC are not well represented in energy sectors in GBFM such as biomass. In 2023 we investigated the impact of increased TAC on biomass traffics for the ORR by building a model showing how if rail transport costs increased, Drax could source more of its biomass from the nearer ports (Immingham and Hull), thus reducing tonne kms[7]. This showed that adding 1.599 £/kgtm (in 2022/23 price base) results in 11.4% loss of biomass tonne kms, with a linear response. Converting to 2025/26 price base, this equates to a 6.29% loss of traffic with £1/kgtm (2025/26 price base) TAC increase.

However we are forecasting a big decline in biomass traffic. Drax may then be more inclined to seek traffics from a single nearby port (Immingham) rather than its current policy of seeking diversity of supply. Therefore Drax may not have the flexibility to switch traffic away from longer distance ports if TAC goes up (which we assumed in our earlier study).

In such a single-port scenario, the tonne km response to increased TAC would be much lower. We have therefore halved the response to:

3.15% loss of biomass Tkm with £1/kgtm (2025/26 prices) increase.

applied to all biomass.

Domestic waste

Most domestic waste traffic is from and to rail-served sites including Wilton, Severnside, Runcorn Folly Lane. These traffics are well-established and it is unlikely that these traffics would be significantly affected by increased TAC unless the increases were very large.

In the long term, when relationships between waste producers and waste processors could be re-considered, rail costs would be a component of the decision-making process.

Nuclear and MOD

Nuclear traffic is already subject to a significant Freight Specific Charge (FSC), having been judged to be captive to rail. MOD traffic is also likely to be captive to rail. We therefore adopt a low % response whereby increased TAC would have little impact on volumes.

[7] "Updated impacts of changes in track access charges on the transport by rail of biomass" for Office of Rail and Road. May 2023. https://www.orr.gov.uk/media/24379/download

Engineering haulage

Engineering haulage represents trains run for the benefit of maintaining and operating the railway. This is out of scope for the consideration of charging extra TAC.

5.3.4. Out of scope of GBFM

There are also the sectors that are not included within the scope of GBFM because they are may not conventionally be considered as "freight":

- Passenger Stock Moves
- Wagon Maintenance
- Light Locos associated with freight (i.e. not passenger)

There are also potential sectors for which we are not forecasting any traffic in our 2033/34 Central forecasts:

- Mail and Premium Logistics
- Carbon Capture, Usage and Storage (CCUS)
- Hydrogen

For both of these groups of sectors, we do need to estimate some potential responses to increased TAC if indeed there were some traffic, so that a judgement can be made as to how resilient they would be to increased TAC.

Passenger Stock Moves and Wagon Maintenance

These movements are highly captive to rail. There is little scope for them going by road or other modes, and there is little choice as to whether they move. Increased TAC would have little impact on volumes.

Light Locos associated with freight (i.e. not passenger)

Ideally there wouldn't need to be many light locomotive movements, and the vast majority of loco movements would be associated with moving loaded or empty wagons. However there are instances where rakes of wagons will not need to be moved for long periods of time and it would be wasteful for a loco to wait doing nothing during those periods. It therefore makes sense for locos to sometimes move between jobs if they would otherwise have to wait for long periods. This is already an optimisation that FOCs undertake; deciding whether to accept the "wasted" fuel, driver time and TAC etc of moving a light loco, or choosing lower loco utilisation and therefore needing more locos in the fleet.

Increased TAC may affect this optimisation to some extent and would slightly encourage lower loco utilisation with a need for more locos in the fleet.

There are also other operational reasons for light loco movements such as returning to a depot between jobs.

Significantly increased TAC could impact on the choices FOCs make to move light locos around.

Some of these light loco movements are not productive in themselves in terms of the movement of cargo, and so their reduction should not be seen as detrimental to the economy.

If light loco journeys could be split between movements necessary to conduct cargo movements, and other more optional journeys, then there could be a case for charging higher TAC on those optional journeys. However trying to distinguish between such journey purposes would be challenging.

Mail and Premium Logistics

Royal Mail services were a long-established sector with many services. However they ceased to operate in the last couple of years. There have been several attempts to restart other logistics services, by operators such as Varamis Rail, but none have proved viable in the long term.

The fact that such services appear to be difficult to sustain suggests that they would have a high elasticity to increased TAC.

Carbon Capture, Usage and Storage (CCUS)

CCUS is a new technology to reduce carbon emissions by capturing the emissions at source and typically storing them for the long term, so they do not enter the atmosphere.

It is currently not a mainstream technology, but if the carbon price is high enough and the promoters can demonstrate that CO_2 can be reliably stored cheaply enough, then there may be scope for its commercial use. Most commercial examples in the early days are likely not to involve long distance transport of the CO_2, and will typically use short distance pipelines.

However where there are significant rail-served CO_2 emitters a long distance from any CO_2 storage sites, without a pipeline they can use, there may be scope for the use of rail. Inland cement plants may be the most likely candidates.

At the point of making decisions about where and how to implement CCUS technology, several factors will be considered:

- A CO_2 producing plant could continue producing but pay the carbon price of emitting
- A pipeline could be built to a carbon storage site.
- Rail could be used
- The plant could relocate or close

Once a decision has been made and the infrastructure built (carbon capture technology, pipeline or terminal), small changes in TAC are unlikely to have much impact on the quantity by rail freight in the

short to medium term. But prior to a decision, high TAC could deter a decision in favour of rail, in which case the loss of potential rail traffic could be large.

Hydrogen

Using hydrogen as a sustainable energy source has significant potential. It can be produced and stored by electrolysing water using renewable electricity at windy or sunny times when production exceeds demand. It can then either be used later to generate electricity when needed without harmful emissions, or it can be used directly in various industrial processes.

However without a pipeline it is difficult to transport because it needs to be carried at high pressure and/or low temperatures and is much more difficult to contain than most other gases due to its small molecular size. There are various plans for hydrogen pipelines such as Hynet in North West England and North Wales. Away from those pipelines, it is possible that there could be a demand for rail in future.

There was a test movement on 3rd December 2025 using 3 intermodal containers containing many cannisters of hydrogen.

The alternative mode for such containers would be road, such that there would be a high elasticity to increases in TAC. As per CCUS, high TAC could deter investments in solutions that would incorporate rail.

5.3.5. Adjusting the results

The origin, destination, commodity, tonne kms spreadsheet with the modelled outputs, results in a modelled % change in tonne kms for each TAC increase for each record within scope of the modelling. There are then further fields that allow for over-ruling of the modelled result, and for filling in impact estimates for the traffics without modelled results.

6. CORE ELASTICITY ANALYSIS - MARKET SEGMENTATION OPTIONS

Once a modelled or estimated response for every origin-to-destination traffic has been established, the task is to decide how to group traffics together into market segments.

Sections 6.1-6.6 show various separate ways the rail freight market could be segmented. For each option, a table shows gross tonne kms in the 2031/32 reference case, along with the percentage of

the traffic lost for the 4 TAC-increase scenarios. The final column shows the standard deviation of the percentage response for the £1 increase scenario weighted by tonne kms[8].

[8] This is a standard statistical method for seeing how much values within a group vary from the mean; a small value shows that the percentage impact response is very similar across all the traffics in that sector, whereas a large value shows that the percentage impact response is varied across the traffics within that sector.
In a simple hypothetical example if there were 2 equal-tonne-km origin-to-destination traffics in a group and they both lost 10% of their traffic when TAC was increased by £1/kgtm, then the standard deviation of their responses would be zero, because both responses are the same as the mean.
However if one of them had a 5% loss of traffic and the other had a 15% loss of traffic, the mean loss would still be a 10% loss, but both traffics would vary from that mean by 5%. The standard deviation would therefore be 5%.

6.1. Disaggregating by commodity sector

The current TAC regime segments the market using commodity sector groups. The revised commodity sector groups proposed by Network Rail are therefore a natural place to start with the analysis.

Table 5: Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Commodity sector	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
Maritime Intermodal	19,026	2.1%	**9.9%**	27.8%	71.6%	60.2%
Domestic Intermodal	4,472	4.2%	**12.4%**	34.9%	77.0%	11.1%
Construction Materials	10,402	1.8%	**3.4%**	11.8%	40.8%	4.2%
Domestic Automotive	403	1.2%	**3.7%**	10.6%	62.9%	1.1%
European Automotive	66	4.6%	**14.7%**	38.4%	80.7%	0.0%
European Intermodal	44	4.6%	**14.7%**	38.4%	80.7%	0.0%
European Other	202	4.6%	**14.7%**	38.4%	80.7%	0.0%
Industrial Minerals	573	1.2%	**2.3%**	7.1%	24.0%	2.1%
Petroleum	910	0.1%	**0.2%**	0.8%	2.5%	1.4%
Steel	2,462	0.4%	**2.4%**	8.4%	32.2%	2.6%
Biomass	1,470	0.9%	**3.1%**	9.4%	31.5%	0.0%
Chemicals	0	0.4%	**5.6%**	10.1%	21.5%	11.9%
Light Locos	385	1.8%	**6.7%**	19.6%	52.8%	0.0%
Coal	*106*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Domestic Waste	*751*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Engineering Haulage	*2,571*	*0.0%*	***0.0%***	*0.1%*	*0.2%*	*0.4%*
Iron Ore	*168*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Nuclear & MOD	*68*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Passenger Stock Moves	*324*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Wagon Maintenance	*55*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Total	**44,458**	**1.8%**	**6.7%**	**19.6%**	**52.8%**	**39.7%**

Those commodities in *grey italics* are already mentioned in section 5.3 and are already assumed to have a low response to increased TAC, and are therefore strong candidates for increased TAC.

6.2. Disaggregating Maritime Intermodal and Domestic Intermodal by distance band

Maritime intermodal and Domestic intermodal lose a relatively high percentage of traffic (9.9% and 12.4% respectively for the £1/kgtm increase). Both sectors show a large standard deviation, suggesting that the lost traffic percentage response is not consistent within those sectors, and that therefore we could consider disaggregating the sector.

The table below shows Maritime intermodal disaggregated by distance band.

Table 6: Maritime Intermodal by distance band. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Distance band (km)	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
0 to 100	48	1.8%	**7.2%**	18.6%	45.9%	6.0%
100 to 200	961	1.1%	**6.0%**	18.0%	49.7%	3.4%
200 to 300	7,454	2.5%	**-16.3%**	1.7%	39.5%	85.7%
300 to 400	8,178	1.1%	**25.4%**	44.4%	95.9%	23.9%
400 to 500	1,155	5.1%	**27.6%**	45.3%	96.5%	22.4%
500 to 600	6	6.7%	**21.1%**	52.6%	100.0%	0.0%
600 to 700	1,223	3.5%	**51.7%**	67.3%	100.0%	31.1%
Total	**19,026**	**2.1%**	**9.9%**	**27.8%**	**71.6%**	**60.2%**

Looking at the £1/kgtm increase scenario, there is an apparent anomaly in the 200km to 300km band whereby increasing TAC has a *negative* loss: traffic *increases* by 16.3%. This could be a real effect in some circumstances but is exaggerated by the way the model functions:
If containers from Felixstowe are destined for somewhere in the Crewe area, they may take the train to Trafford Park and then drive South by road to their destination. A slightly more expensive alternative route could be to go by rail to Birmingham (shorter rail journey) and drive North by road to their destination in the Crewe area (longer road journey).

If TAC per km is increased, this will increase the rail cost component of these journeys, with longer rail journeys increasing more than short rail journeys. In this example, this could make the journey via Trafford Park more expensive than via Birmingham, and therefore the traffic would switch to the Birmingham route.

This can result in what is observed: an increase in TAC resulting in an increase in rail traffic in a shorter distance band as traffic switches from longer rail journeys.

For each cargo origin to cargo destination, GBFM assigns to the cheapest generalised cost rail service and therefore this effect can materialise. In reality, the switch from Trafford Park to Birmingham would be less like a cliff-edge, but it is still a real effect.

Following the logic of this analysis, the shorter distance traffic could appear to be resilient because increased TAC was not reducing volumes, and it could therefore be given an increased TAC. The longer distance traffic appears less resilient and would therefore not be given increased TAC. If this logic were applied, then in this Felixstowe to Crewe example, the traffic would remain via Trafford Park, and the via-Birmingham route would not gain this Crewe traffic and would instead lose further traffic because of its increased TAC.

This suggests that introducing increased TAC for commodities that often involve road hauls would affect competition between services.

Longer distance journeys are typically more viable by rail in competition with road than short journeys, and therefore it may be thought that they would be more resilient to increased TAC. However when a local road haul is involved, there will always be some destinations that it is only just worth using that rail service plus road for, and if the rail service were more expensive, using a shorter distance rail service or travelling direct by road would become cheaper.

Given that TAC is a distance-based charge, longer rail journeys would also suffer a larger increase in their costs than short journeys.

We therefore conclude that charging different rates for different journey lengths for Maritime intermodal would not be desirable.

Table 7: Domestic Intermodal by distance band. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Distance band (km)	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
0 to 100	61	2.4%	**9.4%**	23.9%	55.9%	10.0%
100 to 200	790	1.9%	**0.6%**	11.8%	47.6%	16.3%
200 to 300	426	3.2%	**6.9%**	22.9%	63.6%	16.7%
300 to 400	429	4.3%	**12.7%**	33.8%	76.7%	7.1%
400 to 500	419	5.3%	**17.6%**	43.6%	86.5%	1.2%
500 to 600	2,235	4.9%	**16.1%**	42.5%	87.9%	1.3%
600 to 700	85	9.4%	**23.3%**	69.2%	94.7%	12.5%
700 to 800	10	5.7%	**18.9%**	52.0%	96.1%	1.1%
800 to 900	17	7.3%	**22.5%**	84.0%	100.0%	2.4%
Total	**4,472**	**4.2%**	**12.4%**	**34.9%**	**77.0%**	**11.1%**

Domestic intermodal traffic has the same potential as Maritime intermodal for encouraging a switch to shorter distance rail services if TAC were increased. There isn't a clear pattern, with most traffic bands in the £1/kgtm increase scenario in the 10% - 20% lost range, suggesting that there is little benefit in disaggregating Domestic intermodal by distance band.

6.3. Disaggregating bulks by distance band

There may be some long-distance bulk traffics by rail where the cargo is travelling from rail-served site to rail-served site (so no local road haul is needed), where the only realistic alternative is to go by road, and road would be a lot more expensive. Assuming the industrial activities facilitated by the rail movements were secure, then such rail journeys could absorb additional cost without losing much traffic.

At shorter distances, road would be more able to compete, and therefore such rail journeys would be more vulnerable to competition.

The table below shows traffic for all bulk commodities apart from those in grey italics (and not intermodal, European or Light locos), i.e. Biomass, Chemicals, Construction Materials, Domestic Automotive, Industrial Minerals, Petroleum, Steel. It shows their modelled responses and standard deviations.

Table 8: Modelled bulk commodities by distance band. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Distance band (km)	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
0 to 100	3,027	1.9%	**3.0%**	8.6%	24.6%	5.8%
100 to 200	7,122	1.2%	**2.7%**	9.2%	34.6%	3.3%
200 to 300	4,373	1.2%	**3.5%**	12.6%	44.2%	2.2%
300 to 400	1,232	1.5%	**3.9%**	14.0%	52.8%	1.9%
400 to 500	190	1.3%	**2.0%**	6.1%	17.4%	2.5%
500 to 600	161	0.3%	**1.4%**	4.9%	15.8%	2.7%
600 to 700	115	0.8%	**3.1%**	11.2%	62.1%	1.6%
700 to 800	0	3.3%	**4.6%**	14.2%	36.6%	2.4%
Total	**16,220**	**1.3%**	**3.0%**	**10.3%**	**36.5%**	**3.6%**

Focussing on the £1/kgtm increase scenario, most of the traffic is under 400km, and the lost % is reasonably stable in those distance bands, suggesting there is no significant difference in response for different distances. However it is not easy to reliably represent the security of bulk traffics in the modelling, so it is still likely that in reality there are some secure-to-rail long distance bulk traffics. In principle these could be identified, separated out into a different group and charged extra TAC without much loss of traffic. However defining rules that could identify such traffics would be difficult.

We therefore do not recommend this disaggregation.

6.4. Disaggregating by volume

There could be an argument that large volume rail traffic flows are more resilient to increases in TAC due to economies of scale.

The table below disaggregates all origin-to-destination traffics (not including those in grey italics and Light locos) by annual tonne kms bands.

Table 9: Gross Tonne kms volume bands. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Gross Tonne km band (Tonne kms)	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
>100m	19,819	3.9%	**12.6%**	28.7%	68.7%	36.0%
30m-100m	10,203	-1.5%	**-0.5%**	13.3%	49.4%	60.1%
10m-30m	5,197	2.5%	**6.6%**	17.2%	47.4%	16.8%
<10m	4,811	1.2%	**3.6%**	14.4%	44.1%	32.6%
Total	**40,030**	**2.0%**	**7.4%**	**21.6%**	**58.1%**	**41.8%**

The modelling does not suggest a consistent pattern of increased volume resulting in increased security to rail, albeit the modelling does not represent well the economies of scale associated with high volumes.

High volumes and economies of scale could potentially be the only reason a particular traffic goes by rail at all. Therefore it would still be susceptible to being unviable if TAC increased.

Charging more TAC for higher volumes could discourage increased traffic volumes and would create administrative challenges and distort competition. For example Felixstowe has several terminals and several operators. An operator may be incentivised to switch some traffic from Felixstowe North terminal to Felixstowe South terminal, or a lower-volume operator would be given an advantage over a high-volume operator operating from the same port.

The downsides of this discrimination would need a strong case for implementing such a disaggregation. We do not believe there is such a case.

6.5. Disaggregating Steel

As mentioned in section 5.3.2, scrap metals (mainly to Port Talbot's electric arc furnace) are unlikely to be as captive to rail as most other Steel movements, and could therefore be considered separately from other Steel.

Table 10: Disaggregating Steel. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group

Steel category	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
Scrap metal	671	1.1%	5.9%	20.4%	60.5%	1.2%
Other Steel	1,791	0.1%	1.1%	3.9%	21.6%	1.5%
Total	**2,462**	**0.4%**	**2.4%**	**8.4%**	**32.2%**	**2.6%**

Scrap metal (mainly to Port Talbot) shows a larger response to increased TAC than other steel, and therefore could be considered as its own separate category.

6.6. Other potential options

6.6.1. Charge more for traffics not needing a local road haul

Consider a maritime container travelling by train from a South East port (e.g. Felixstowe) to a rail-served warehousing site in the Midlands (e.g. DIRFT). If this is the final destination of the container, then no further road leg is required, and rail is likely to have lower generalised cost than road. If an additional road leg is required, then choosing road direct from the port may be lower generalised cost than using rail.

In general, most rail traffics not needing an additional road leg are cheaper than road, and are therefore more captive to rail upon increasing TAC.

In theory it would be possible to target additional TAC at such traffics. However that could be difficult to enact because some containers on any one train may be bound for a warehouse at DIRFT, and others may need a local road haul to get to their final destination.

Large warehousing sites being built with integrated rail terminals reduces the cost of using rail freight. Any such discrimination would discourage building such rail terminals and damage rail freight growth.

6.6.2. Charge more for traffics with planning restrictions on train or HGV numbers

If a site (such as a quarry) has a limitation on the number of trains it can run, and they would run many more if there was no limitation, then such a traffic would be relatively resilient to increased TAC.

Similarly if a site had a limitation on the number of HGVs it can run and it was operating at this maximum, then there is little scope for mode switch from rail to road, so such rail traffic would also be relatively resilient to increased TAC.

In both cases, such rail traffics could probably be charged higher TAC with only a small loss of traffic. Therefore there could be a separate market segment for rail traffics with such planning restrictions, and this would be classed as: A: Strong candidates for mark-ups (low elasticity).

However increased TAC per kgtm would encourage the site to focus more on shorter distance rail at the expense of longer distance rail, thus potentially slightly reducing the tonne kms.

There would also be an administrative challenge for Network Rail to understand the planning restrictions placed on every rail terminal that could be included in this market segment. There may also be some sites that do have an HGV or train number restriction, but traffic volumes are below that limit such that the site would respond to increased TAC as though there were no restriction. Keeping abreast of such traffic volumes and limits in order to accurately and fairly levy the extra TAC would be challenging, particularly for HGV traffics.

Even though in principle there is a logical case for categorising such traffics in a separate market segment, the practicalities of gathering the necessary data to do so would make this very difficult to implement and would be contentious. We therefore do not propose this discrimination.

6.6.3. Alternatives to a flat per gross tonne mile rate

VUC and FSC are charged as a flat per gross tonne mile rate for any vehicle and cargo category. I.e. the charge for a given journey is:

£X per mile

VUC is based on the amount of damage done by the traffic, and therefore has to be distance related.

However it would in theory be possible for other TAC to have a more complicated relationship to distance. Instead of distance bands discussed earlier in the chapter, which would inevitably have undesirable step-changes, a continuous function could be used such as:

£X per mile + £Y.

This would penalise short distance traffics, or if *Y* was negative, this could make TAC free up to a certain distance and then gradually increase from there.

In principle this could be adopted, but the distance band analysis above doesn't suggest that there is a strong argument in favour of discriminating on the basis of distance and moving away from the *£X per mile* model.

7. PROPOSED SEGMENTATION AND MARK-UP STATUS

The previous section discusses various options for segmenting the market. Apart from commodity sector, where traffics are independent of each other, we have not concluded that there is a strong practical case for disaggregating traffics any further – by distance band, volume, or by whether a local road haul is required.

However there is a case for disaggregating by the new commodity sectors. Some of these commodity sectors are groups of commodities that have different characteristics and could be considered separately. We have identified Scrap metal as such a category to be separated from Steel. Given there are only very small volumes of Chemicals traffic, we suggest that Chemicals could be absorbed into Petroleum.

As Nuclear and MOD are very different sectors and because spent nuclear fuel already has a FSC levied on it and MOD does not, we suggest it may be wise to consider them as separate categories in case there is a wish to apply different values of extra TAC.

Table 11 summarises our proposed market segmentation, using tables 5 and 10.

Table 11: Proposed market segmentation. Gross tonne km (2031/32 reference case) with the percentage of gross tonne kms lost for each TAC increase scenario. Also shows the (tonne kms weighted) standard deviation of the percentage responses for the £1 TAC increase scenario, for all origin-to-destination traffics in the group.

Commodity sector	Gross Tonne km (million)	Lost % for the TAC increase (£/kgtm) scenarios				Std Dev for £1/kgtm increase
		£0.30	£1.00	£3.00	£10.00	
Maritime Intermodal	19,026	2.1%	**9.9%**	27.8%	71.6%	60.2%
Domestic Intermodal	4,472	4.2%	**12.4%**	34.9%	77.0%	11.1%
Construction Materials	10,402	1.8%	**3.4%**	11.8%	40.8%	4.2%
Domestic Automotive	403	1.2%	**3.7%**	10.6%	62.9%	1.1%
European Automotive	66	4.6%	**14.7%**	38.4%	80.7%	0.0%
European Intermodal	44	4.6%	**14.7%**	38.4%	80.7%	0.0%
European Other	202	4.6%	**14.7%**	38.4%	80.7%	0.0%
Industrial Minerals	573	1.2%	**2.3%**	7.1%	24.0%	2.1%
Petroleum	910	0.1%	**0.2%**	0.8%	2.5%	1.4%
Scrap metal	671	1.1%	5.9%	20.4%	60.5%	1.2%
Steel (except scrap)	1,791	0.1%	1.1%	3.9%	21.6%	1.5%
Biomass	1,470	0.9%	**3.1%**	9.4%	31.5%	0.0%
Light Locos	385	1.8%	**6.7%**	19.6%	52.8%	0.0%
Coal	*106*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Domestic Waste	*751*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Engineering Haulage	*2,571*	*0.0%*	***0.0%***	*0.1%*	*0.2%*	*0.4%*
Iron Ore	*168*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Nuclear and (separately) MOD	*68*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Passenger Stock Moves	*324*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Wagon Maintenance	*55*	*0.0%*	***0.1%***	*0.3%*	*1.0%*	*0.0%*
Total	**44,458**	**1.8%**	**6.7%**	**19.6%**	**52.8%**	**39.7%**

Those commodities in *grey italics* are assumed to have a low response to increased TAC.

For nearly all cargo groups, under certain circumstances, an increase in TAC will result in some decrease in traffic volumes. In order to judge whether a cargo is a good candidate for additional TAC, it has to be decided what is an acceptable loss.

There are competing objectives:

- Network Rail wish to raise more money from its customers to better cover the costs that it incurs.

- Network Rail do not wish to price off current and future potential traffics – given they have a 75% growth target for 2050.

It could be argued that all traffics should pay some additional TAC beyond VUC, with the most resilient paying higher rates than the most vulnerable, so that they were all contributing in some way towards Network Rail's costs, over and above VUC, which covers the marginal costs directly incurred by operating trains.

However for those vulnerable movements, much more traffic would be lost per £ raised in revenue than for the resilient movements. It therefore is justifiable to target the extra TAC at the more resilient categories, and leave the vulnerable categories uncharged.

The commodity sectors in table 11 show a % response for the £1/kgtm TAC increase scenario. This has been the initial basis for allocating the sectors into the following options:

- Below 1%: A: Strong candidates for mark-ups (low elasticity)
- 1% - 7%: B: Marginal candidates for mark-ups (mixed or sensitive results)
- Above 7%: C: Not suitable candidates for mark-ups (high elasticity)

These are judgement-based thresholds adopted for the purposes of this analysis – which are broadly in line with the ORR's previous approach to selecting appropriate commodities for FSC.

That results in the following categorisation:

A: Strong candidates for mark-ups (low elasticity)

- Coal
- Domestic Waste
- Iron Ore
- MOD
- Nuclear
- Passenger Stock Moves
- Petroleum
- Wagon Maintenance

For all of these low-elasticity market segments (apart from Petroleum), we have estimated that they could take a £10/kgtm increase in TAC with minimal (around 1%) loss in traffic. For Petroleum we estimate it would be approximately a 2.5% loss.

B: Marginal candidates for mark-ups (mixed or sensitive results)

- Biomass
- Construction Materials

- Domestic Automotive
- Industrial Minerals
- Light Locos
- Scrap Metal
- Steel (except scrap)

For these marginal candidates, we estimate the traffic loss to be in the 1% to 7% range for the £1/kgtm TAC increase scenario. Steel (except scrap), Industrial Minerals and Biomass are towards the low elasticity end of the grouping, while Scrap metal and Domestic Automotive are towards the high elasticity end.

C: Not suitable candidates for mark-ups (high elasticity)

- Carbon Capture, Usage & Storage
- Domestic Intermodal
- European Automotive
- European Intermodal
- European Other
- Hydrogen
- Mail and Premium Logistics
- Maritime Intermodal

Even at relatively low levels of extra TAC (e.g. £0.30/kgtm), we estimate that most of these high elasticity modelled market segments could lose significant traffic volumes; around 4% (2% for Maritime Intermodal). For the new (and unmodelled) market segments, we estimate the impact could be broadly similar, although this is highly uncertain, depending on the nature of those traffics.

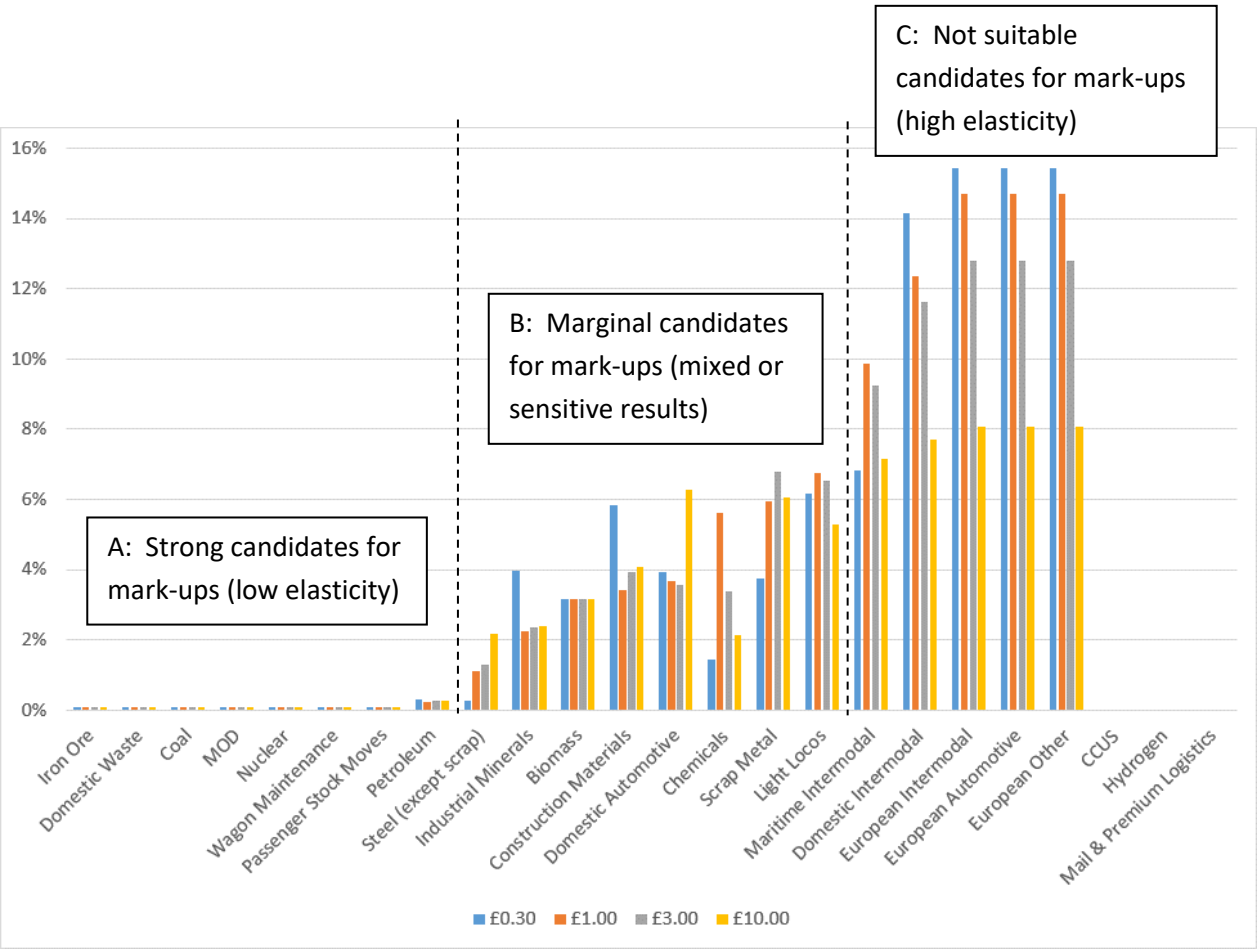
If we consider the £3/kgtm TAC increase scenario from table 11, this represents 3 times the TAC increase of the £1/kgtm TAC increase scenario. If we therefore consider the % response categorisation bands to be 3 times as large (i.e. A = below 3%, B = 3%-21% and C = above 21%), this results in the same categorisations of market segments into A, B and C as shown above. Following the same principles for the £10/kgtm TAC increase scenario also results in the same categorisations.

However following the same principles for the £0.30/kgtm TAC increase scenario results in the same categorisations, but with "Steel (except scrap)" being categorised as A, and Maritime Intermodal just scraping into category B. We have retained the categorisations listed above because 3 of the scenarios result in that categorisation.

The above analysis and choice of thresholds is based on responses to increased TAC for an efficient operator. However section 8 shows how the increased TAC impact would be similar if the analysis

was based on a less efficient operator, assuming that increased TAC does not result in efficiency improvements.

Figure 2: % loss of tonne kms due to increased TAC by market segment, for the 4 TAC increase scenarios (£0.30, £1.00, £3.00 and £10.00/kgtm). Impacts scaled to per £1/kgtm increase.



For most low-response (A) and medium-response (B) market segments, the impact per £1/kgtm increase is similar for the 4 scenarios. However some large traffic flows will suffer from "tipping points" where they will suffer a large loss of traffic upon a small increase in TAC. These tipping points boost the impact per £1/kgtm around these TAC levels. For example Construction Materials has a much larger per £1/kgtm response for the £0.30/kgtm scenario than for the other scenarios, while Domestic Automotive has a much larger per £1/kgtm response for the £10.00/kgtm scenario than for the other scenarios.

For the high-response segments (C), the maximum possible lost is 100% which would equate to 10% per £1/kgtm increase, so that scenario can never be above 10% lost per £1/kgtm increase.

7.1. Maximum rational extra TAC levels

VUC is intended to recover the infrastructure costs that vary with marginal changes in traffic. A mark-up above VUC can therefore provide an additional contribution towards fixed Network Rail costs. However, the scope to levy such a mark-up depends on the amount that an efficient operator would be able to pay, and the potential effect of the charge on freight traffic is relevant to that assessment.

Because VUC already covers the cost directly incurred by running freight trains, any extra TAC above VUC that can be raised could be considered a financial benefit to NR, although this needs to be considered alongside the impact it has on freight traffic volumes.

If NR were solely looking to maximise revenue from this extra TAC, then they could seek to increase this TAC up to the point where any further extra TAC would result in a market segment's volumes reducing such that revenue would decrease.

If we assume there is a linear response between £3/kgtm and £10/kgtm, there are several market segments for which the £10/kgtm charge exceeds this threshold such that more revenue would be raised at a lower TAC rate:

- Maritime Intermodal
- Domestic Intermodal
- Domestic Automotive
- European Intermodal
- European Automotive
- European Other

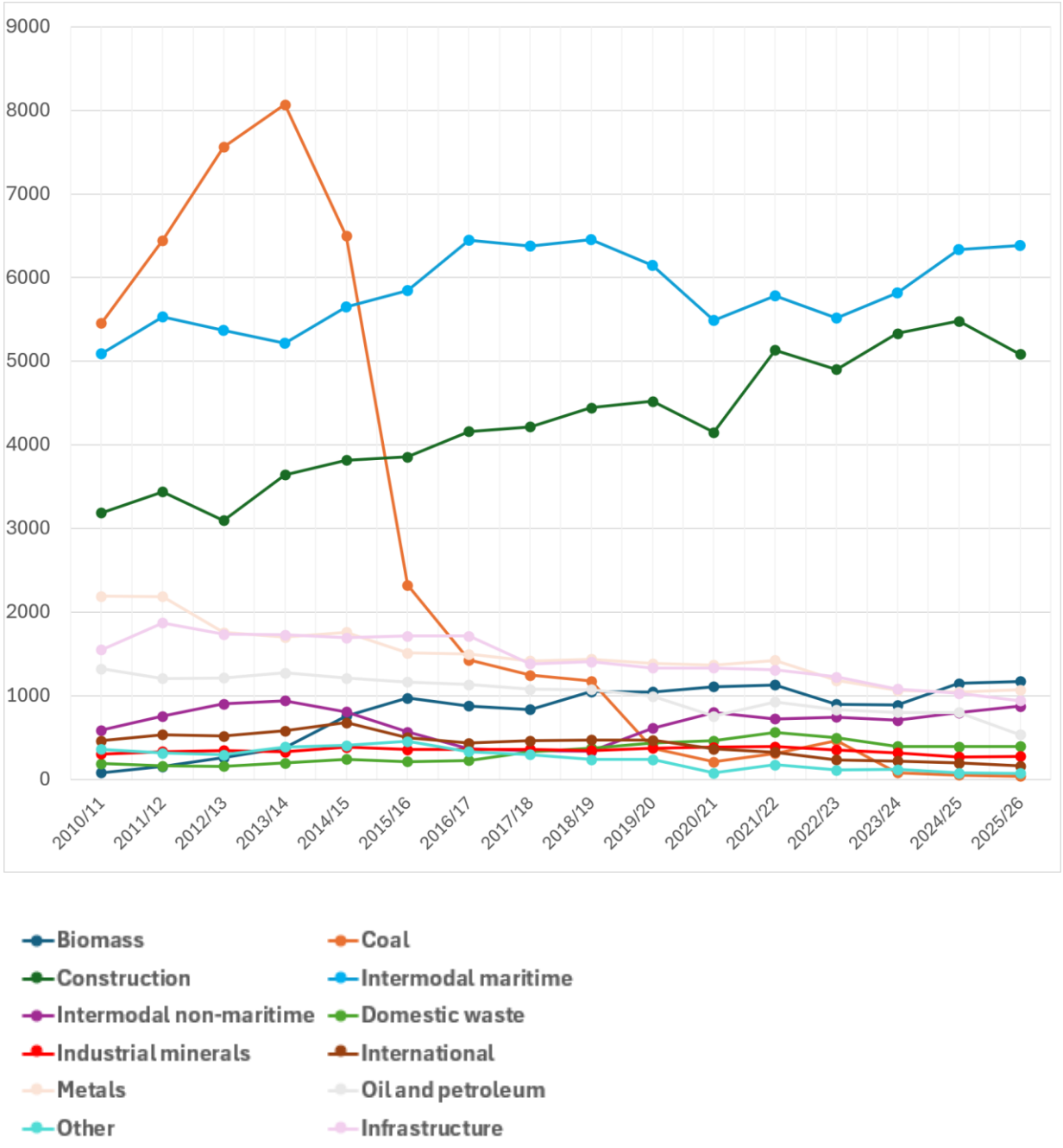
This threshold for each market segment sets an absolute maximum for what any extra TAC could rationally be, because any additional charge beyond that would result in lower revenue. Realistic extra TAC levels are likely to be much lower than these thresholds.

This report does not seek to recommend quantified extra TAC levels.

7.2. Historical traffic trends

7.2.1. Annual Tonne kms trends for each ORR commodity group

Figure 3: Annual million tonne kms trend for each commodity within Great Britain from 2010/11 to 2025/26. Source: ORR

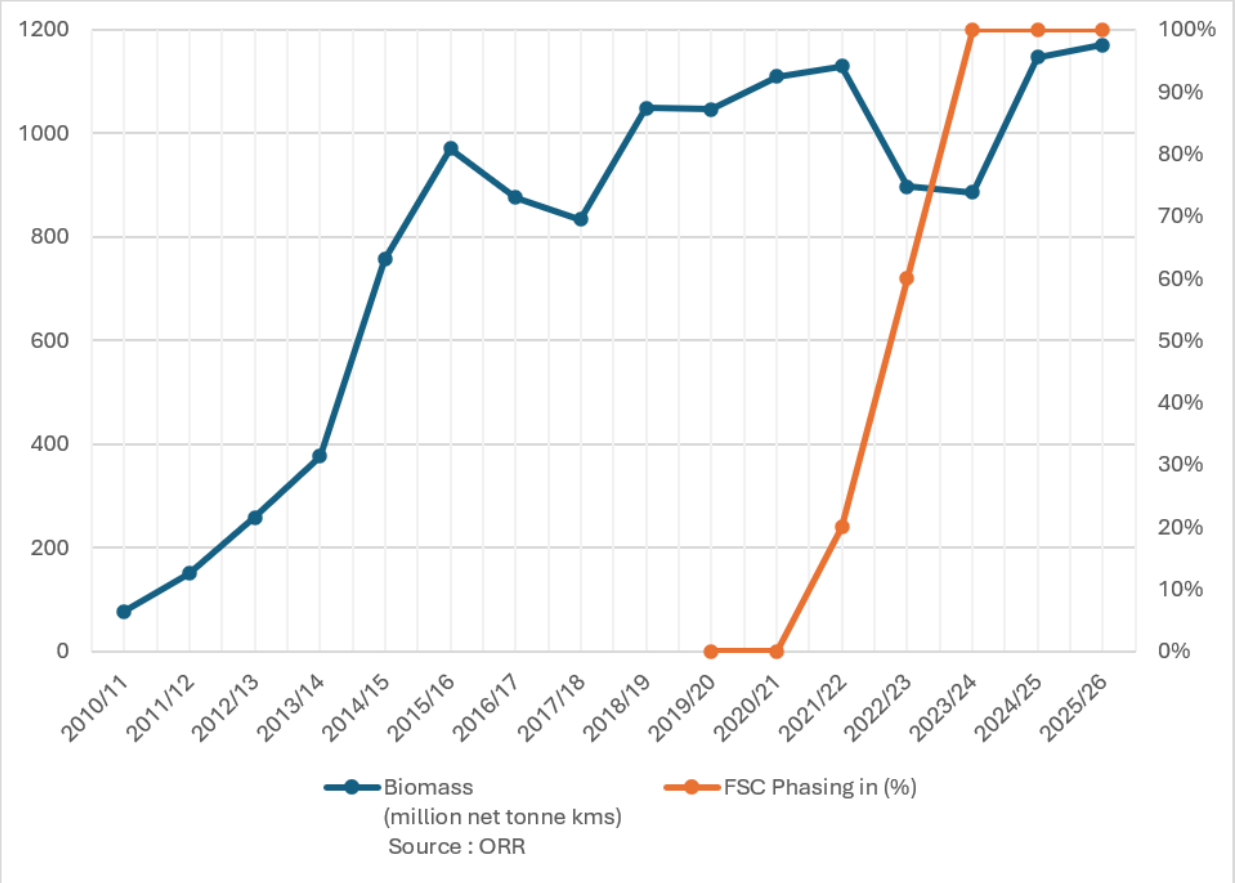


The graph above shows the Tonne kms trends for each ORR commodity group. It could be thought that those sectors that are declining (such as Coal, Oil and Petroleum) are more vulnerable to increased TAC than stable or growing commodities. However the industry should be making decisions

on what services are viable to operate based on costs and demand (and alternative options such as using road or water modes, or alternative sourcing) at any point in time. Any increase in TAC should affect the demand in the relevant time period irrespective of whether they are in a declining or growing market. So we have not incorporated historical trends in the assessment.

7.2.2. Effect of the introduction of FSC on Biomass traffic

Figure 4: Annual biomass moved within Great Britain from 2010/11 to 2025/26 along with the percentage of total Freight Specific Charge (FSC) applied.



Analysing just 2022/23 and 2023/24 this graph would suggest that increasing the FSC on Biomass had an immediate negative noticeable effect on the amount of biomass moved. However, expanding the analysis and including 2024/25 and 2025/26, the amount of biomass moved returns back to original levels even with the full FSC remaining. Therefore, this would suggest that other changes in the market were responsible for this increase rather than it having anything to do with FSC. As there are so many external factors that could affect the amount of Biomass or any other commodity that moves, we deem looking at previous FSC impacts on the market too unreliable to draw robust conclusions from.

8. IMPACT OF EFFICIENCY ON RESPONSE TO INCREASED TAC

As mentioned in section 4.1, our work has been based on cost models for an efficient operator (75th percentile), but we have also generated outputs based on a standard operator (operating characteristics representing the 50th percentile; the median). These 50th percentile costs have been used to provide a sensitivity test of 2031/32 modelled outputs at different increased levels of TAC.

A reference case was run for each efficiency scenario from which TAC increases were applied. The impacts of these increases are in the tables below. These modelled impacts assume that the operator does NOT become more efficient if TAC is increased.

Table 12: Raw GBFM intermodal million rail cargo tonne kms, showing impact of varying levels of TAC for the 50th and 75th percentile efficiency scenarios. Comparing the TAC impact for 50th and 75th percentile

TAC increase (£/KGTM)	50th	75th	50th percentile. % of Reference Tkms lost	75th percentile. % of Reference Tkms lost	75th minus 50th
Reference case	4,361	7,040	-	-	**0.00%**
0.30	4,204	6,825	3.59%	3.05%	**-0.54%**
1.00	3,861	6,190	11.47%	12.07%	**0.60%**
3.00	2,997	5,002	31.28%	28.95%	**-2.34%**
10.00	1,194	2,132	72.62%	69.71%	**-2.92%**

The table below shows an equivalent analysis for bulks based on the raw outputs from GBFM v4.

Table 13: Raw GBFM bulk million rail cargo tonne kms, showing impact of varying levels of TAC for the 50th and 75th percentile efficiency scenarios. Comparing the TAC impact for 50th and 75th percentile

TAC increase (£/KGTM)	50th	75th	50th percentile. % of Reference Tkms lost	75th percentile. % of Reference Tkms lost	75th minus 50th
Reference case	10,192	11,301	-	-	**0.00%**
0.30	10,079	11,143	1.10%	1.40%	**0.30%**
1.00	9,881	10,969	3.05%	2.94%	**-0.12%**
3.00	9,336	10,298	8.39%	8.88%	**0.48%**
10.00	6,655	8,159	34.70%	27.80%	**-6.90%**

These tables back up the assertion given in section 4.1.7, that the efficiencies of operators are not critical to an estimate of a percentage response to increased TAC for a group of services. This is especially true at low TAC increases where the impact of efficiency on response to increased TAC is small; sometimes slightly larger in the 50th percentile analysis compared to the 75th percentile, and sometimes slightly smaller. For example for bulks, if efficient costs are assumed (i.e. 75th percentile),

if TAC is increased by £3/kgtm, then 8.88% of Tonne kms is lost. However if 50th percentile costs are assumed, if TAC is increased by £3/kgtm, then 8.39% of Tonne kms is lost. This is a very similar response irrespective of the choice of reference case costs. This suggests that any conclusions on the A/B/C classifications would ***not*** be significantly affected by assumptions on the efficiency of operators.

9. PHASING IN

When previous new TAC have been brought in by the ORR[9], they have been gradually phased in over the 5-year Control Period, with the charges being levied as follows:

- Year 1: 0%
- Year 2: 0%
- Year 3: 20%
- Year 4: 60%
- Year 5: 100%

This gives the industry time to prepare and adapt before having to pay the full charge. Unless there is an urgent need for NR to receive the TAC income quickly, or there is a convincing case that more time is needed for the industry to adapt, we would recommend following the same phase-in approach again.

The modelling and estimation for this work considers 4 different TAC-increase scenarios but does not recommend specific rates that should be applied for each market segment. However in general we would expect the trend of the response to increased TAC to be broadly linear, subject to acknowledging that there would be some cliff-edges whereby a service could cease due to it becoming unviable at a particular level of TAC.

There would inevitably be some lag in response to increased TAC while FOCs and hauliers rearranged themselves in line with the new market position, because some assets such as terminals cannot be quickly dispensed with in line with a new operating environment. However given a couple of years to adapt before the TAC increases were implemented, we would expect much of the market response to be in line with the extent of the TAC increase.

9.1. Phasing in cost-reflective VUC

As mentioned in section 4, assumptions are made on how the Variable Usage Charge (VUC) would be increased up to 2031/32, on the path to full cost reflectivity (such that all marginal costs directly incurred by operating trains are covered by the VUC).

[9] FSC for Coal ESI and Iron Ore in CP5, Freight Only Line Charge for Iron Ore in CP5, and FSC for biomass in CP6

VUC increases up to 2028/29 are already finalised and published on the Network Rail website. The ORR's stated position is that they would then increase, reaching cost reflectivity (as defined by PR23 (Periodic Review 2023)) by the end of CP8 (2033/34). This represents an 8.6% increase from 2028/29. We have straight-line interpolated this, resulting in a 5.16% growth from 2028/29 to 2031/32.

However calculated marginal costs directly incurred by operating trains have increased since PR23, so there would need to be further increases beyond the 8.6% to reach full cost reflectivity, based on the more recently calculated costs.

10. COMPARISON TO PREVIOUS WORK

The Invitation to Tender (ITT) included a link to previous similar work we did in this area for the ORR[10]. The tonne kms responses to increased TAC are given for the 2 scenarios in tables 8 and 9 from that report. These scenarios looked to test the demand elasticities of each commodity in relation to an increase in VUC. Scenario 1 assumes increases in VUC in line with the ORR's capping and phasing-in policy at the time such that the charges reached full cost-reflectivity in 2028/29. This first scenario is quantified comparatively in the table below. Scenario 2 applies an illustrative further increase in VUC of 20% on top of the VUC previously applied in Scenario 1.

They are summarised below, and converted into a response to a £1/kgtm (2025/26 prices) increase as per the current work. This is then compared to the % responses from the current work for the £1/kgtm and £3/kgtm scenarios.

[10] Updated impacts of changes in track access charges on rail freight traffic – Revised report by MDS Transmodal for the ORR. April 2023

Table 14: impact on tonne kms. Comparison between the two scenarios from the previous ORR work, and the current work (£1/kgtm & £3/kgtm scenarios)

	Previous ORR Scenario 1					% impact scaled to £1/kgtm **			
Commodity	**2028/29 Reference case VUC ***	**% change in VUC**	**VUC increase ***	**Impact on traffic**	**VUC increase ****	**Previous ORR Sc 1**	**Previous ORR Sc 2**	**Current Work £1/kgtm**	**Current Work £3/kgtm**
Intermodal	1.92	8.5%	0.163	-1.5%	0.199	-7.5%	-8.9%	-10.3%	-9.7%
Automotive	2.20	6.9%	0.152	-0.2%	0.185	-1.1%	-7.9%	-3.7%	-3.5%
Construction Materials	3.49	25.7%	0.897	-4.1%	1.094	-3.7%	-5.8%	-3.4%	-3.9%
Domestic Waste	3.22	15.2%	0.489	-0.02%	0.597	-0.03%	0.01%	-0.1%	-0.1%
Metals	3.21	18.5%	0.594	-2.0%	0.724	-2.8%	-3.1%	-2.4%	-2.8%
Petro / Chem / Ind Min	2.49	16.7%	0.416	-1.2%	0.507	-2.4%	-2.0%	-1.0%	-1.1%

- Prices given in £/kgtm
- * Price base: 12 months to the end of October 2021
- ** Price base: 2025/26
- Intermodal includes Domestic and Maritime Intermodal.
- Metals equates to Steel

Comments on the comparison:

- For Maritime Intermodal, for the current work, we have included an estimate of maritime competition for shipping from the Deep-Sea South East Ports to Northern England and Scotland, and therefore we have a slightly higher response.
- For Automotive, the previous work had a large range of response for the two scenarios. The current work fits within those two extremes.
- For Construction Materials the responses are broadly similar, with the current work showing a slightly lower average response.
- For Domestic Waste, we have chosen a low response in both pieces of work.
- Metals (Steel) shows a broadly similar response to the previous work.
- For Petro / Chem / Ind Min, the current work shows a slightly lower response than the previous work.

This previous work focussed on candidate commodities for FSC for which there wasn't already an FSC in place. None of these commodities ultimately had an FSC applied to them in CP7.

In earlier work on the impact of TAC increases on Biomass the FSC was chosen at a level that could be expected to result in around 10% loss of traffic[11]: £1.9137/kgtm (2025/26 price base).

[11] "2018 periodic review final determination. Supplementary document – Charges and incentives: Infrastructure cost charges conclusions", ORR, October 2018
Para 2.29 https://www.orr.gov.uk/sites/default/files/om/pr18-final-determination-infrastructure-cost-charges-consultation-conclusions.pdf

APPENDIX 1: NEW COMMODITY SECTOR GROUP DEFINITIONS

The billing data from Network Rail includes a Train Service Code (TSC) for every movement. This TSC has an associated lookup list such that it can be converted into a commodity sector group. This coding of traffic is already established between Network Rail and the FOCs such that all movements can be categorised.

However these commodity sector groups are being changed as shown in figure 1, so for those sectors that are changing, there needs to be a means of translating to the proposed new commodity sector groups.

Most sectors are unchanged. However for the following commodities, changes had to be made. For each of the following commodity sectors the categorising decision was made in a hierarchy such that if the first commodity was not a match, then it would check for the next valid commodity. The new commodity sectors were defined as follows:

- Light locos: If the first digit of the headcode for a movement was zero i.e. "0xxx" and most of the locomotive's haulage movements were associated with freight (as opposed to passenger).

- Wagon Maintenance: If the train service code (defined by the train header file) started with 524068 or 554600 or was either 59460080 or 57620570 then it was defined as wagon maintenance, as informed by relevant train service codes specified by NR.

- Nuclear: Anything where the TOPS_COMMODITY code of the wagon represented nuclear material (095, 096, 097 or 098). Additionally, using the service code lookup provided where the NR reporting commodity was "Other" and the Service Code Name contained "Nuclear" or the Service Group Name was "OTHR - Sellafield – Power Stations".

- MOD: We included anything where the NR reporting commodity was "Other" and the Service Code Name was "OTHR - MoD Various".

- Passenger Stock Moves: If a wagon had its vehicle code start with A, D, E, G, L or N then it was classed as a passenger stock movement unless the NR commodity related to the service code stated it was Royal Mail in which case it was classed as Mail and Premium Logistics. The consequence of this assumption is that some passenger stock moves were previous NR reporting commodities and would no longer be classed as such. For example, some engineering haulage movements from Derby RTC. This has minimal impact on this work.

- Maritime Intermodal: If the origin and/or destination of a wagon was a port and the old NR reporting commodity was "Domestic Intermodal" then this movement was classed as "Maritime Intermodal". The remaining "Domestic Intermodal" traffic retained its "Domestic Intermodal" category name – but now only represents non-port traffic.

- NR Reporting commodity: If any of the wagons were not related to the above commodities as described, then the NR reporting commodity provided by NR relating to the Train Service Code was used. This applies to most traffic.

The table below shows the main detailed-commodities that are included in each of the new commodity group sectors, ranked by highest-traffic detailed-commodities at the top for each commodity group sector.

Table A1.1: Main detailed-commodities included in each new commodity group sector with the highest-traffic (2031/32) commodities shown first.

New Commodity Sector Group	Detailed commodities
Maritime Intermodal	Intermodal containers to or from a port Chemicals in lift-on lift-off containers
Domestic Intermodal	Intermodal containers NOT to or from a port Chemicals in lift-on lift-off containers
Construction Materials	Limestone Basalt/Granite/Gritstone/Hardstone Marine Sand and Gravel Cement Sugarstone Gypsum For Cement Manufacture Spoil, Commercial Timber Sand Ash/Cinders/Slag
Steel	Scrap metal – proposed to be separated out Hot Rolled Coil Sheet Bar / Slabs Coils, Steel Rod In Billets (Steel), Blooms & Slabs Tinplate/Blackplate Cold Rolled Coil Alloys / Metals (Non-Ferrous) Other
Biomass	Biomass
Petroleum	Derv/Gas Oil/Diesel/Heating Oil Aviation Turbine Fuel (Avtur) Benzole / Motor Spirit Burning Oil / Kerosene
Domestic Waste	Household Refuse Containers returning empty Spoil, Commercial
Industrial Minerals	Sand for Glass Making Other Calcium Carbonate Potash (Potassium Chloride) Alumina/Bauxite Rock Salt China Clay/Clay Stone Clay Common/Fire
Domestic Automotive	Cars & Vans
Iron Ore	Iron Ore
Coal	Coke To Steel Works Industrial Coal
Nuclear	Nuclear (Irradiated Fuel) Flask Discharged Radioactive Flasks Other Radioactive Material
European Other	Mineral Water Packaged Wood & Cork Products
European Automotive	Cars & Vans
Light Locos	Light Locos
Passenger Stock Moves	Passenger Stock
Wagon Maintenance	Wagon Maintenance