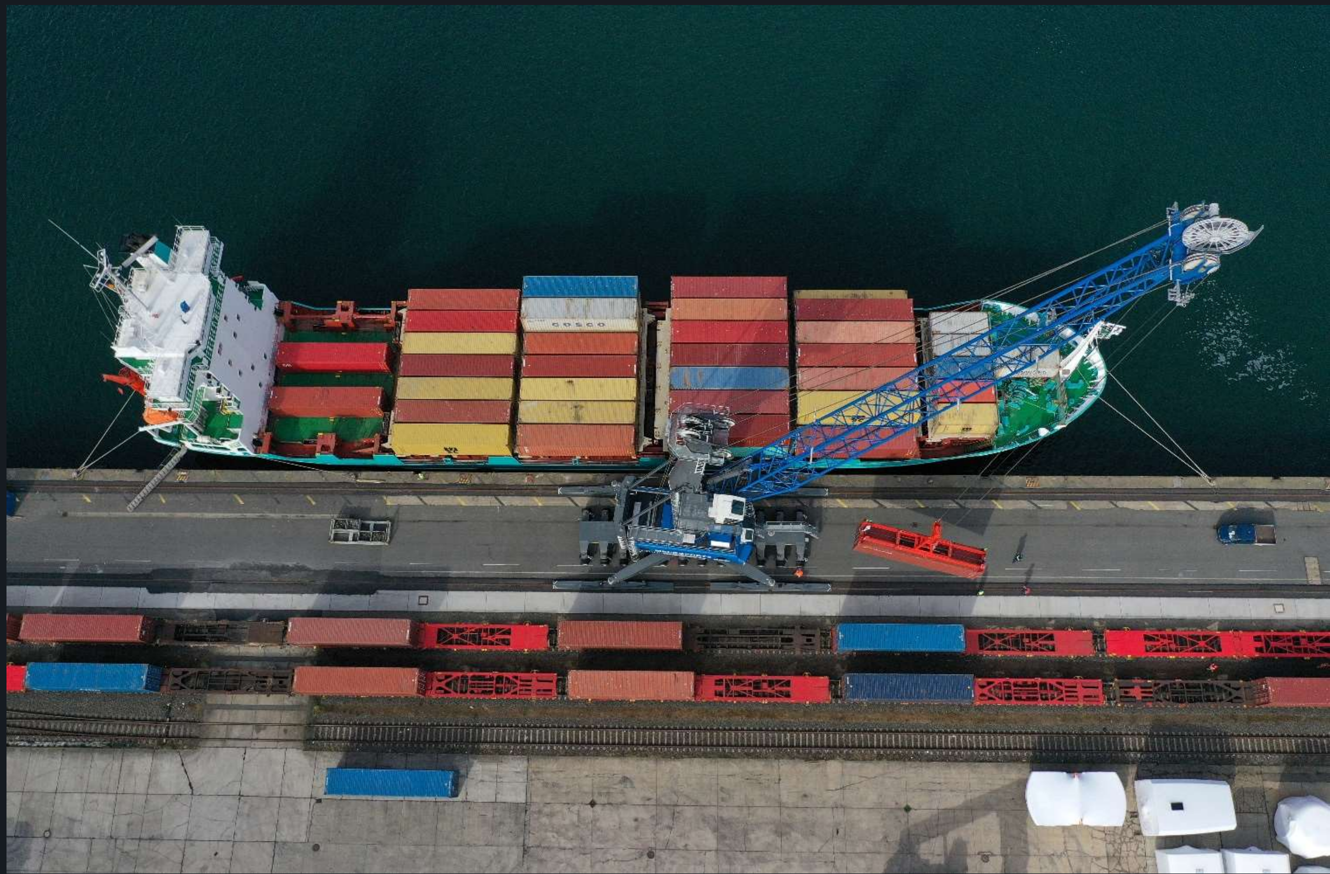
Report
December 2024

Road v Rail Freight Cost Analysis



Rail Partners
Our ref: 24747601

steer

Report
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Road v Rail Freight Cost Analysis

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1 Overview

Background

1.1 Steer were commissioned by Rail Partners to undertake this study, the purpose of which is to understand:

- how road haulage and rail freight costs have changed over time, and
- how the differential between these costs affects rail freight growth.

1.2 Rail Partners is commissioning this study as part of their mandate to make the railway better on behalf of the international transport companies that make up their membership.

1.3 Steer have produced this analysis through consultation with Rail Partners and their members, drawing on publicly available data and commercial data from rail freight operators. This has formed the basis of Steer's estimate of how the cost per tonne mile of rail and road freight has changed from FY2015 to FY2024.

1.4 The following sections of this report cover:

- a detailed description of the approach taken, including sources, assumptions, and methodology, and
- a step through of the results, at an overall market level and then broken down by commodity type and cost component.

Confidentiality

Non-Disclosure Agreements (NDAs)

1.5 In order to obtain access to commercially sensitive operational and cost data from the Freight Operating Companies (FOCs) who form Rail Partners' members, Non-Disclosure Agreements were agreed between Steer and with each freight operator.

1.6 As such, data contained in this report has been suitably anonymised so as to not identify the commercial performance of any single Operator. This has meant that the specific representative flows chosen for each commodity have had to be anonymised, with the majority of outputs shown as an indexed trend or proportion.

Disclaimer, in accordance with NDAs

1.7 We accept no responsibility for any error or omission in the Report which is due to an error or omission in data, information or statements supplied to us by other parties (the 'Data'). We have not independently verified the Data or otherwise examined it to determine the accuracy, completeness, sufficiency for any purpose.

Report Structure

1.8 This report sets out in the following chapters our approach to freight cost estimation, findings from this analysis, and the relationship between the determined cost differential and rail freight demand.

2 Approach: Cost Estimation

Overview

2.1 The relative costs between rail freight and road freight, since FY2015 to FY2024, have been calculated by the following steps:

- Identifying a selection of representative flows reflecting a range of commodity types.
- Gathering data from Rail Partners' FOC members and publicly available information.
- Reviewing the data and select appropriate assumptions to estimate a representative set of road and rail freight costs for a typical flow within each commodity type.
- Comparing this time series of rail and road costs with respect to each commodity type and cost component.
- Determining costs for each cost component at a journey level, before dividing by the weight carried and distance covered for each commodity flow to give a cost component shown on a £ per tonne mile basis.
- Inferring an aggregate industry-wide cost estimate by averaging the cost estimates for each commodity flow, weighting by the amount and distance of each commodity carried by rail in 2024.

2.2 Data has been converted to financial years and FY2024 prices where necessary.

2.3 The remainder of this section documents in detail the approach, data sources used, and assumptions made during this process.

Representative Flows

2.4 A suitable range of flows across were identified to represent the UK freight market. This was achieved in consultation with Rail Partners' FOC members. Factors involved in choosing the representative flows included data availability and ensuring a representative range of geographies, commodities, and flow lengths.

2.5 The long list of representative flows is shown in Table 2.1. The data received from the freight operators on these flows, and from subsequent consultation discussions with the FOCs, form the basis for our analysis. This data was paired with publicly available data and, where necessary, experienced professional judgement to form the the assumptions used.

2.6 The representative flows covered the following commodities:

- **Intermodal – Diesel Traction**
- **Intermodal – Electric Traction**
- **Construction**
- **Metals**
- **Automotive**
- **International**

2.7 In total, these represent 78% of the total UK rail freight market in 2024, in billion net tonne kilometres.

Table 2.1: Long list of representative flows

Commodity	Origin	Destination	Region	Distance	Traction
Intermodal	Southampton	Cardiff	South West	Short	Diesel
Intermodal	Port of Felixstowe	West Midlands Hubs	Midlands	Medium	Diesel
Intermodal	Port of Felixstowe	Trafford Park / Widnes	North West	Long	Diesel / Electric
Intermodal	London Gateway	Doncaster / Wakefield Europort	Yorkshire	Long	Diesel
Intermodal	Seaforth Docks	Mossend	Scotland	Long	Diesel
Construction	Peak District	Manchester	North West	Short	Diesel
Construction	Peak District	Northampton	Midlands	Medium	Diesel
Construction	Peak District	Battersea	London	Long	Diesel
Metals	Scunthorpe	Doncaster / Masborough	Yorks & Humberside	Short	Diesel
Metals	Port of Boston	Wolverhampton Steel Terminal	Yorks & Humberside	Medium	Diesel
Automotive	Plant*	*	*	Medium	Diesel
International	UK*	Spain (via Channel Tunnel) *	International	Long	Electric

* Information redacted for reporting due to commercial sensitivity, for when a commodity has a single representative flow identified.

Diesel and Electric Traction

2.8 The majority of flows identified used diesel traction. The only flows identified which used electric traction were the **International** flow, whose costs are based on the HS1 Electric Current for Traction (EC4T) charges, and a portion of an intermodal flow.

2.9 As such, the representative **Intermodal** flow was split into two, one using diesel traction, and one with almost identical assumptions, but running under electric power. This electric flow is illustrative as in practice the flow combines diesel and electric traction.

The International Flow

2.10 The **International** flow represents a flow which crosses into Europe via the Channel tunnel and uses HS1 infrastructure when in the UK. For both of the rail and road freight estimates, just the UK and Channel tunnel costs of the journey have been estimated.

Data Sources

Freight Operator Data

2.11 The majority of our analysis is based on data received by the Rail Partners' FOC members. This includes detailed information on:

- Flow origin and destination
- Rail and road distances
- Ultimate destination, if available
- Annual volumes carried, in Twenty-foot Equivalent Units (TEUs) or Tonnes
- Representative locomotive and wagon types
- Representative wagon numbers
- Utilisation rates
- Backload factors
- Asset costs, related to
  - Locomotives and Wagons
  - Leasing and Maintenance
- Staff (driver and ground staff) assumptions including:
  - hours per year
  - productivity rates
  - on-costs (National Insurance, pensions, overtime)
- Energy (diesel and electric) consumption rates
- Handling and (port) access costs
- HS1 and Channel Tunnel access and energy costs
- Overhead costs

Other data sources

2.12 The remaining information came from the data sources shown in Table 2.2, with the majority of road freight assumptions coming from Motor Transport operating cost tables.

Table 2.2: Non-FOC Data Sources and their use in our analysis[1]

Data Source	Use
Motor Transport Tables	For road freight assumptions. Specifically: • AdBlue costs (part of wider fuel costs) • Vehicle levies • Asset costs • Vehicle Configurations • Staff Productivity Assumptions
Network Rail Track Access Charges	Rail track access costs (excluding the International flow)
Eurotunnel Freight	Road channel tunnel freight costs for the International flow
ONS Annual Survey of Hours and Earnings	Staff salaries (Rail drivers, Road drivers, Rail Ground Staff)
DESNZ weekly road fuel prices	Diesel costs (with and without Fuel Duty)
DESNZ domestic energy prices	Electricity costs
CPIH data	Convert from nominal to Real FY24 prices
ORR Rail Freight Moved by Commodity	Weighting used to aggregate commodity level cost estimates to industry level.
Google Maps	Road route distances

[1] External sources throughout the document are detailed in Table 5.1

Route and Cost components

2.13 To calculate the costs per tonne mile for road and rail freight, we have made assumptions in relation to the specifics of each route operated, and the different components which form the costs of transporting freight by either road or rail.

2.14 To simplify comparison between road and rail costs, we have grouped freight cost data into the following cost components:

- Track Access Costs (/ Road Levies)
- Energy Costs
- Staff Costs
- Asset Costs
- Route-Based Costs (e.g. Handling, Terminal Access)
- First and Last Mile Costs

2.15 These components are defined in the following sections, with the operational assumptions for each commodity flow and how the costs of road and rail freight are calculated for each component explained.

Flow Distances

2.16 The scope of this analysis is to compare relative costs on a per tonne mile basis. As some cost items vary by distance covered (e.g. fuel costs) while others are fixed for a trip (e.g. asset costs), a representative distance for rail and road has been assumed for each commodity type.

2.17 The ultimate start and end points for each representative commodity flow were based on data from the long list of representative flows created in consultation with Rail Partners' FOC members (see Table 2.1).

Table 2.3: Assumed representative flow distances for each representative flow

Commodity flow	Rail distance	Road distance
Intermodal – Diesel	186 rail miles + 30 road miles	183 road miles
Intermodal – Electric	186 rail miles + 30 road miles	183 road miles
Construction	215 rail miles + 0 road miles	173 road miles
Metals	138 rail miles + 10 road miles	124 road miles
Automotive	90 rail miles + 0 road miles	69 road miles
International	110 rail miles + 30 road miles	115 road miles

2.18 The rail distance was provided by FOCs. This data and subsequent discussions also aided in determining the last mile distance. This last mile distance is assumed to be completed via road. For a trip cycle (a combined outbound and return rail journey) these distances are assumed to be doubled.

2.19 **Construction**, **Metals**, and **Automotive** commodities have been assumed to have minor or negligible last mile distances. This is based on a review of the list of representative flows in Table 2.1. We are aware that there are examples of other flows in the UK for these commodities where a last mile distance is not negligible. However, this information was not available is sufficient detail to be used for this work.

2.20 The road distance uses the same ultimate start and end points for each flow, with Google Maps used to determine the road milage.

2.21 These distances are shown in Table 2.3. Rail distances range from 20-30% longer than road distances once last mile distances are accounted for in rail freight. This is driven by the constraints of the rail network and limited rail connected facilities compared to the more extensive and accessible road network.

Vehicle Configurations

2.22 Specific vehicle types and payload capacities were defined and held constant over our analysis period. These are also used to determine their corresponding asset cost prices.

Rail

2.23 Train configurations were selected via review of those used by Rail Partners' FOC members across provided representative flows. Table 2.4 outlines these configurations, with the backload factor representing the proportion of the outbound payload carried on the return rail leg.

Table 2.4: Rail vehicle configurations

Commodity	Locomotive Type	Wagon Type	Wagon numbers	Backload Factor	Total Single Direction Payload
Diesel Intermodal	Class 66/5	FXAC	30	100%	54 TEUs/ 513 Tonnes
Electric Intermodal	Class 90/0	FXAC	30	100%	54 TEUs/ 513 Tonnes
Construction	Class 66/5	HIAA	24	0%	1,440 Tonnes
Metals	Class 66/5	BYAA	21	0%	1260 Tonnes
Automotive	Class 66/5	WIAA	10	0%	285 Cars/ 570 Tonnes
International Intermodal	Class 92/0	FXAC	30	100%	54 TEUs/ 513 Tonnes

Source: Steer analysis of Rail Partners' FOC members data

Road

2.24 Road vehicle configurations were determined based on the vehicle types available via the Motor Transport Cost Tables. However, the types available are limited with the specified articulated vehicle trailer types not directly applicable to the representative freight movements being analysed.

2.25 Therefore a tri-axle trailer (curtain sider) has been used for all articulated trucks, with a specific adjustment factor – "Trailer Cost Factor," applied when determining costs for each commodity flow.

Table 2.5: Road vehicle configurations

Commodity	Vehicle Type	Trailer Cost Factor	Total Payload
Diesel Intermodal	Articulated - 38-tonne unit 4x2	0.6	2 TEUs/ 19 Tonnes
Electric Intermodal	Articulated - 38-tonne unit 4x2	0.6	2 TEUs/ 19 Tonnes
Construction	Rigid - 32-tonne GVW 8x4 (tipper)	-	32 Tonnes
Metals	Articulated - 38-tonne unit 4x2	1.0	38 Tonnes
Automotive	Articulated - 38-tonne unit 4x2	1.5	10 Cars/ 20 Tonnes
International Intermodal	Articulated - 38-tonne unit 4x2	0.6	2 TEUs/ 19 Tonnes

Source: Steer analysis of Motor Transport Tables

Track Access Costs

Rail

2.26 For the majority of commodity types, track access costs were calculated by applying Network Rail Track Access Charges for locomotives and wagons. These charges relate to weight carried and distance covered for each flow.

2.27 The data used to determine these charges can be found in Table 2.4, noting the backload factor is applied on the return journey. Charges vary when wagons are run tare (empty) and laden (loaded).

2.28 For the **International** commodity, HS1 Access Charges have been applied. These are charged on a per train basis, and do not depend on weight or distance.

Road

2.29 The equivalent access costs for road freight are determined from the Motor Transport tables and include:

- Vehicle Excise Duty (VED), and
- Road User Levy (RUL).

Staff Costs

Rail

2.30 For all commodity types, annual salaries for rail drivers and ground staff were determined from ONS data, as outlined in Table 2.2, for the analysis period. These are based on four-digit Standard Occupation Classification codes, with the averages of the following occupations used for rail staff:

- Drivers
  - 8231 – Train and tram drivers
- Ground staff
  - 5236 – Rail and rolling stock builders and repairers
  - 8153 – Rail construction and maintenance operatives

2.31 Using this data, a staff cost per mile is determined using costs and productivity data provided by Rail Partners' FOC members as outlined in Table 2.6.

Table 2.6: Staff productivity metrics

Productivity metric	Driver	Ground Staff
Yearly working hours	1,400	1,800
Productivity factor (admin, training, and sick time)	50%	70%
On-costs factor (pensions, national insurance, and overtime)	20%	20%
Hours per trip	Based on 10 miles per hour	12 hours per train load

Source: Rail Partners' FOC members data

2.32 To account for establishment overhead costs, a 15% uplift (based on Rail Partners' FOC members' data) is applied to total rail freight costs and then assigned to the staff cost component.

Road

2.33 For all commodity types, annual salaries for road drivers were determined from the ONS Annual Survey of Earnings for the analysis period. These are based on the four-digit Standard Occupation Classification codes, with the code "Large goods vehicle drivers" used for this analysis.

2.34 Motor Transport Tables provide productivity estimates for the road haulage industry of 80,000 miles per year for articulated vehicles, and 60,000 miles per year for rigid vehicles. These are used to convert the salary data to a per mile cost for road freight with an additional 20% applied for On-costs.

2.35 As with rail, a 15% uplift is applied to total road freight costs to account for establishment overhead costs and is then assigned to the staff cost component.

Energy Costs

Rail

2.36 As outlined in Table 2.2, energy costs are determined from DESNZ sources at a cost per litre or kWh basis. These charges relate to distance covered for each flow.

2.37 Energy consumption rates are determined based on locomotive types outlined in Table 2.4, with consumption rates as follows, benchmarked against Rail Partners' FOC members' data.

- Diesel – Class 66/5 – 7.6 litres per mile
- Electricity – 90/0 – 41 kWh per mile

2.38 For the **International** commodity, energy charges are based on HS1 EC4T. These are a cost per train, and do not depend on distance.

Road

2.39 Road fuel costs are determined for diesel and AdBlue costs from Table 2.2, with applicable fuel duties, at a cost per litre basis.

2.40 Energy consumption rates are determined based on vehicle types outlined in Table 2.4, with consumption rates as follows:

- Articulated – 38-tonne unit 4x2 – 2 miles per litre
- Rigid – 32-tonne GVW 8x4 (tipper) – 1.65 miles per litre
- AdBlue – 6% of Fuel consumption

Asset Costs

Rail

2.41 Ownership and maintenance costs, determined separately for locomotives and wagons, are determined for the latest complete financial year, FY2024. Costs are based on the train configurations outlined in Table 2.4 at a cost per locomotive or wagon trip.

2.42 The data is derived from an overview of Rail Partners' FOC members' data for the corresponding train configurations. However, the percentage yearly change is held consistent over time and the different commodity types.

Road

2.43 Ownership and maintenance annual costs are derived from the Motor Transport Tables. These are converted to a per mile cost using the same method as used for staff costs as outlined in 2.34.

Route-Based Costs (Handling and Access)

Rail

2.44 For **Intermodal** flows, route-based costs are determined from Rail Partners' FOC members' data and represent the following components:

- Terminal handling: Covers terminal/dock-to-train and train-to-terminal/dock handling
- Port/Terminal access: Covers entry and terminal use costs
- International access: Channel Tunnel access costs applying to the **International** flow.

2.45 These costs apply at a per TEU or a per train basis so are calculated for the trip as a whole before being related to weight carried and distance covered for each flow.

2.46 As outlined in 2.10, for the **International** flow, costs are based on the UK leg of the rail journey, with the price of using the Channel Tunnel included. This Channel Tunnel access cost is determined from Rail Partners' FOC members' data.

2.47 Route-Based costs are not applied to non-intermodal commodity flows. This is due to the prominence of these costs being borne directly by the customer, based on discussions with Rail Partners' FOC members.

Road

2.48 For **Intermodal** flows, both terminal handling and terminal access costs are determined as being represented by Vehicle Booking System (VBS) costs as provided by FOCs for FY2024. These are assumed to have held constant over time in real terms over the analysis period.

2.49 For the **International** flow, data on freight vehicle costs to use the Channel Tunnel as sourced in Table 2.2 was used.

2.50 Route-Based costs are not applied to all non-intermodal commodity flows.

First and Last Mile Costs

Rail

2.51 First-mile costs represent backload journeys and are equated to last-mile costs as derived from on distances as described in Table 2.3.

2.52 The cost for this last mile distance is determined from FOC data for the latest complete financial year, FY2024. The percentage yearly change is based on the change of total equivalent road freight cost for the same commodity flow over time.

2.53 This total cost for the trip is then related to the total weight carried and distance covered for the rail flow.

Road

2.54 First and last mile costs are not applicable for road freight as goods are assumed delivered to the end destination of the customer.

Aggregation approach

2.55 The costs determined for each cost category and for each commodity flow were combined to determine a representative cost for the rail freight industry nationally.

2.56 A weighted average of the costs determined for the different commodities is calculated using the FY2024 share of tonne kilometres of UK rail freight, provided by ORR data, as shown in Figure 9.

2.57 This is done for each cost component before being aggregated to a £ per tonne mile for UK rail freight. The same weighting is used to convert corresponding road freight costs for each commodity to a national comparator road freight £ per tonne mile.

3 Relative Cost Analysis

Overview

3.1 The results show that since FY2015, on average overall rail freight costs have grown 10%, compared to road freight costs at 3%. This 7%-point difference has been calculated on a per tonne mile basis.

3.2 At a freight commodity level, rail costs have increased since 2015 by a higher percentage relative to road in all commodity categories.

3.3 This highest differential cost rise is for the **International** flow, the 20%-point difference reflects a 21% cost growth for rail compared to 1% for road, driven in part by the rapid rise of HS1 EC4T charges in the last two years, the rise in HS1 access charges, and by the relative change in channel tunnel costs.

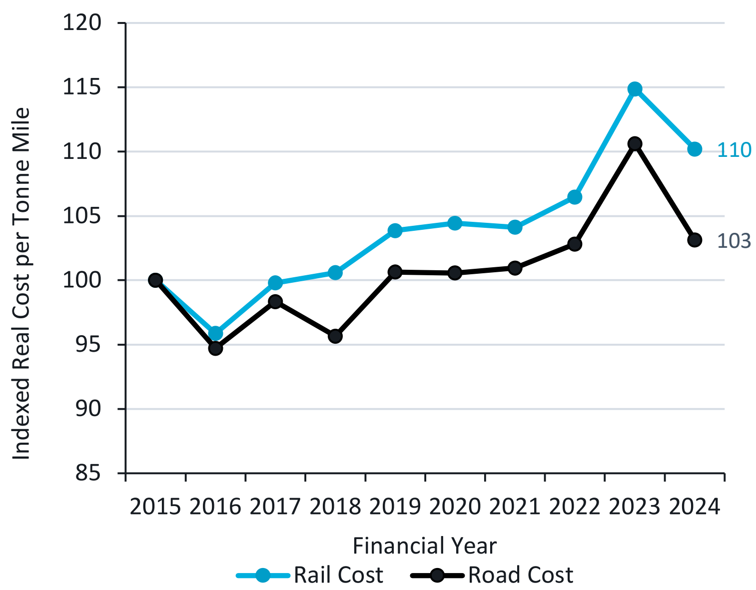
Table 3.1: 2024 Percentage point price change from 2015 by commodity

Freight Commodity	Cost growth per tonne mile from FY2015 to FY2024		
	Rail	Road	Rail over Road
Intermodal – Diesel	10%	5%	+5% points
Intermodal – Electric	14%	5%	+9% points
Construction	9%	1%	+8% points
Metals	9%	5%	+4% points
Automotive	6%	6%	+0% points
International	21%	1%	+20% points
Weighted Average	**10%**	**3%**	**+7% points**

3.4 This is followed by **Intermodal – Electric**, which has a 9%-point difference, reflecting a 14% cost growth for rail compared to 5% for road driven by strong divergence in increases of energy costs. **Construction**, which has a significant share of rail freight, has an 8%-point difference, reflecting a 9% cost growth for rail compared to 1% for road.

3.5 Further detail of these changes is found later in this section. Table 3.1 presents these relative cost changes for each commodity and at an overall level. Figure 1 presents the indexed change in overall rail and freight cost since 2015.

Figure 1: Overall Rail vs Road Real Cost Change, Indexed 100 = FY 2015



3.6 The indexed change in rail and freight cost since 2015 by commodity is shown in Figure 2 - Figure 7.

Figure 2: Indexed Rail vs Road Real Cost Change, Commodity: *Intermodal – Diesel*

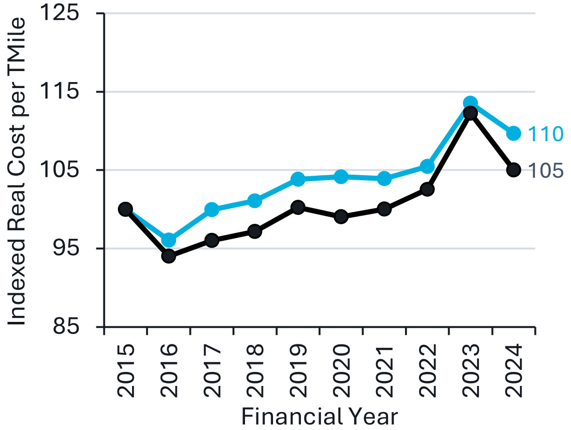


Figure 4: Indexed Rail vs Road Real Cost Change, Commodity: *Construction*

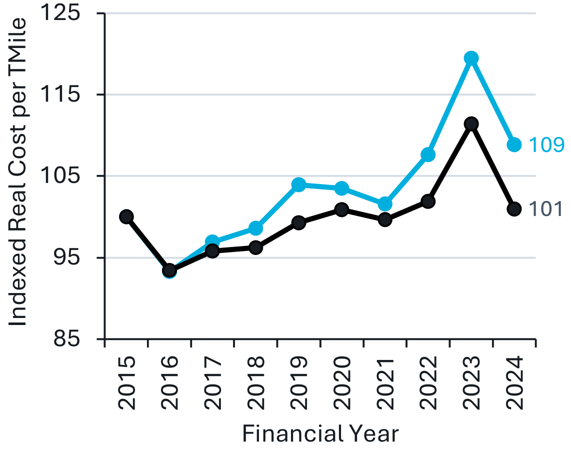


Figure 6: Indexed Rail vs Road Real Cost Change, Commodity: *Automotive*

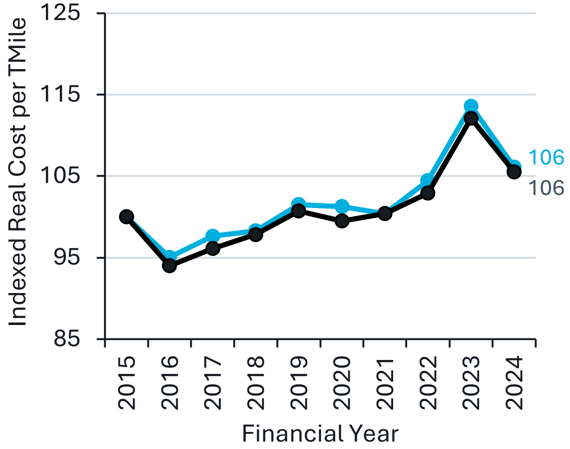


Figure 3: Indexed Rail vs Road Real Cost Change, Commodity: *Intermodal – Electric*

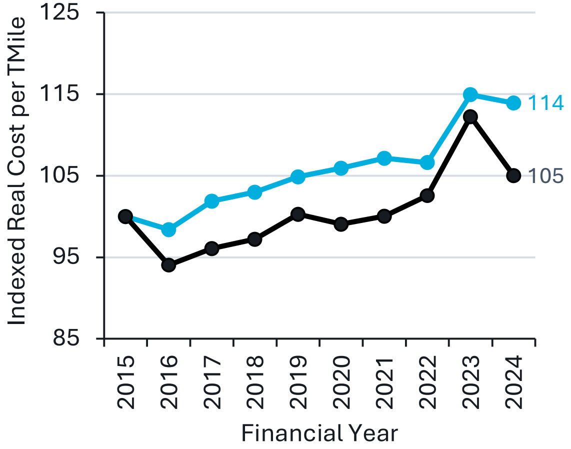


Figure 5: Indexed Rail vs Road Real Cost Change, Commodity: *Metals*

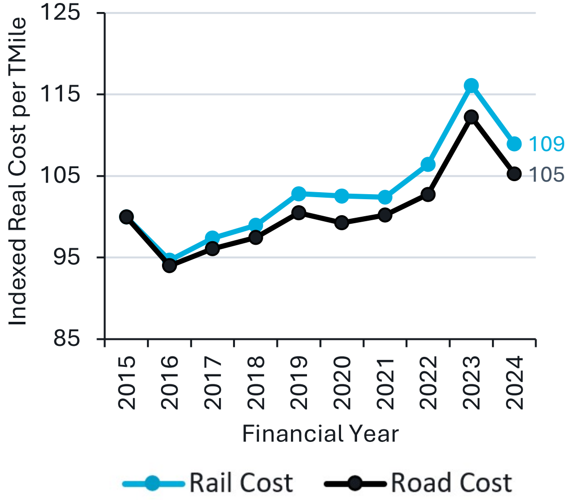
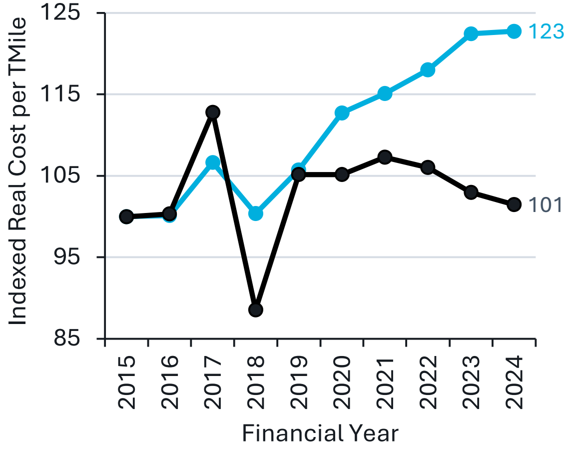


Figure 7: Indexed Rail vs Road Real Cost Change, Commodity: *International*

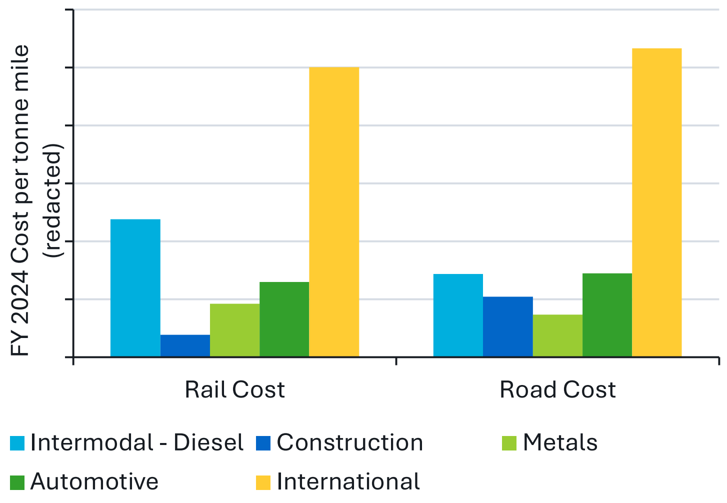


Weighting by commodity

3.7 As mentioned in the previous section, in order to produce an overall cost per tonne mile for rail and road freight, ORR data, as per Table 2.2, of 2024 rail freight carried by commodity type in billion net tonne km was used to weight the estimated commodity costs produced in this analysis.

3.8 The mapping of the cost categories used in the ORR data to that used in this analysis is shown in Table 3.2. The relative costs per tonne mile for each cost category can be seen in Figure 8. This can be compared to the weightings applied by commodity, shown in Figure 9.

Figure 8: Estimated FY 2024 cost per tonne mile for Rail and Road Freight by commodity type



Note: Y-axis values redacted due to commercial sensitivity

Figure 9: ORR Rail freight share, bn net tonne km

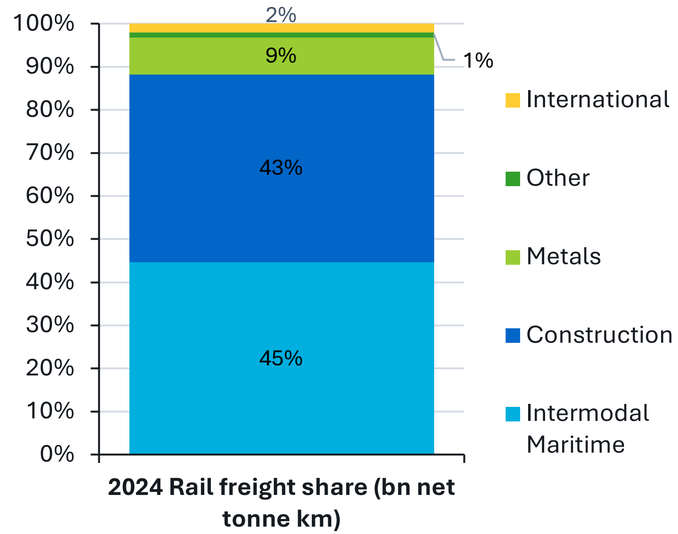


Table 3.2: Mapping of commodity types to cost weighting categories (in ORR data)

Commodity flow	Cost weighting category
Intermodal - Diesel	Intermodal Maritime
Construction	Construction
Metals	Metals
Automotive	Other
International	International

3.9 **Intermodal – Electric** is excluded from the above weighting as the proportion of freight moved by electric traction is minimal, with intermodal costs best represented by **Intermodal – Diesel** costs.

Cost per tonne for an average trip cycle

3.10 When averaging across commodity types and then considering the average length for a trip cycle, the cost per tonne for rail is £36, with road at £34, in FY2024. The breakdown over time of rail and road costs per tonne for a standard trip cycle is shown in Figure 10 and Figure 11.

3.11 Note that, using the distances in Table 2.3, the representative flow distances used has rail freight travelling approximately 18% to 30% more miles than road freight on the same routes, see Table 3.3 for the comparison by commodity.

Figure 10: Rail freight cost per tonne for a standard trip cycle, by cost component

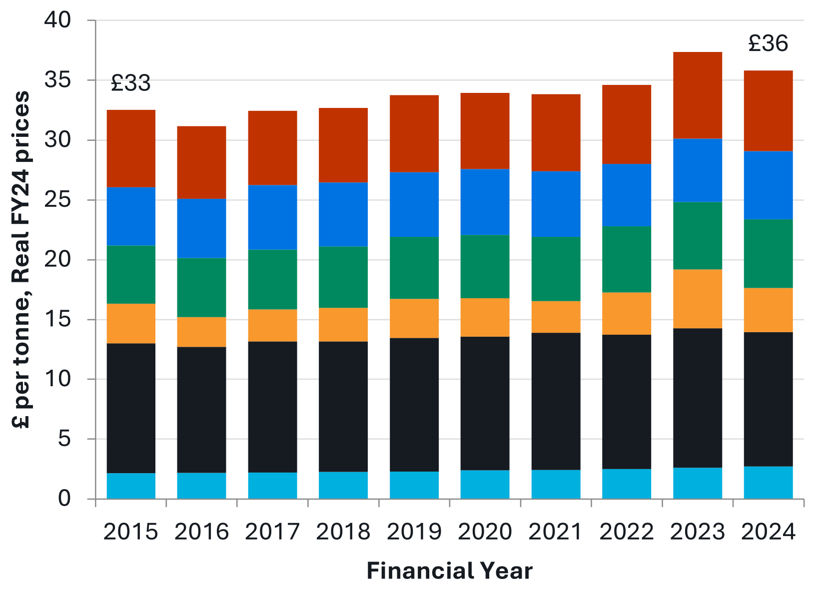
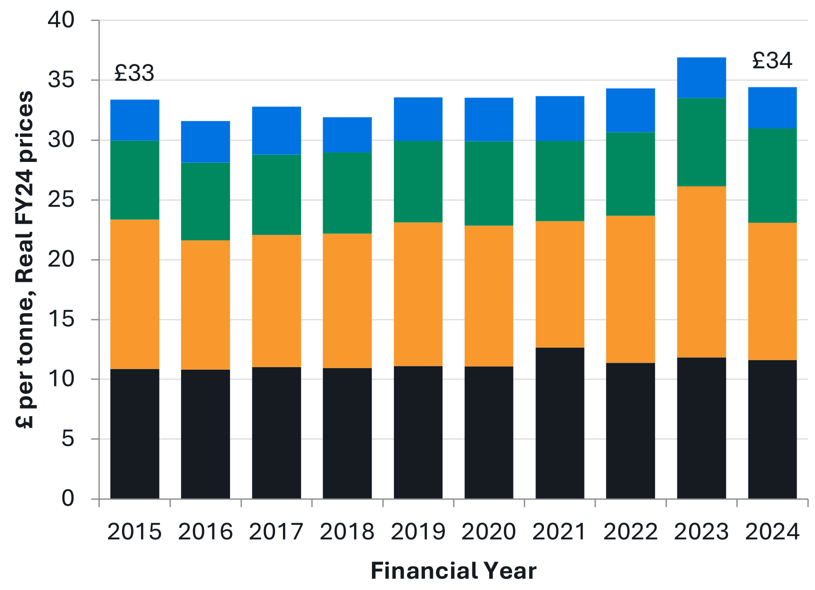


Figure 11: Road freight cost per tonne for a standard trip cycle, by cost component



Track Access/Road Levy Costs
Staff Costs
Energy Costs
Asset Costs
Route Charges
Last Mile Costs

Table 3.3: Rail route mileage compared to road, proportional difference

Commodity flow	Rail mileage	Road mileage	Extra Rail distance
Intermodal	216	183	18%
Construction	215	173	24%
Metals	148	124	19%
Automotive	90	69	30%
International	140	115	22%

Note Rail mileage includes last mile distances, see Table 2.3 for breakdown.

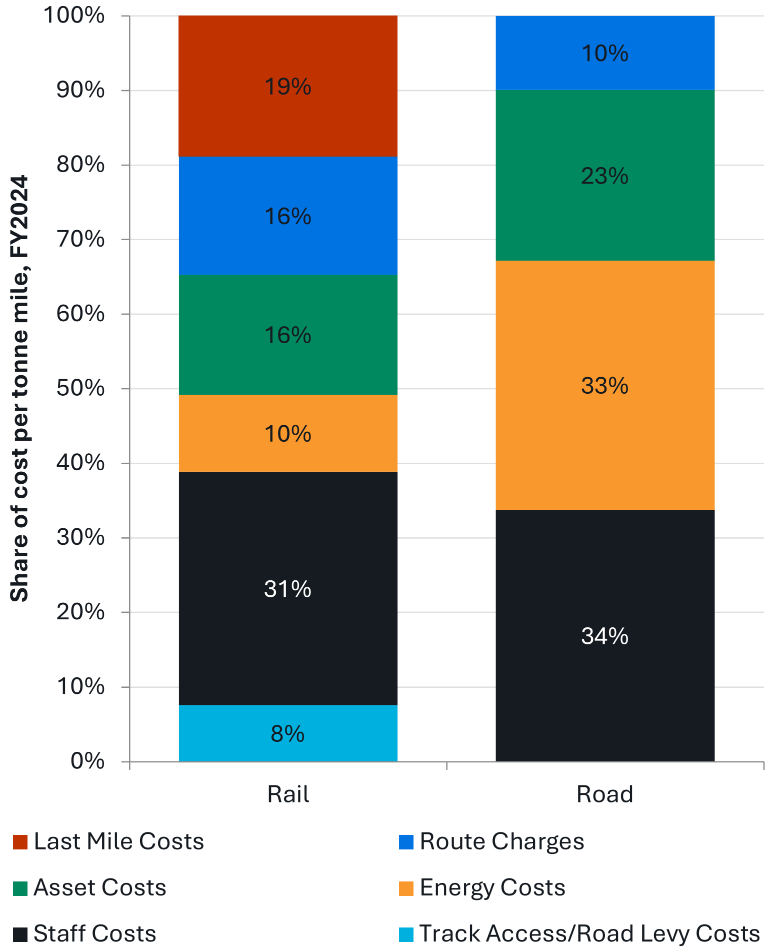
3.12 Figure 12 shows, for FY2024, the relative shares by cost component of road and rail costs per tonne mile. Energy costs are estimated to contribute 10% to the total rail cost, and 33% to the total road cost. Track access costs are estimated to be 8% of rail costs and are negligible for road costs.

3.13 Last mile costs for rail are estimated to be 19% of all costs, noting that this will vary by commodity type with the analysis assuming no last mile cost for **Automotive** and **Construction** flows.

3.14 The relative shares for in cost component, for each commodity flow type, comparing road and rail, is shown in Figure 13.

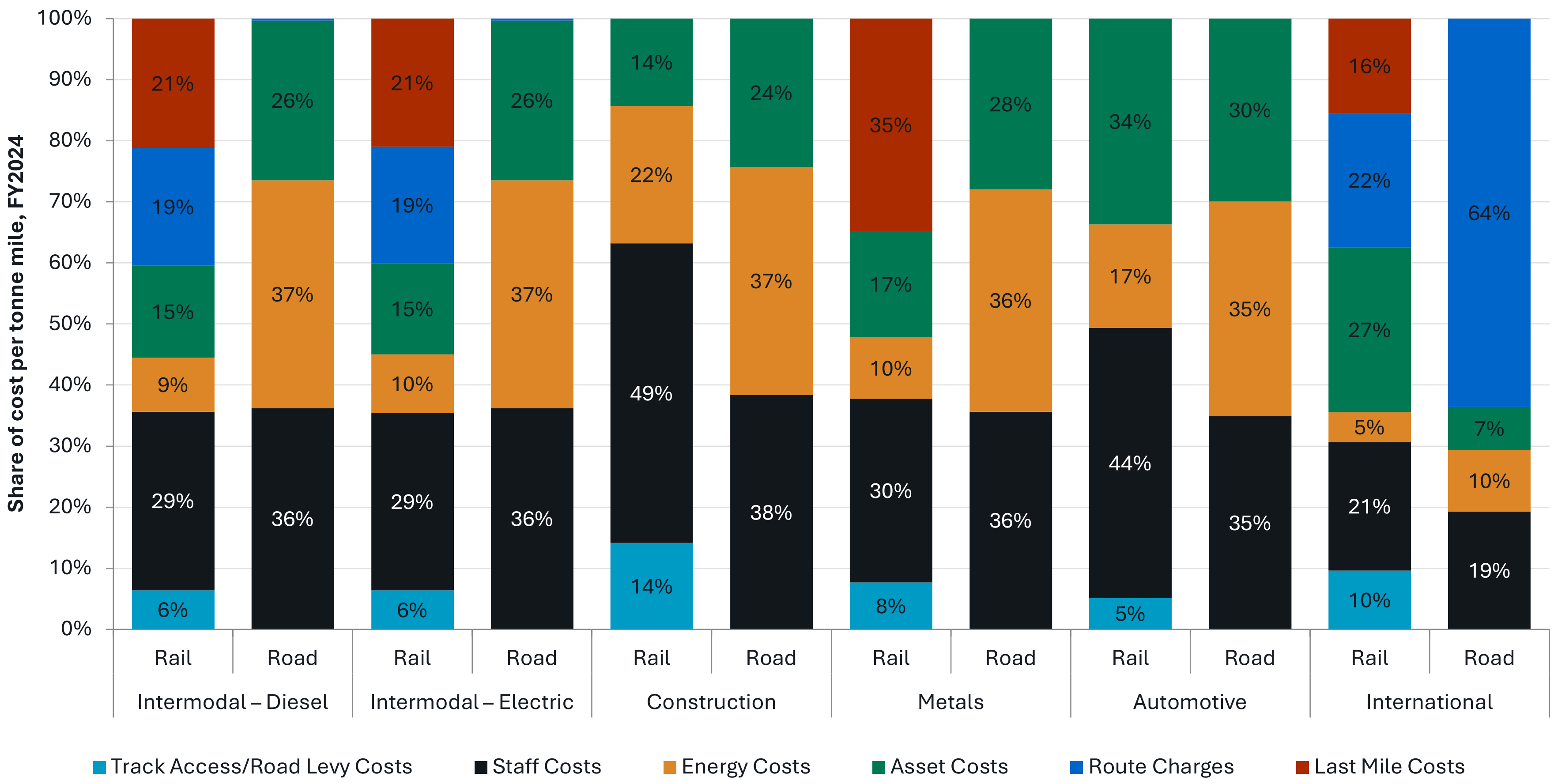
3.15 The relative competitiveness between rail and road freight varies by flow and commodity carried. This analysis focusses on the trend of how rail and freight costs have changed over time.

Figure 12: Share of costs per tonne mile by cost component, FY2024



Summaries by Cost Component

Figure 13: Share of costs per tonne mile by cost component for each representative commodity flow type, FY2024,



Overall Indexed change by cost component, aggregated over all commodities

3.16 Figure 14 to Figure 18 highlight the overall change in costs over time compared to 2015 for the different cost components.

3.17 The largest differences between road and rail costs can be seen in track access /road levy, energy, and route charges costs.

3.18 Last mile costs are not shown as they are a direct reflection of the overall change in road costs over time as detailed in 2.52.

3.19 Each of these components are further broken down to the trends per commodity type in the following sections of the report.

Figure 14: Indexed Rail vs Road Real Cost Change, Cost Component: ***Track Access / Road Levy***

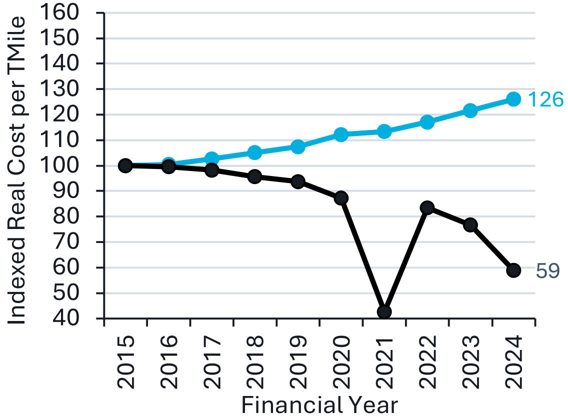


Figure 15: Indexed Rail vs Road Real Cost Change, Cost Component: ***Staff Costs***

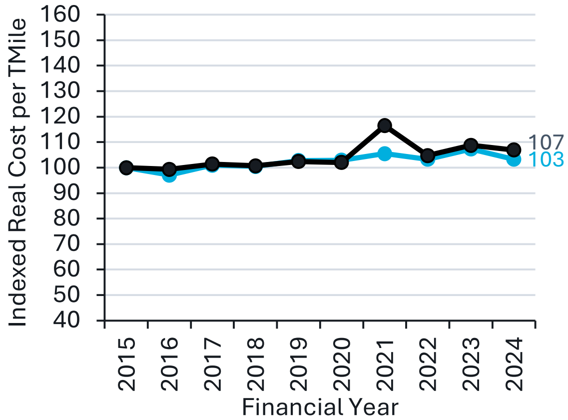


Figure 16: Indexed Rail vs Road Real Cost Change, Cost Component: ***Energy Costs***

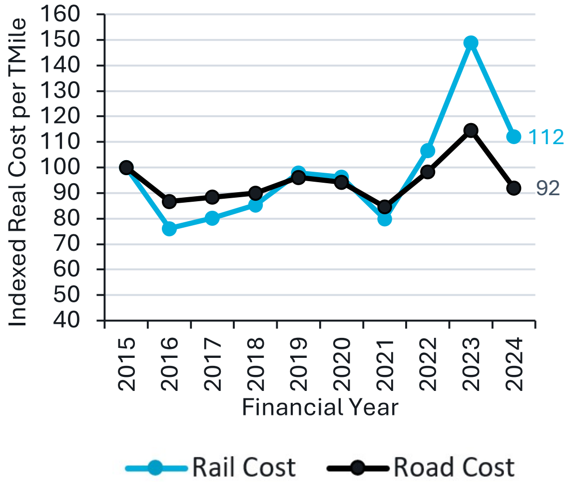


Figure 17: Indexed Rail vs Road Real Cost Change, Cost Component: ***Asset Costs***

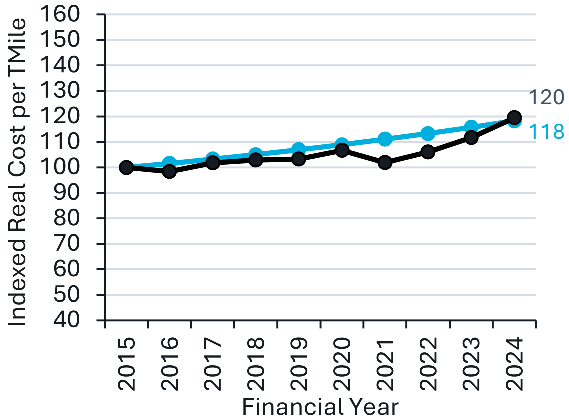
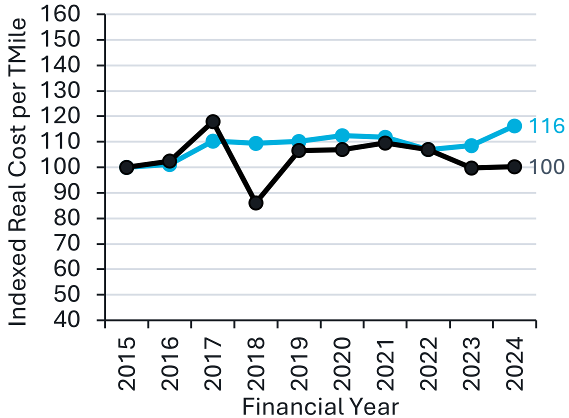


Figure 18: Indexed Rail vs Road Real Cost Change, Cost Component: ***Route Charges***



Track Access / Road Levy Costs

3.20 Track access costs have increased steadily over time, except for **Automotive** costs in real terms, driven by bespoke wagon track access cost trends in real terms. Note that the **International** track access costs represent HS1 access charges.

3.21 Road equivalent costs have dropped steadily over the last 10 years, driven by no nominal increases in the period, with the drop in 2021 due to the suspension of the HGV Road User Levy. This cost is also negligible in absolute terms as per Figure 13, further highlighting the difference from rail.

Figure 19: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *Intermodal – Diesel*

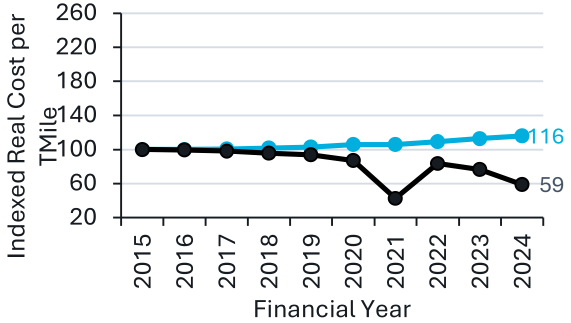


Figure 20: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *Intermodal – Electric*

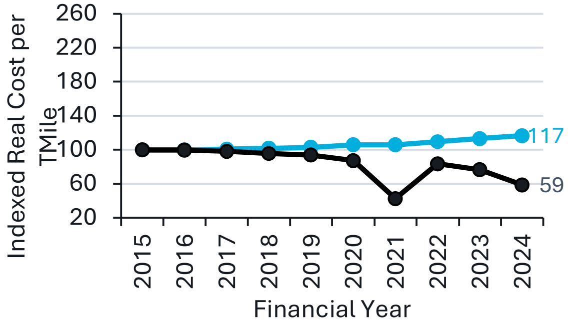


Figure 21: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *Construction*

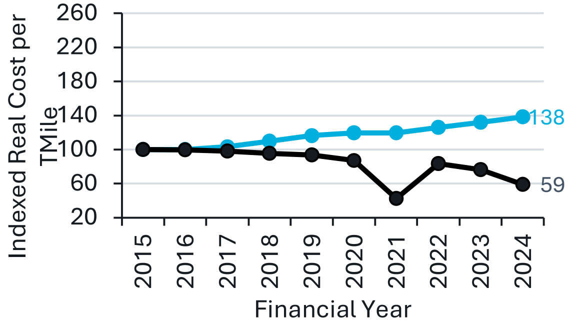


Figure 22: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *Metals*

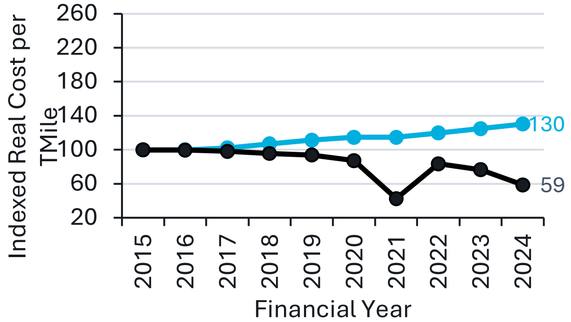


Figure 23: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *Automotive*

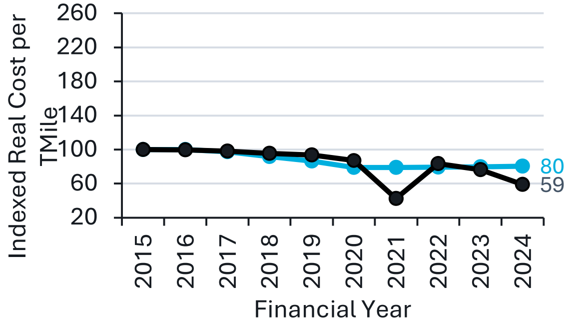
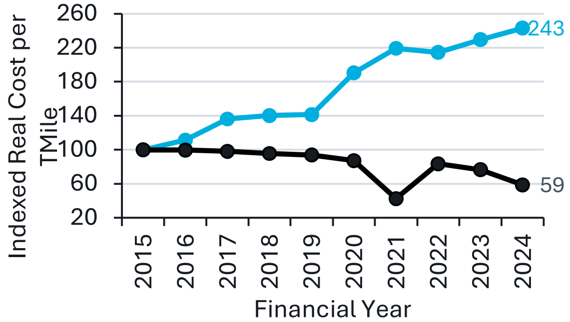


Figure 24: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *International*



Staff Costs

3.22 Staff costs have risen slightly higher for road freight compared to rail freight across the different commodity types. Changes observed for this cost component also vary due to overhead costs for the commodity, which are a factor of the total freight costs.

3.23 Road driver costs have increased significantly in recent years due to Brexit induced staff shortages, with 2021 particularly affected.

Figure 25: Indexed Rail vs Road Real Staff Cost Change, Commodity: *Intermodal – Diesel*

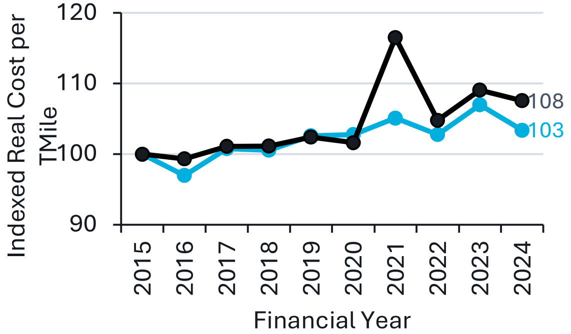


Figure 27: Indexed Rail vs Road Real Staff Cost Change, Commodity: *Construction*

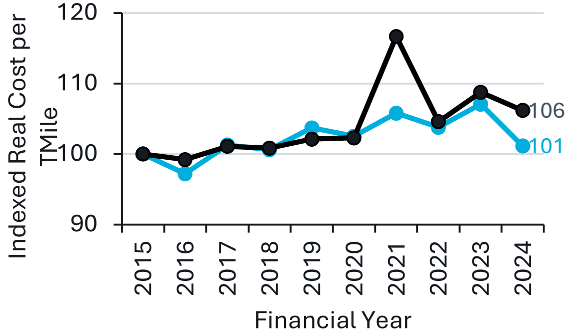


Figure 29: Indexed Rail vs Road Real Staff Cost Change, Commodity: *Automotive*

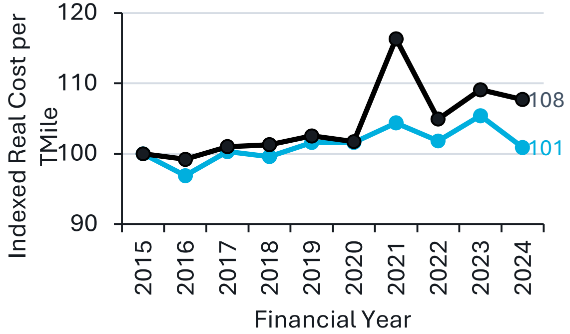


Figure 26: Indexed Rail vs Road Real Staff Cost Change, Commodity: *Intermodal – Electric*

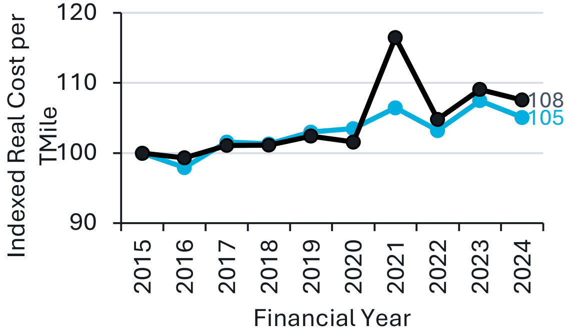


Figure 28: Indexed Rail vs Road Real Staff Cost Change, Commodity: *Metals*

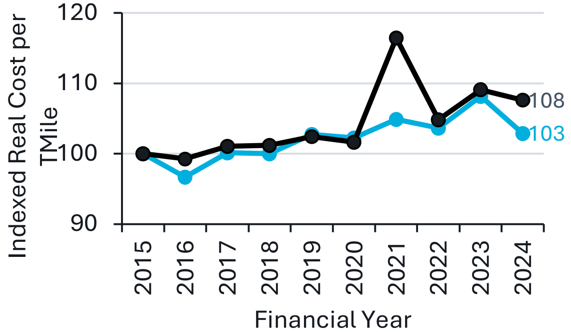
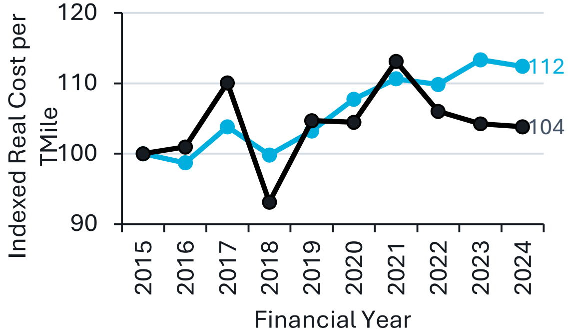


Figure 30: Indexed Rail vs Road Real Staff Cost Change, Commodity: *International*



Energy Costs

3.24 Rail energy costs have increased significantly compared to road and is most pronounced in the electricity traction flows of **Intermodal - Electric** and **International**, which have more than doubled in that time due to increased electricity costs in recent years.

3.25 Road costs for diesel differ to rail costs as road costs also include fuel duty. With a freeze of fuel duty increases since 2011, road diesel costs have declined by 8% since 2015.

Figure 31: Indexed Rail vs Road Real Energy Cost Change, Commodity: *Intermodal – Diesel, Construction, Metals, Automotive*

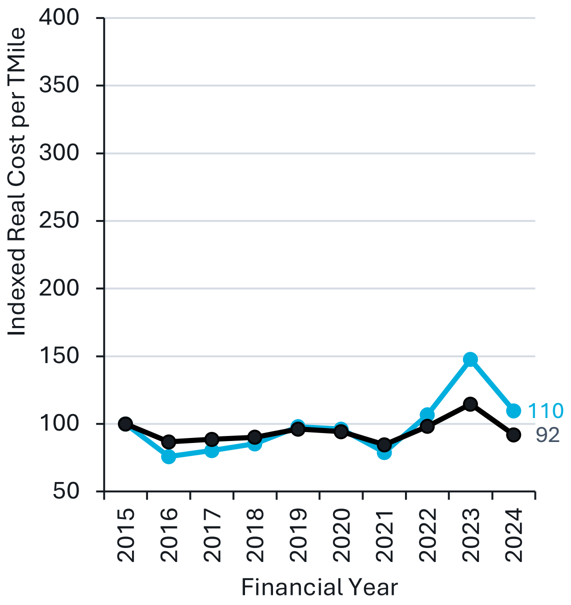


Figure 32: Indexed Rail vs Road Real Energy Cost Change, Commodity: *Intermodal – Electric*

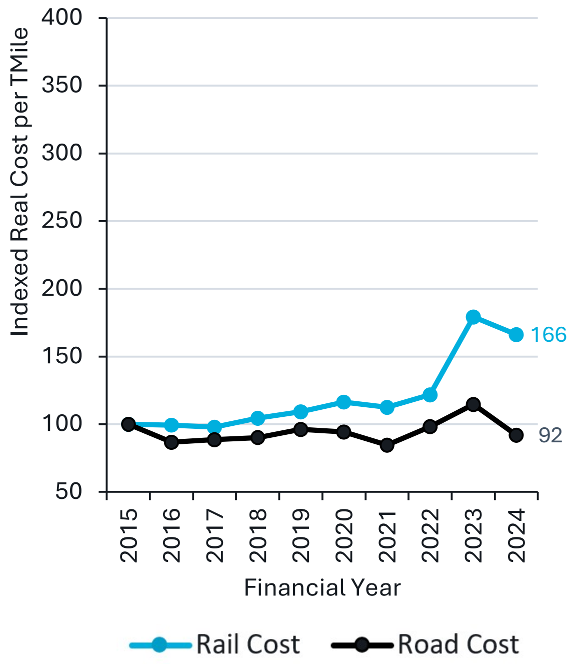
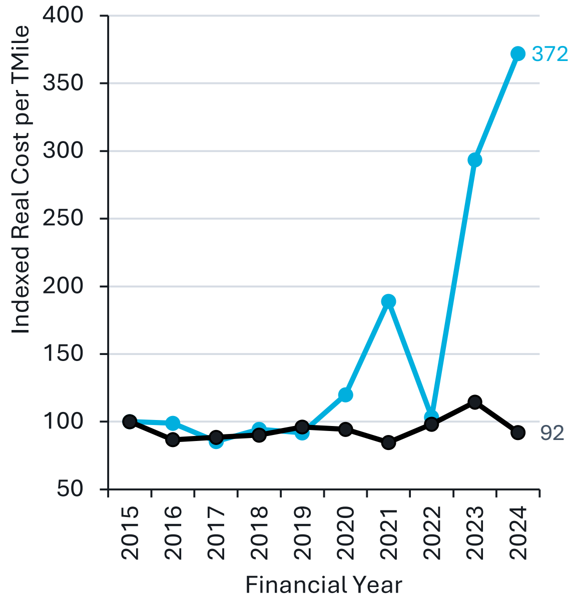


Figure 33: Indexed Rail vs Road Real Track Access Cost Change, Commodity: *International*



Asset Costs

3.26 Road freight asset costs have increased slightly more than rail freight over time for most commodity types. Yearly changes in rail asset costs are kept consistent over time as detailed in 2.42.

3.27 Road asset costs have risen particularly sharply since FY2021, driven by increased financing and maintenance costs.

3.28 Rail asset costs have grown more than road asset costs for the **Construction** flow, due to a lower increase over time for rigid truck costs compared to articulated trucks.

Figure 34: Indexed Rail vs Road Real Asset Cost Change, Commodity: *Intermodal (Diesel and Electric)*

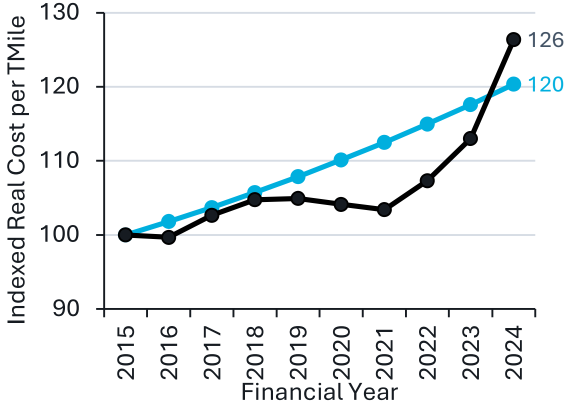


Figure 35: Indexed Rail vs Road Real Asset Cost Change, Commodity: *Construction*

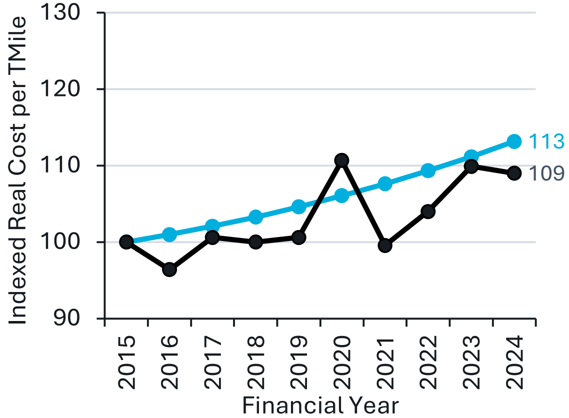


Figure 36: Indexed Rail vs Road Real Asset Cost Change, Commodity: *Metals*

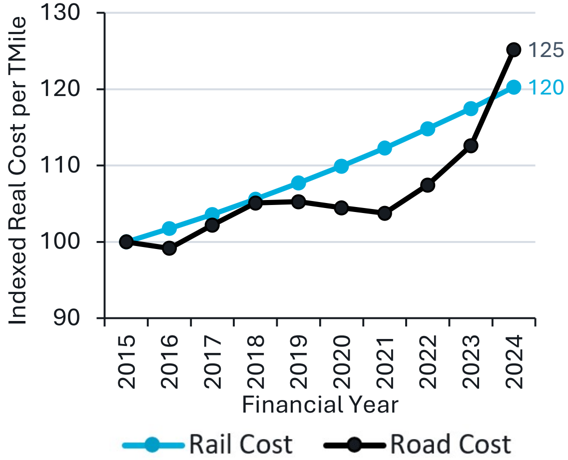


Figure 37: Indexed Rail vs Road Real Asset Cost Change, Commodity: *Automotive*

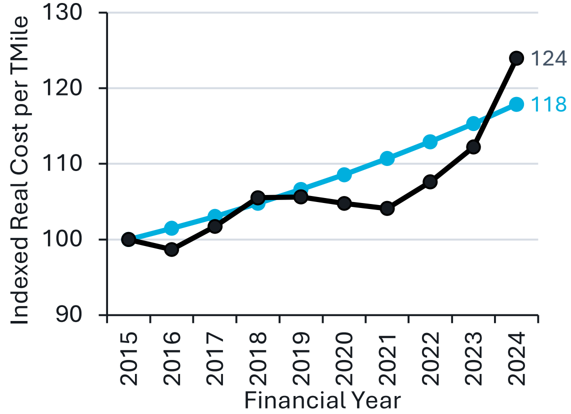
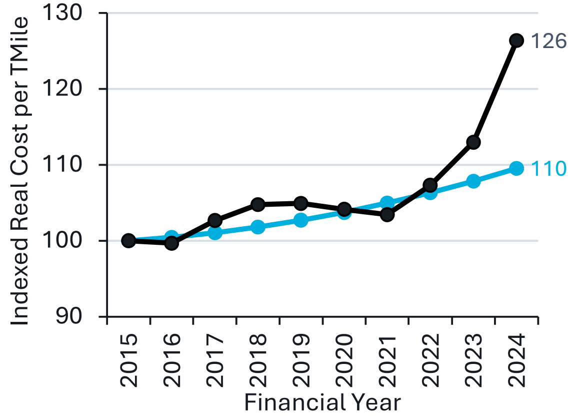


Figure 38: Indexed Rail vs Road Real Asset Cost Change, Commodity: *International*



Route Charges

3.29 For the **Intermodal** flows, it is assumed that road terminal handling and access costs have not changed in real terms over the analysis period as detailed in 2.48. However, it is worth noting that these route charges are a relatively small part of the overall cost for road freight as shown in Figure 13.

3.30 Rail costs have increased significantly in this period, growing by 16%, a trend observed for both handling and access costs.

3.31 For the **International** flow, route charges are almost entirely driven by Channel Tunnel access costs. These have risen significantly more for rail compared to road since 2019, with the trend before that year for road matched with the rail trend due to availability of data.

Figure 39: Indexed Rail vs Road Real Route Charges Change, Commodity: ***Intermodal (Diesel and Electric)***

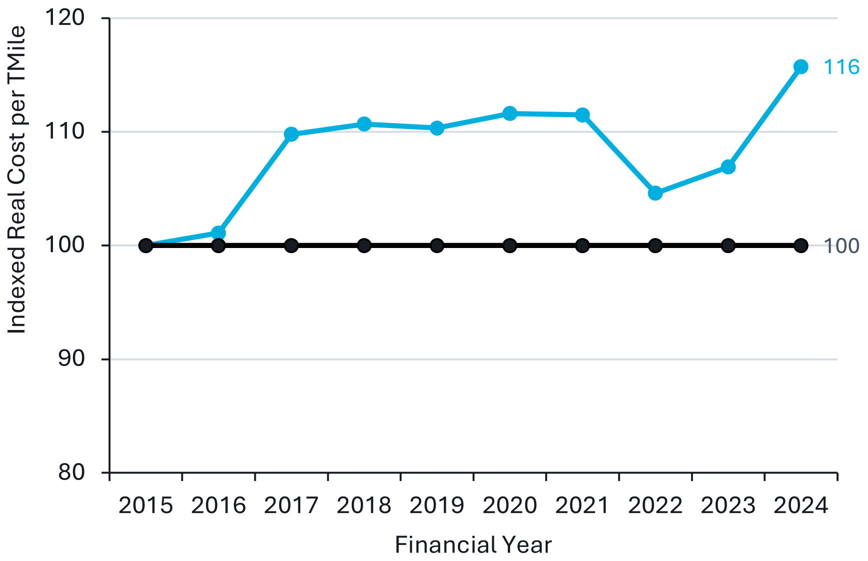
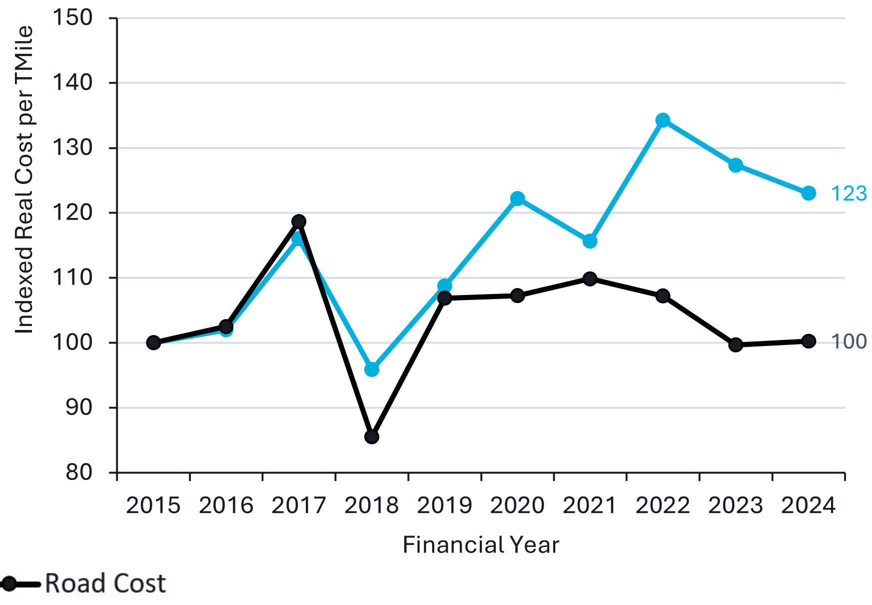


Figure 40: Indexed Rail vs Road Real Route Charges Change, Commodity: ***International***



4 Cost Differential Relationship with Rail Freight Demand

Overview

4.1 Following the analysis of road and rail freight cost changes, this section examines the impact of cost differences on rail freight growth. Scenario analysis indicates that changes in policy could result in 4.9 billion tonne kilometres shifting from road to rail, a 31% growth in rail share (41% of the government's 2050 target of 75% rail freight growth), a removal of 112 million HGV miles and 69% decrease in CO2e emissions.

4.2 This analysis has been approached in the following way:

- A linear regression comparing rail share of freight moved against the ratio of road costs to rail costs, where:
  - The ratio of road costs to rail costs is derived from the overall costs per tonne shown in the previous section.
  - The rail share of freight is derived from combining the ORR Rail Freight Usage and Performance Data with the Department for Transport's (DfT's) domestic road freight activity data.
- The resulting model was then used to infer the freight tonne kilometres transferred from road to rail under a set of indicative cost change scenarios.
- The amount of HGV miles removed from the road, and subsequent CO2e emission savings were then calculated.

Indicative Cost Change Scenarios and Results

4.3 The following scenarios were considered:

1. **No freeze on fuel duty –** Where today's road costs are uplifted to reflect the increase which would have occurred if fuel duty had not been frozen in 2011 and instead increased with inflation.
2. **Halving of track access –** Where current rail track access costs are halved.
3. **No freeze on fuel duty and halving track access –** The combination of the above two items.

4.4 The results of these scenarios are shown in Table 4.1.

Table 4.1: Estimated impacts of applying indicative cost scenarios to the estimated relationship between road and rail cost differentials and rail freight demand

Cost Change Scenario:	1. No freeze on fuel duty	2. Halving of track access	3. 1 and 2
Change in Road Costs	+6.7%	-	+6.7%
Change in Rail Costs	-	-4.1%	-4.1%
FY2024 Rail Share	8.6%	8.6%	8.6%
Change in rail freight modal share (relative change)	+1.5% (17.7%)	+0.9% (11.0%)	+2.7% (31.3%)
Freight transferred (bn net tonne km)	2.77	1.72	4.91
HGV miles removed (m)	61	38	108
Reduction in CO2e tonne emissions (relative change)	208,849 (-69%)	129,554 (-69%)	369,806 (-69%)

4.5 This analysis is further detailed in the following sub-sections.

Regression Approach and Results

Dependent Variable

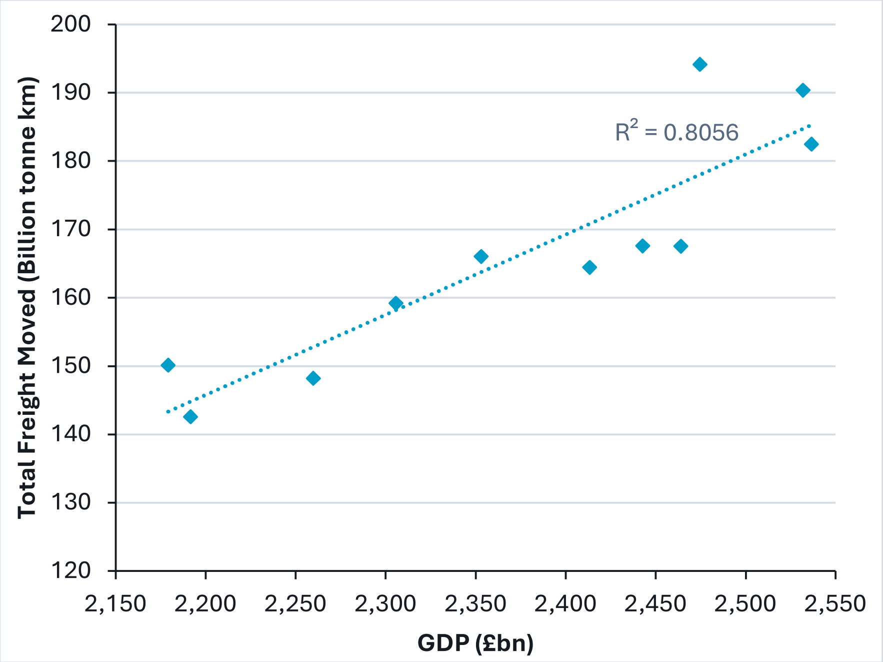
4.6 While this analysis ultimately aims to understand the relationship between total rail freight moved in tonne kilometres and cost differentials, there are various external factors that may impact total freight (road and rail) moved.

4.7 It is expected that growth of the overall freight market is independent of the differences of cost between road and rail and is driven more by wider production trends. To illustrate, Figure 41 shows a strong relationship between total freight moved and GDP. As such, a dependent variable that excludes the impact of external factors is desirable.

4.8 The rail freight share of total freight was deemed the most appropriate variable, as road and rail carry the vast majority of total freight, with the decision between them driven mostly by the economic incentives captured by their respective costs.

4.9 Note when calculating the rail freight share, we removed coal data as the current market for coal freight does not reflect previous market conditions. This is due to the phasing out of coal as a source of power by the National Grid, closure of coal mines in the country, and the end of coal imports.

Figure 41: Relationship of total freight moved to GDP



Source: ONS GDP data and ORR freight moved data

Independent Variable

4.10 A range of ways to calculate the differential between road and rail costs were assessed. It was found that the ratio of road costs to rail costs was the most explanatory variable considered. It captured the cost differential between the two modes directly, relative to the corresponding rail costs.

Regression Methodology

4.11 This analysis uses a simple linear regression where both the dependent variable (rail freight moved share) and the independent variable (ratio of road freight costs relative to rail freight costs) have been transformed using natural logarithms.

4.12 This approach of transforming both data using natural logarithms allows us to explore the percentage-based (elastic) relationship between these variables, making it easier to interpret how changes in cost ratios impact rail freight share.

Statistical Results

4.13 The regression results indicate that a 1% increase in the ratio of road freight costs to rail freight costs is associated with an estimated 2.60% increase in rail freight moved share. The model equation is given below:

$$\ln(y) = 2.60 * \ln(x) - 2.85$$

4.14 The model has an $R^2 = 0.355$, indicating that 35.5% of the variation in rail freight moved share is explained by the road-to-rail cost ratio, suggesting a moderate fit, while the relationship is significant at the 10% level, with a P-value of 0.069 for the cost ratio coefficient.

4.15 This implies that the cost ratio is an important driver of rail market share, though other factors also contribute to its change over time. Although – from standard economic theory and our results here – we know there is a relationship between the relative price of goods/services and demand, we do note there is some uncertainty around the forecasting results from this model, given the moderate R^2 and statistical significance.

Approach to Calculating Impact on HGV Movements and CO2e

4.16 Using the percentage change in rail and road costs for each indicative scenario as per 4.13, a new ratio between the two is calculated, allowing the use of the formula in 4.13 to determine the new rail freight share and therefore freight tonne kilometres transferred as shown in Table 4.1.

4.17 A weighted average of the rail freight and road freight trip distance and payload outlined in Table 2.3 was then calculated, taking into account the rail first/last mile distance for rail freight. This was weighted using the same distribution by commodity as in Figure 9.

4.18 This weighted average of mileage and payload for freight was used in combination with the freight tonne kilometres transferred from road to rail in each scenario to calculate the estimated reduction in road miles travelled, while accounting for the first/last mile requirements of using rail freight.

4.19 The change in CO2 equivalent (CO2e) emissions can therefore be calculated using the tonne km of freight transferred, accounting for the amount that is to be moved by road for the rail last mile. The data for this analysis is sourced from DESNZ and BEIS conversion factors for greenhouse gas emissions.

4.20 The conversion factors are provided for road freight by vehicle type and for rail freight as a whole at a tonne kilometre rate. For road freight, the appropriate vehicle type is assigned based on commodity type with the corresponding factors weighted using the same method as used for the freight distances and payload.

Impact Analysis Breakdown

4.21 Table 4.2 outlines the results of the calculation steps taken to determine the impact of the three indicative cost change scenarios, as discussed in 4.18 to 4.20.

Table 4.2: Indicative scenario impact on HGV movements and CO2e emissions analysis breakdown

Cost Change Scenario:	1. No freeze on fuel duty	2. Halving of track access	3. 1 and 2
Change in road costs	+6.7%	-	+6.7%
Change in rail costs	-	-4.1%	-4.1%
FY2024 rail share	8.6%	8.6%	8.6%
Change in rail freight modal share	+1.5%	+0.9%	+2.7%
Relative change in rail freight modal share	+17.7%	+11.0%	+31.3%
Freight moved by road transferred to rail (bn net tonne km)	2.77	1.72	4.91
Additional rail freight moved (bn net tonne km)	2.57	1.60	4.56
Additional rail first/last mile by road freight moved (bn net tonne km)	0.20	0.12	0.35
Additional rail first/last mile by road freight distance moved (m miles)	4.72	2.93	8.36
Additional total rail freight CO2e tonne emissions	93,302	57,877	165,208
Freight distance moved by road before transfer (m miles)	65.53	40.65	116.03
CO2e tonne emissions by road before transfer	302,150	187,431	535,013
HGV miles removed (m)	60.80	37.72	107.66
Reduction in CO2e tonne emissions (relative change)	208,849 (-69%)	129,554 (-69%)	369,806 (-69%)

Source: Steer analysis

5 Sources

5.1 Links to external sources discussed across the document are provided below.

Table 5.1: External Data Sources

Data Source	Use	Website Link
Motor Transport Tables	Road freight assumptions	https://motortransport.co.uk/cost-tables
Network Rail Track Access Charges	Rail track access costs (excluding the International flow)	https://www.networkrail.co.uk/industry-and-commercial/information-for-operators/cp6-access-charges-2/
Eurotunnel Freight	Road channel tunnel freight costs for the International flow	https://www.eurotunnelfreight.com/uk/fares/ https://web.archive.org/web/20180407230131/https:/www.eurotunnelfreight.com/uk/fares/
ONS Annual Survey of Hours and Earnings	Staff salaries (Rail drivers, Road drivers, Rail Ground Staff)	https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation4digitsoc2010ashetable14
DESNZ weekly road fuel prices	Diesel costs (with and without Fuel Duty)	https://www.gov.uk/government/statistics/weekly-road-fuel-prices
DESNZ domestic energy prices	Electricity costs	https://www.gov.uk/government/statistical-data-sets/monthly-domestic-energy-price-stastics
CPIH data	Convert from nominal to Real FY24 prices	https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/l522/mm23
ORR Rail Freight Moved data	Commodity aggregation weighting and regression analysis	https://dataportal.orr.gov.uk/statistics/usage/freight-rail-usage-and-performance/
DfT domestic road freight activity data	Regression analysis	https://www.gov.uk/government/statistical-data-sets/rfs01-goods-lifted-and-distance-hauled#overall-trends-in-domestic-road-freight
ONS GDP Data	Regression analysis	https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/ukea
DESNZ and BEIS CO2e conversion factors	Scenario impact analysis	https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024

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