Rail infrastructure, assets and environmental 2015-16 Annual Statistical Release

Publication date: 27 October 2016

Next publication date: October 2017

Background

This release contains the following rail statistics for Great Britain in 2015-16:

Rail infrastructure statistics provide details on track length (including electrified track). Sourced from Network Rail and is available from 1985-86.

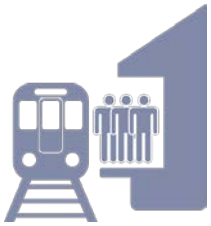
Number of mainline stations are sourced from Estimates of Station Usage (ORR) and Network Rail and is available from 1985-96

Average age of rolling stock is sourced from the Department for Transport and is published by sector from 2000-01 Q2, and by train operator from 2007-08 Q4.

Environmental statistics are sourced from train and freight operators and provide an estimate of normalised CO_2e emissions from traction energy since 2005-06.

Contents

Number of mainline stations:



2,557

Total mainline stations in Great Britain in 2015-16

14

New mainline stations opened in Great Britain in 2015-16

Electrification:

In 2015-16 33.7% of track was electrified, up from 33.5% the previous year. This represents an additional 59 route kilometres which had been electrified in 2015-16.

Average age of rolling stock:

The average age of rolling stock nationally at the end of 2015-16 was 21.0 years, a 0.8 year increase over the past year. Nationally this is the first time the average age of rolling stock is higher than the start of time series in 2000-01 Q2 (by 0.3 years).

2015-16 emissions:

CO_2e emissions per passenger kilometre have declined by 23.9% since 2005-06, and declined by 3.4% compared to last year.

CO_2e emissions per freight tonne kilometre tend to fluctuate from year to year, and are up 20.1% since 2005-06 and up 15.0% compared to last year.

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Website: http://orr.gov.uk/statistics/published-stats/statistical-releases

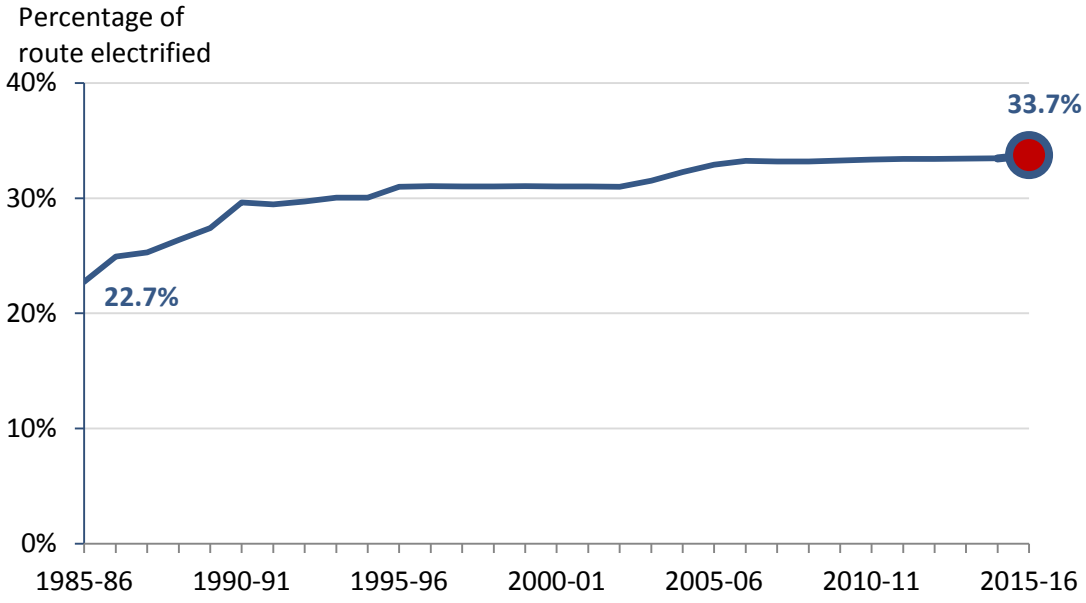
1. Infrastructure on the railways

Infrastructure on the railways shows data on the number of kilometres of route and track open for passenger and freight traffic, the length of route which is electrified and the number of open passenger stations on the Great Britain rail network.

For a detailed history on how route length has changed, including information on the 'Beeching cuts', please see the accompanying quality report.

Electrification

Proportion of the route open for traffic which is electrified, Great Britain, 1985-86 to 2015-16 (Table 2.52)



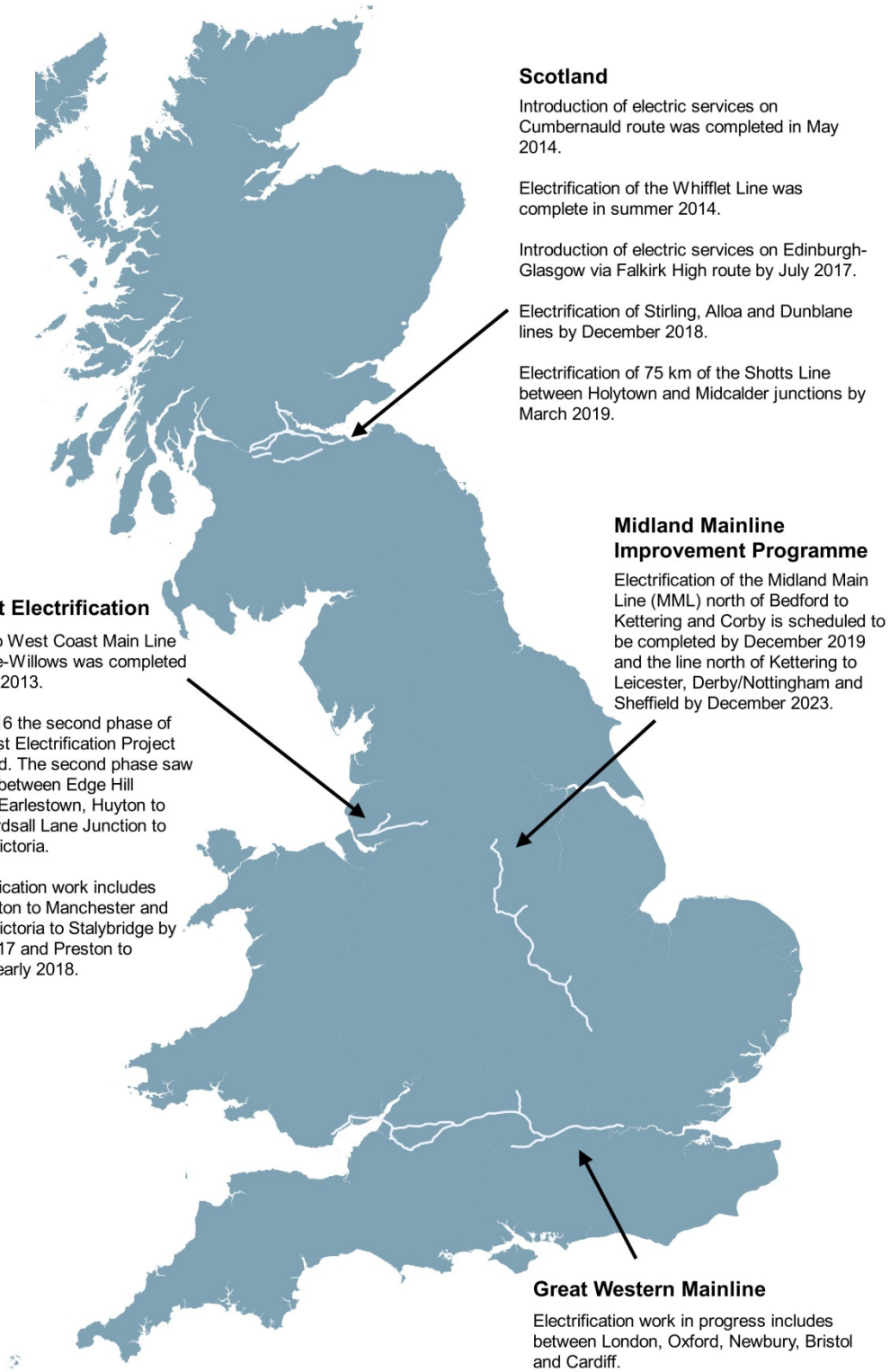
In 2015-16 33.7% of track was electrified, up from 33.5% the previous year. This represents an additional 59 route kilometres which had been electrified in 2015-16.

The percentage of route electrified has been steadily increasing since the time series began in 1985-86 where 22.7% of route was electrified. Between 2010-11 and 2013-14 the percentage of track electrified was relatively stable at 33.4%; however, over the past couple of years there have been small increases in the overall percentage of track electrified.

Electrification overview

The following information is intended to give a brief overview of the main electrification projects. Track location shown in the map is based on Ordinance Survey data, and is not necessarily specific to each electrification project.

For detailed information, please visit the Network Rail website. For detail on electrification in Scotland, please see the Transport Scotland website.



Route open for traffic and track km

15,799km
Route open for traffic in 2015-16

+39km
Compared to 2014-15

31,194km
Track km in 2015-16

+74km
Compared to 2014-15

39km more route was open for traffic in 2015-16, to bring the total to 15,799km. While track kilometres increased by 74km to 31,194km. See definition boxes below for the difference between route and track km.

67 kilometres of the new track was in Scotland with the opening of the Scottish Borders railway in September 2015. There was 10 kilometres of track between Bolton and Blackburn. Wales had three kilometres of new track to extend the line between Ebbw Vale Parkway and Ebbw Vale Town stations. Please note the new track listed above comes to more than 74 kilometres as there were small track closures throughout the network as well[1].

Route open kilometres are the total extent of routes available for trains to operate.

Sidings and depots are excluded.

Track kilometres takes into account multiple track routes (e.g. for each route kilometres where there is double track, there are two track kilometres).

Sidings and depots are excluded.

[1] http://www.networkrail.co.uk/Publications/Annual-return/ (page 254 of the 2016 Annual Return)

Number of mainline stations in Great Britain

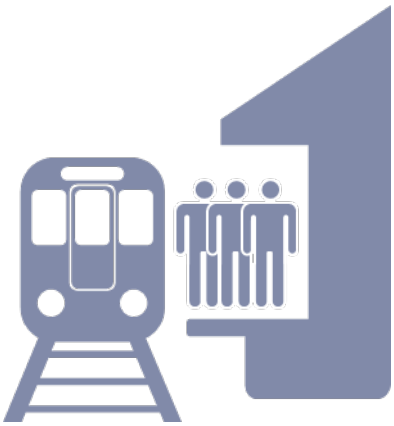
New data source for the number of mainline stations.

For 2015-16 the number of mainline stations is now sourced from ORR's Estimates of Station Usage. Previously the number of stations was sourced from Network Rail.

Estimates of station usage is used as the source between 1999-00 and 2015-16 (when the time series began).

Between 1985-86 and 1998-99 Network Rail's Operational Property Asset System (OPAS) is used as the source.

Therefore there is a series break between 1998-99 and 1999-00. Please view annex 4 or the quality report for more information.



2,557

Total mainline stations in Great Britain in 2015-16

14

New mainline stations opened in Great Britain in 2015-16

Six new stations in Scotland were opened as part of the Borders Railway in September 2015. The route joins Edinburgh, through Midlothian and into the Scottish Borders. The new stations are: Eskbank, Galashiels, Gorebridge, Newtongrange, Shawfair, Stow and Tweedbank.

In Wales, Ebbw Vale Town was opened in May 2015. This extends the track approximately 1.5 miles from Ebbw Vale Parkway station.

Two new stations opened in Devon: Cranbrook and Newcourt. Cranbrook rail station serves a new eco-community in Devon[2], and Newcourt is part of the avocet line which connects Exeter and Exmouth.

Oxford Parkway opened in October 2015. It is part of a multi-modal transport interchange which aims to reduce congestion into Oxford.

Apperley Bridge opened in December 2015 and improves services between Leeds and Bradford Forster Square.

Both Coventry Arena and Bermuda Park opened in January 2016, this is part of inmprovements to the Coventry-Nuneaton rail corridor.

- Infrastructure on the railways (route open, electrifed, and track km) annual data is available on the data portal in: Table 2.52
- Mainline station annual data is available on the data portal in: Table 2.53

[2] http://www.bbc.co.uk/news/uk-england-devon-35087123

2. Average age of rolling stock

Average age of rolling stock shows the average age of rail vehicles for each franchised train operating company at the end of 2015-16. This includes passenger vehicles leased to franchised train operating companies by rolling stock leasing companies (ROSCOs) and other financiers, but excludes vehicles such as locomotives and Driving Van Trailers.

ROSCOs own most of the coaches, locomotives and freight wagons that run on the rails, which they lease to train operating and freight operating companies.

About rolling stock

Modern rolling stock can offer a more comfortable service and higher standards of reliability and performance. However, older rolling stock can be refurbished and upgraded which can also increase comfort and reliability of the rolling stock, but this will not be reflected in these statistics.

Rolling stock and accessibility

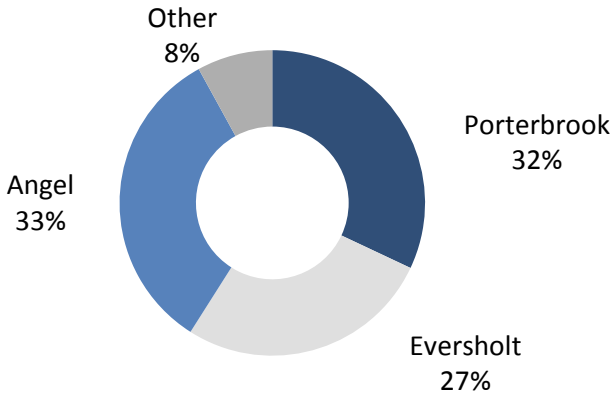
Over 60% of rolling stock had been built or refurbished to be accessible to disabled passengers by the end of 2015[3]. This is part of the Equality Act 2010 in which all train operators must ensure all UK rolling stock adhere to the regulations by 2020.

Owners of rolling stock

ROSCOs own the majority of rolling stock. The chart on the next page shows the majority of rolling stock is owned by three companies. The ROSCOs lease rolling stock to train operating companies.

[3] Annual Report Rail Vehicle Accessibility Regulations Exemption Orders

Ownership of rolling stock fleet, March 2016



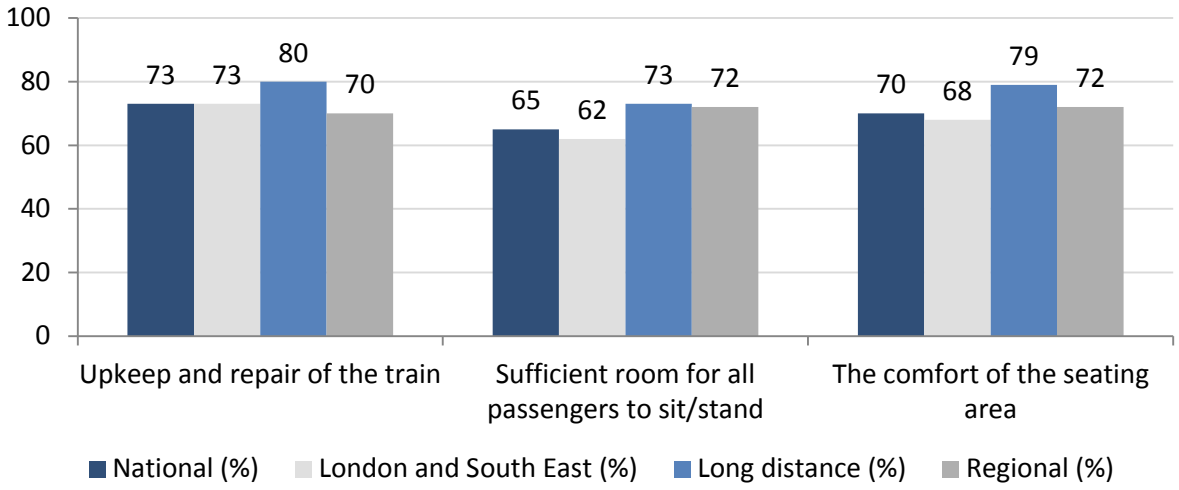
Source: Long Term Passenger Rolling Stock Strategy for the rail industry, March 2016. Analysis of ROSCO and train operator data

Passenger satisfaction with rolling stock

Passenger satisfaction with rolling stock depends on many factors, of which average age is just one. The National Rail Passenger Survey (NRPS) (Spring 2016) shows that long distance operators, who have generally an older average age of rolling stock, tend to have higher NRPS scores for several questions about rolling stock (see below).

In addition, some train operators with older rolling stock (such as Merseyrail) tend to have higher satisfaction scores with aspects of the rolling stock over train operators with younger average age of rolling stock. Therefore, looking at the average age of rolling stock by train operator is just one factor in passenger satisfaction with the quality of rolling stock.

National Rail Passenger Survey (Spring 2016)
Passengers who rated the following questions as satisfactory or good (%).



Source: National Passenger Rail Survey, Spring 2016

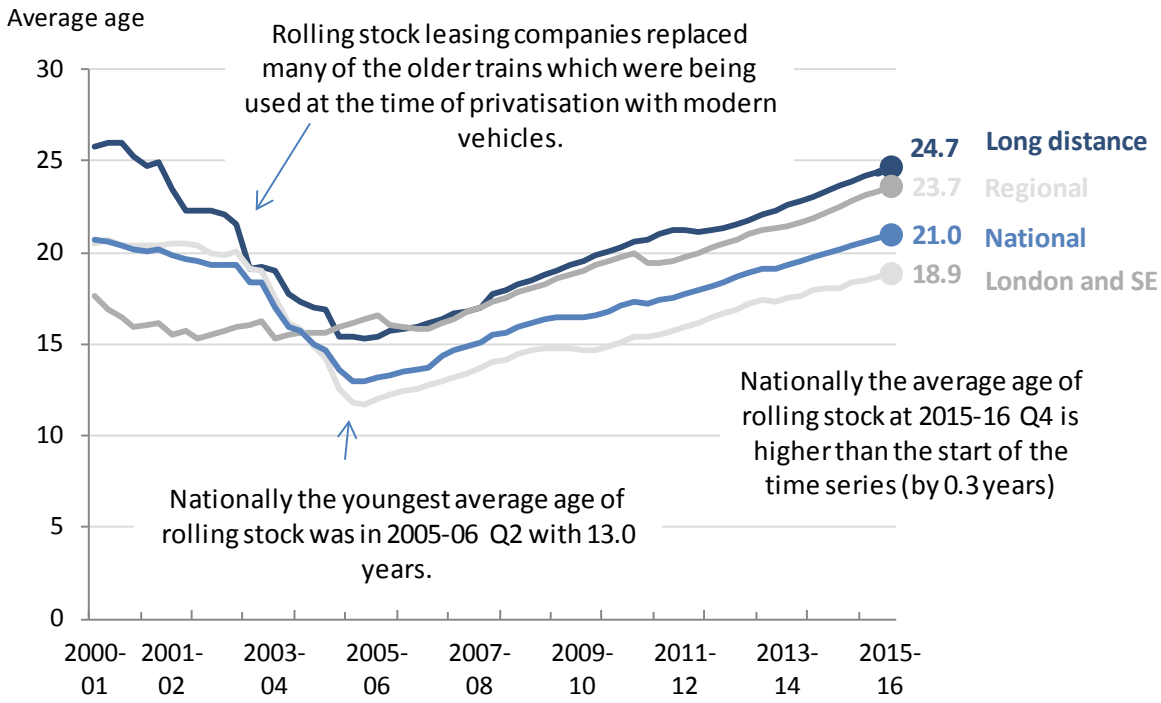
How average age of rolling stock is calculated

The average age of rolling stock is the age as of quarter 4 (January to March) 2015-16. Changes in rolling stock average age are recorded against the same time period the year before.

If the fleet remains unchanged, we expect the average age to increase by one year each year. Should the increase for a train company be less than one year this would indicate that some new or younger rolling stock has been introduced or some older stock has been phased out. Any increase greater than one year would indicate that some older stock has been put into service or some younger stock has been removed. A vehicle drops out of the dataset when its lease either expires or is terminated.

Average age of rolling stock by sector

Average age of rolling stock by sector, Great Britain, 2000-01 Q2 to 2015-16 Q4 (Table 2.30)



The average age of rolling stock nationally at the end of 2015-16 was 21.0 years, a 0.8 year increase over the past year. Nationally this is the first time the average age of rolling stock is higher than the start of time series in 2000-01 Q2 (by 0.3 years).

The average age of rolling stock fell across all sectors following the start of the time series. Nationally the average age of rolling stock fell 7.7 years between 2000-01 Q2 and 2005-06 Q2 to reach the lowest average age in the time series of 13.0 years. This was due to ROSCOs replacing many of the older trains which were being used at the time of privatisation with modern vehicles. After 2005-06 Q2 the average age of rolling stock increased for all sectors. Since 2005-06 Q2 the average age nationally has risen by 8.0 years up to 2015-16 Q4.

London and South East

18.9 years

0.8 year increase since last year

London Overground's average age of rolling stock is 13.7 years, an increase of 9.0 years over the past year. This increase is due to London Overground taking over some suburban routes from the Greater Anglia franchise in May 2015, and inheriting their rolling stock.

Chiltern's average age is 19.8 years, a 0.7 year increase over the past year. Chiltern inherited class 168/3 vehicles (previously class 170s at Transpennine Express) which were built between 2000-01[4].

Govia Thameslink Railway's (GTR) rolling stock figures have been combined with Southern's rolling stock to reflect the merged franchise. Class 442 rolling stock used in Gatwick Express have started to be replaced with newer class 387 rolling stock[5]. In addition, 16 class 319 units (built between 1987 and 1988) have been cascaded to London Midland.

Regional

23.7 years

1.1 year increase since last year

Transpennine Express (TPE) average age is 9.5 years, a 1.8 year increase over the past year. TPE had 10 class 170 vehicles that went off lease and were transferred to Chiltern. To make up for those vehicles going off lease, TPE sub leased a number of class 156 units from Northern.

[4] https://www.gov.uk/government/publications/rolling-stock-perspective-2016

[5] http://www.bbc.co.uk/news/uk-england-sussex-35688899

Long distance

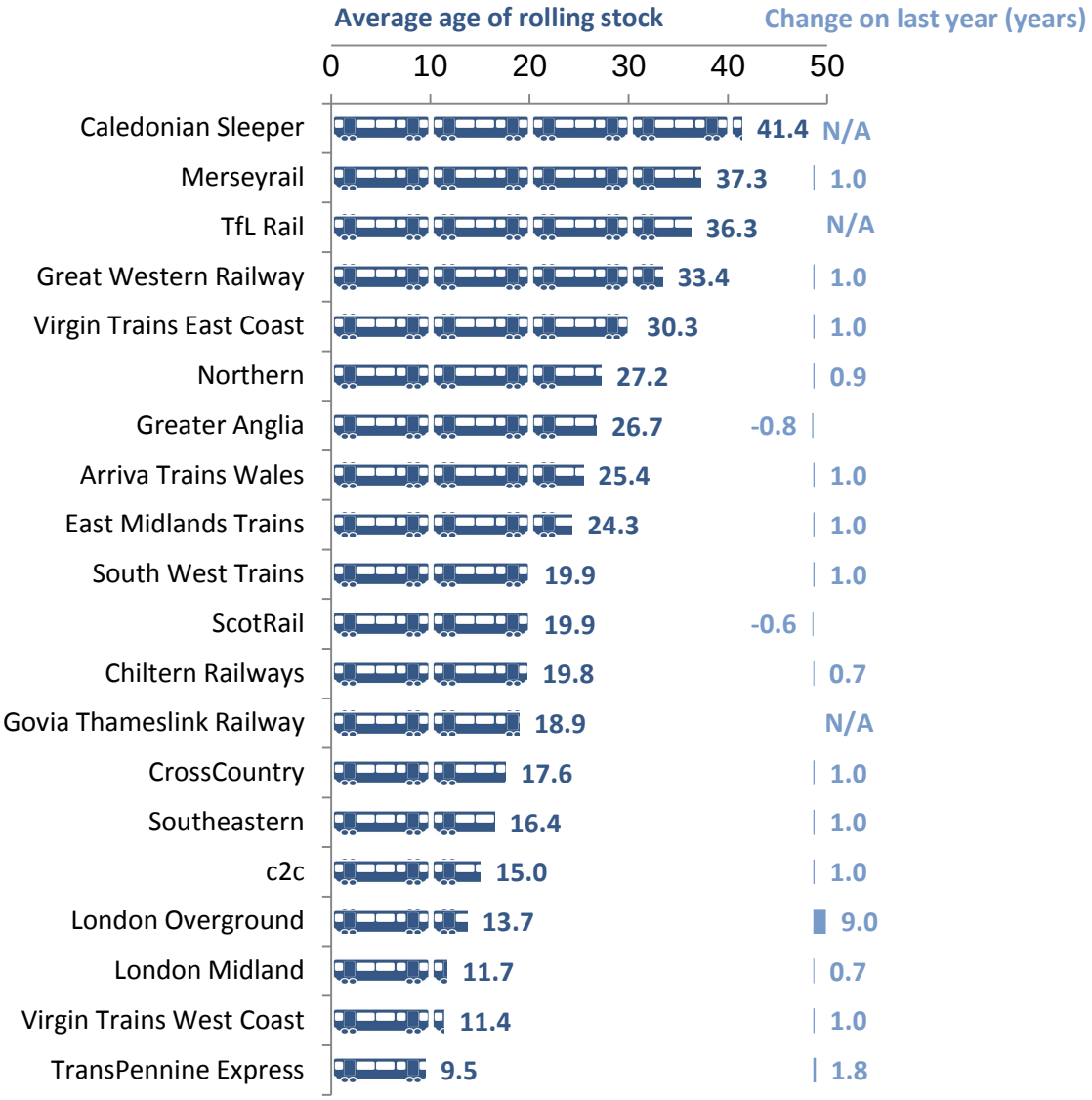
24.7 years

1.0 year increase since last year

The Long distance sector average age of rolling stock is 24.7 years, a 1.0 year increase on last year. This means no newer rolling stock was introduced, and/or older rolling stock removed from service during 2015-16.

Average age of rolling stock by train operating company

Average age of rolling stock (years) by train operator, Great Britain, 2015-16 Q4, (Table 2.31)



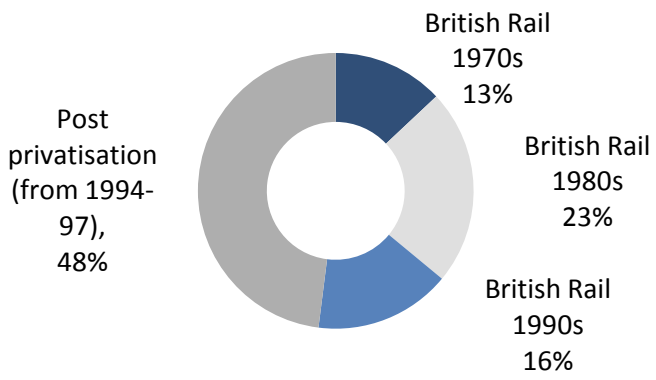
Note: N/A indicates there was no data for Q4 2014-15 for Caledonian Sleeper and TfL Rail as these franchises only started in 2015-16. Southern data has been merged with GTR for 2015-16 so comparisons have not been made. A selection of key rolling stock changes, and future rolling stock orders have been explained in annex 3.

Rolling stock built by decade

Around 50% of the rolling stock has been built post privatisation. The chart below shows the breakdown of rolling stock by the decade it was built.

Note: the data in the chart is not based on ORR Official Statistics, it has been sourced from ROSCOs and TOCs and published by the Rail Delivery Group in *Long Term Passenger Rolling Sock Stragegy for the Rail Industry*.

Rolling stock built by decade, 2016



Source: Long Term Passenger Rolling Stock Strategy for the Rail Industry, March 2016.

Long term rolling stock forecast

The average age of rolling stock is forecast to fall from 21 years of age to 16 years between now and the early years of the next five year period, in which the rail industry calls Control Period 6 (2019 to 2024). This is according to the Long Term Rolling Stock Strategy, and is not an ORR Official Statistic. The number of new vehicles expected to be delivered are 4,500 with a cost of more than £7.5 billion. A selection of future rolling stock orders are explained under each train operating company in annex 3.

- Average age of rolling stock by sector quarterly data are available on the data portal in: Table 2.30
- Average age of rolling stock by train operating company quarterly data are available on the data portal in: Table 2.31

3. Environmental

Environmental statistics are an environmental indicator showing normalised CO_2e (carbon dioxide equivalent) emissions from traction energy for passenger and freight trains.

Passenger data has been normalised to show the average CO_2e emission per passenger kilometre. Freight data has been normalised to show the average CO_2e emission per net tonne kilometre of freight moved.

Traction energy refers to rolling stock on the Great Britain rail network and the energy used to power passenger and freight train movements. Non-traction emissions are excluded.

How emissions are calculated:

CO_2e emissions are calculated from actual and estimated data for energy consumption. Train operators provide ORR with their total traction electricity (kWh) and diesel usage (litres) consumption.

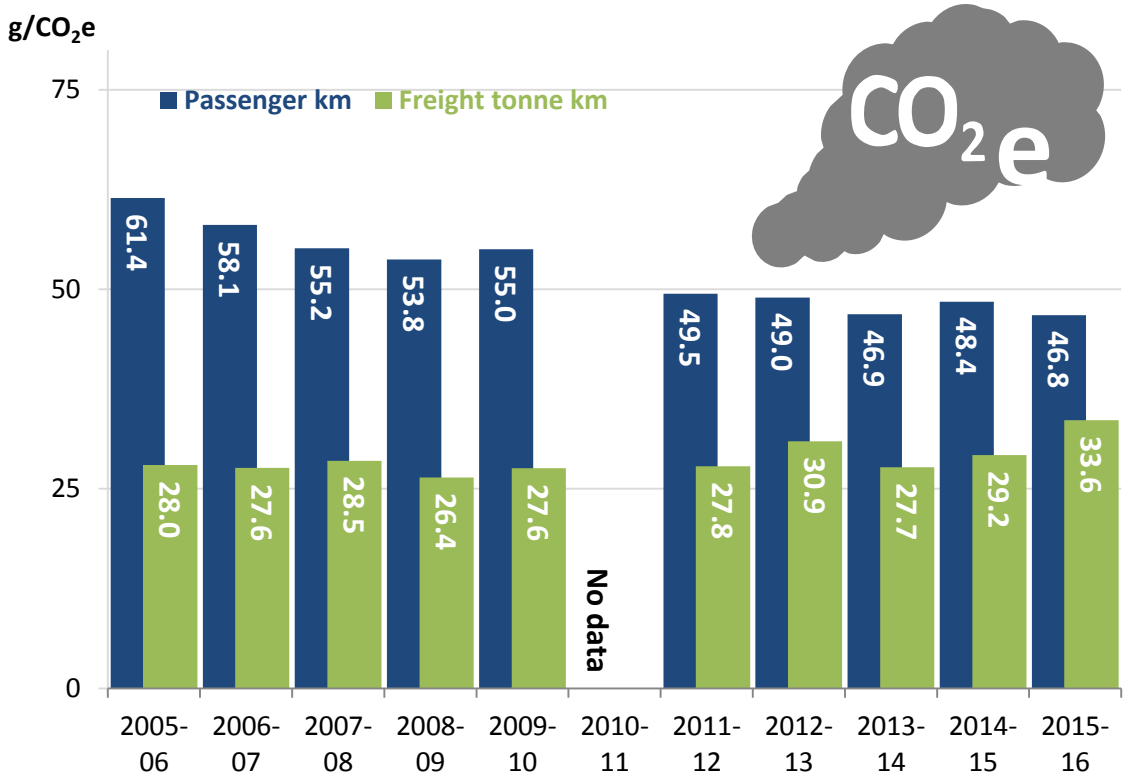
Actual energy consumption data is converted into CO_2e using standard conversion factors from the Department for Environment, Food and Rural Affairs (DEFRA). The conversion factors allow activity data (e.g. litres of fuel used, kWh consumed) to be converted into kilograms of carbon dioxide equivalent (CO_2e) which is a universal unit of measurement that allows the global warming potential of different greenhouse gases (GHGs) to be compared. For more technical information see the methodology section in annex 4 or the quality report.

Estimated emissions:

For 2015-16 the following were estimated due to passenger train or freight operators not providing data:

- 3 passenger train operators are estimated. 97% of passenger kilometres are covered by actual data.
- 5 freight operators are estimated.97% of freight tonne kilometres are covered by the four freight companies who provided data.

Normalised CO_2e emissions for passenger and freight train operators, Great Britain, 2005-06 to 2015-16, (Table 2.100)



Note: There was no data for 2010-11 due to a change in the data collection process, consequently comparisons to emissions in earlier years should be made with caution.

Passenger train emissions

There has been a long term decrease in CO_2e emissions per passenger kilometre since the time series began in 2005-06; emissions per passenger kilometre have fallen by 23.9%. The trend has continued in 2015-16 where emissions per passenger kilometer were 3.4% less than last year at 46.8 grams per passenger kilometre, but were similar compared to 2013-14.

There were a total of 3,051 ktonnes of CO_2e emissions in 2015-16 (traction electricity and diesel combined); this is down 1.7% on the previous year. Since 2005-06 CO_2e emissions have increased by 12.0%, but over the same time period passenger kilometres have increased by 48%[6]. Therefore, when emissions are normalised per passenger kilometre there has been a decrease.

[6] http://dataportal.orr.gov.uk/displayreport/report/html/34856085-cf9c-4e0d-a7f8-8f9e5ee1b772

The rail industry has developed plans to reduce carbon emissions. The rail sustainable development principles[7] (May, 2016) outlines development principles which aim to make the railway more sustainable. This includes being carbon smart in order to achieve a long term reduction in carbon emissions. This is through improved energy efficiency, new power sources and modal shift. Initiatives on the railway include further electrification work, lighter trains, and alternative power sources such as batteries.

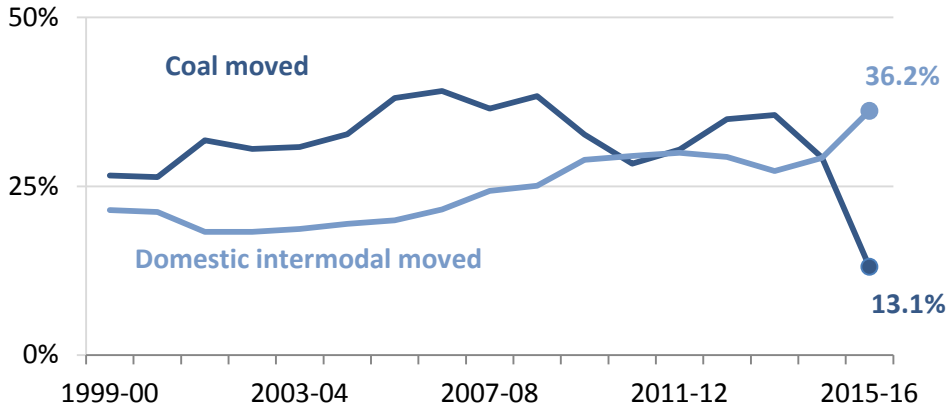
Freight train emissions

Freight CO_2e normalised emissions were 33.6 g/ CO_2e per net freight tonne kilometre in 2015-16. This is the highest normalised emissions in the time series, and is up 15.0% on the previous year, and 20.1% compared to 2005-06. The previous peak in the time series was achieved in 2012-13 where there were 30.9 g/ CO_2e per net freight tonne kilometre. When interpreting these statistics it is worth noting that freight emissions tend to fluctuate from year-to-year throughout the time series.

Domestic intermodal:

Increased emissions per net freight tonne kilometre could be caused by a shift in the type of commodities moved by rail freight. In 2015-16 domestic intermodal had overtaken coal as the commodity moved most by rail freight.

Proportion of coal and domestic intermodal freight moved, Great Britain, 1990-00 to 2015-16 (sourced from table 13.7)



[7] http://www.rssb.co.uk/Library/improving-industry-performance/2016-05-rail-sustainable-development-principles.pdf

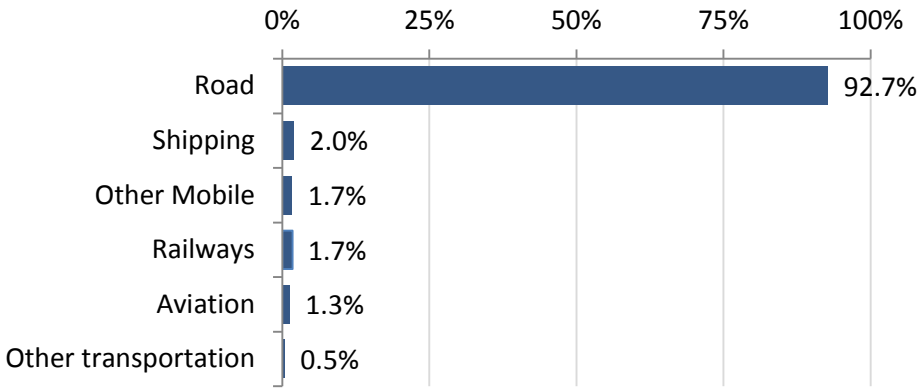
In 2015-16 domestic intermodal accounted for 36% of freight moved. Coal was traditionally the commodity moved most by rail, but over the past year coal moved declined by 64%, and now accounts for just 13.1% of rail freight moved[8].

Domestic intermodal can often involve multiple and smaller loads, whereas the movement of coal can often involve high volume or high tonnage cargo. This may be a reason why there was an increase in emissions per net freight tonne km in 2015-16[9].

Comparison to other transport modes

Transport was responsible for 23% of the UK greenhouse gas emissions in 2014 (the latest year data is available). Road vehicles were responsible for 92.7% of the transport emissions, with rail responsible for 1.7% of transport emissions[10].

Estimated emissions of Greenhouse Gases by transport mode, Great Britain, 2014



Source: Final UK greenhouse gas emissions national statistics: 1990-2014, Department of Energy & Climate Change

[8] http://dataportal.orr.gov.uk/displayreport/report/html/a201ed45-23cf-4785-8d71-881f93592314

[9] https://www.21stcentury-rail.com/what-will-tomorrows-freight-trains-carry/

[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/496942/2014_Final_Emissions_Statistics_Release.pdf

Fifth Carbon Budget

The government has a legally binding Fifth Carbon Budget which aims to reduce emissions by 57% in 2032 compared to 1990 levels, and an 80% reduction by 2050. Moving freight from road to rail is part of the solution and has the potential to help reduce emissions[11]. As part of this a study showed that shifting from HGV road freight to rail could save 19% in greenhouse gas emissions[12].

- Estimates of normalised passenger and freight CO_2e emissions annual data is available on the data portal in: Table 2.100.
- Estimates of passenger and freight energy consumption and CO_2e emissions annual data is available on the data portal in: Table 2.101.

[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/552492/rail-freight-strategy.pdf

[12] http://www.arup.com/railfreightmarket

Annex 1 – List of pre-created reports available on the ORR Data Portal

All data tables can be accessed on the data portal free of charge. The ORR data portal provides on screen data reports, as well as the facility to download data in Excel format and print the report. We can provide data in csv format on request.

Infrastructure on the railways

- Infrastructure on the railways (1985-86 to 2015-16) – Table 2.52
- Mainline station in Great Britain (1985-86 to 2015-16) – Table 2.53

Average age of rolling stock data

- Average age of rolling stock by sector (2000-01 Q2 to 2015-16 Q4) – Table 2.30
- Average age of rolling stock by train operating company (2007-08 Q4 to 2015-16 Q4) – Table 2.31

Environmental data

- Estimates of normalised passenger and freight CO_2e emissions (2005-06 to 2015-16) – Table 2.100.
- Estimates of passenger and freight energy consumption and CO_2e emissions (2005-06 to 2015-16) – Table 2.101.

Revisions: There have been revisions to the previously published time series. Further details on revisions to the data can be found at: Revisions Log

Annex 2 – Statistical Releases

This publication is part of the statistical releases which cover the majority of reports that were previously released through the Data Portal. The statistical releases consist of four annual and four quarterly themed releases:

Annual:

- Rail Finance & Rail Fares Index;
- Key Safety Statistics;
- Rail Infrastructure, Assets and Environmental;
- Regional Rail Usage.

Quarterly:

- Passenger and Freight Rail Performance;
- Freight Rail Usage;
- Passenger Rail Usage;
- Passenger Rail Service Complaints.

A full list of publication dates for the next twelve months can be found in the release schedule on the ORR website.

National Statistics

The United Kingdom Statistics Authority designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics.
National Statistics status means that official statistics meet the highest standards of trustworthiness, quality and public value.

All official statistics should comply with all aspects of the Code of Practice for Official Statistics. They are awarded National Statistics status following an assessment by the Authority's regulatory arm. The Authority considers whether the statistics meet the highest standards of Code compliance, including the value they add to public decisions and debate.

It is ORR's responsibility to maintain compliance with the standards expected of National Statistics. If we become concerned about whether these statistics are still meeting the appropriate standards, we will discuss any concerns with the Authority promptly. National Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

For more details please contact the Statistics Head of Profession Lyndsey Melbourne on 020 7282 3978 or contact rail.stats@orr.gsi.gov.uk.

The Department for Transport (DfT) also publishes a range of rail statistics which can be found at DfT Rail Statistics.

Annex 3 – Average age of rolling stock: further detail by train operator

This annex supplements the rolling stock chapter, and provides some further detail about key rolling stock changes and future rolling stock orders. For a definite summary of rolling stock changes please view Rolling Stock Perspective, second edition.

Chiltern:

Chiltern's average age of rolling stock is 19.8 years, a 0.7 year increase over the past year. This is due to 18 class 168/3 being introduced over the past year which were built between 2000-2001[13].

Govia Thameslink Railway (GTR):

Govia Thameslink Railway's (GTR) rolling stock figures have been combined with Southern's rolling stock to reflect the merged franchise. GTR have started to phase out class 442 rolling stock used in Gatwick Express and replaced with newer class class 387 rolling stock[14]. 16 class 319 units (built between 1987 and 1988) have been cascaded to London Midland[15].

In June 2013, Siemens plc and Cross London Trains were awarded a contract to build 1,140 carriages for the Thameslink route. Most of the trains will be in service by the end of 2018, with the first lot of trains entering service from Spring 2016[16]

Greater Anglia:

Greater Anglia's average age of rolling stock at 2015-16 Q4 was 26.7 years, a 0.8 year decrease compared to the year before. Over the past year some Greater

[14] http://www.bbc.co.uk/news/uk-england-sussex-35688899

[15] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524445/rolling-stock-perspective.pdf

[16] http://www.railtechnologymagazine.com/Rolling-stock/gtr-orders-new-fleet-of-siemens-class-700-variants-for-great-northern

Anglia's services, and therefore rolling stock, have been transferred to London Overground (see London Overground below).

Future rolling stock orders include 1,043 new carriages which have been ordered in a deal worth £1.4 billion. The carriages will enter service between January 2019 and September 2020, with the aim to support a faster timetable[17].

Great Western and Virgin Trains East Coast - Intercity Express Programme:

The Intercity Express Programme (IEP) is a £4.5billion contact to supply Britain with the next generation of intercity trains. 596 carriages will be introduced and will replace rolling stock originally deployed by British Rail in the 1970s and 1980s. The trains are due to be introduced on the Great Western main line from 2017, and on the East Coast mainline from 2018[18].

London Midland:

London Midland's average age of rolling stock is 11.7 years, a 0.7 increase on the previous year. This is due to 28 vehicles of class 321 built between 1988-1990 being phased out.

London Overground:

London Overground average age of rolling stock is 13.7 years, an increase of 9.0 years over the past year. This increase is due to London Overground taking over suburban routes (Liverpool Street with Chingford, Enfield Town and Cheshunt, and services operating between Romford and Upminster) from the Greater Anglia franchise in May 2015, and inheriting their rolling stock. Previously London Overground had one of the youngest rolling stock in the country; it had an average age of 4.7 years at 2014-15 Q4.

[17] https://www.gov.uk/government/news/better-journeys-for-rail-passengers-and-boost-for-derby-train-industry-as-new-east-anglia-franchise-announced

[18] https://www.gov.uk/government/news/4-5-billion-investment-in-new-trains-creates-new-jobs

London Overground has a new fleet planned with the first of the new units arriving in summer 2018[19]. The new rolling stock will be built by Bombardier in a £260 million contract for 45 new four-car EMUs to replace the Class 315 and Class 317 trains inherited from Greater Anglia.

Merseyrail:

Merseyrail has the second oldest rolling stock in Great Britain with an average age of 37.3 years. Over the past eight years Merseyrail's rolling stock has increased by 8.0 years which indicates no newer roller stock has been introduced, or older rolling stock removed during this period.

Merseyrail has plans to replace existing rolling stock with a new fleet of electric multiple-units to replace the 59 three-car Class 507 and 508. Merseyrail plans to introduce the new trains from the early 2020's[20].

Northern:

Northern's average age of rolling stock is 27.2 years, a 0.9 year increase compared to last year. A future rolling stock deal worth £490m financed by Eversholt Rail will replace Northern's Pacer trains. The trains are due to be delivered by October 2018[21].

Scotrail:

Scotrail's average age of rolling stock is 19.9 years, a 0.6 year decrease over the past year. In March 2015 a new Caledonian Sleeper franchise was awarded to Serco Caledonian Sleepers, this was previously managed by Scotrail. This has resulted in the transfer of some rolling stock to Caledonian Sleeper[22].

[19] https://tfl.gov.uk/info-for/media/press-releases/2014/may/tfl-appoints-london-overground-operator-to-run-additional-services

[20] http://www.railwaygazette.com/news/traction-rolling-stock/single-view/view/merseyrail-emu-fleet-to-be-replaced.html

[21] http://www.railtechnologymagazine.com/Rail-News/arriva-signs-490m-rolling-stock-contract-to-replace-northerns-pacers

[22] http://www.transport.gov.scot/rail/caledonian-sleeper-franchise

Future rolling stock includes 70 new electric Hitachi trains rolled out between summer 2017 and early 2019[23].

South West Trains (SWT):

Over the past year SWT rolling stock has increased by 1.0 year to 19.9 years. SWT have announced £210m of new trains with 30 new five-carriage Desiro City trains will boost capacity, providing for more than 18,000 extra peak-time passengers every day travelling into London Waterloo. The first of the 150 new carriages will begin arriving in 2017 and all will be in service by early 2018[24].

Transpennine Express (TPE):

TPE's average age of rolling stock is 9.5 years, a 1.8 years increase over the past year. TPE had 10 class 170 vehicles that went off lease and were transferred to Chiltern. To make up for those vehicles going off lease, TPE sub leased a number of class 156 units from Northern.

TPE have ordered rolling stock which will come into service by April 2019. This includes 12 five-car intercity trains in a deal worth £120m, and is financed by Eversholt Rail[25]. Beacon Rail will lease 13 sets of five-car intercity carriages to TPE[26]. Angel trains will lease 19 five-car Hitachi AT300 bi-mode trains which will be delivered from July 2019[27].

[23] http://www.transport.gov.scot/rail/scotrail-franchise/scotrail-franchise

[24] http://www.stagecoach.com/media/news-releases/2014/2014-09-03.aspx

[25] http://www.railwaygazette.com/news/traction-rolling-stock/single-view/view/transpennine-express-orders-emus-and-hauled-stock.html

[26] http://www.beaconrail.com/beacon-rail-to-supply-rolling-stock-to-transpennine-express-limited/

[27] https://www.angeltrains.co.uk/news/66

Annex 4 - Methodology

Number of mainline stations in Great Britain

For 2015-16 ORR changed the data source for the number of open mainline stations in Great Britain. This is now sourced from Estimates of station usage, which is also published by ORR. Previously the number of stations was sourced from Network Rail via the Operational Property Asset System (OPAS). OPAS was not designed for this type of statistical reporting and the estimates of station usage data is of higher quality for the following reasons:

Station usage data includes mainline stations only. This includes stations managed by Network Rail, Transport for London (TfL), and other organisations on the mainline railway. Only stations opened throughout the year are included, and closed stations are excluded.

Station usage data excludes those on the tram network. Both the Greater Manchester tram network and Tyne and Wear metro are excluded from station usage as they are not on the mainline rail network. However, they were included in the data provided by Network Rail.

No double counted stations within station usage data. Each station is counted once in the station usage dataset; whereas the Network Rail source had some double counting due to a station being counted twice as higher and lower levels.

Station usage data has clear methodology documentation for every year. Whereas the Network Rail data has a lack of documentation and some data quality issues throughout the time series.

Not all new stations are recorded in the Network Rail source. Network Rail source the data from Operational Property Asset System (OPAS). Stations are included if they were deemed to be “live” and those with an operation status of “operational”, “null” and combined”. However, not all of the 14 stations opened in 2015-16 are recorded. Estimates of station usage data accurately records all the 14 stations opened during 2015-16.

Environmental: how carbon emissions are calculated

For the time period between 2005-06 and 2009-10, energy consumption data was provided for passenger and freight operators by the Association of Train Operating Companies (ATOC) and Network Rail respectively.

Since 2011-12, energy consumption data have been collected directly from the operators themselves:

- Franchised passenger operators;
- Open access passenger operations;
- Freight operations; and
- Eurostar services (UK side).

These operators provide us with their total traction electricity (kWh) and diesel usage (litres) consumption. Traction energy refers to rolling stock on the Great Britain rail network and the energy used to power passenger and freight train movements.

We convert the actual energy consumption data into CO_2e using standard conversion factors from the Department for Environment, Food and Rural Affairs (DEFRA) Greenhouse gas conversion factors[28]. The conversion factors allow activity data (e.g. litres of fuel used, kWh consumed) to be converted into kilograms of carbon dioxide equivalent (CO_2e) which is a universal unit of measurement that allows the global warming potential of different greenhouse gases (GHGs) to be compared.

In some instances actual consumption data is not provided by passenger or freight operators. In these cases an estimate of CO_2e is made based on the number of train kilometres each operator runs. The estimate of CO_2e which is applied to the number of train kilometres is calculated using a conversion factor derived by taking the aggregate sum of CO_2e emissions calculated from operators' actual consumption data and dividing by the aggregate sum of their actual train kilometres`.

To calculate the final normalised output, the total CO_2e emissions for passenger and freight operators are normalised by passenger kilometres and net tonne kilometres respectively. Passenger kilometre data is calculated from passenger kilometre statistics published in the Passenger Rail Usage statistical release[29], and Eurostar

[28] http://www.ukconversionfactorscarbonsmart.co.uk/

[29] ORR – *Passenger rail usage statistical release*

and Heathrow Express data submissions. Net tonne kilometres data for the normalisation of freight emissions is sourced from the dataset published in the Freight Rail Usage statistical release[30].

For the purposes of the calculation of normalised CO_2e emissions the following definitions are employed:

- Diesel – gas, oil, diesel or biofuel volume (litres) consumed in train movements (separate volumes for each fuel type used);
- Electricity – electricity consumed (kWh) in train movements;
- Passenger kilometre – moving one passenger, one kilometre; and
- Net tonne kilometre – moving one tonne of freight, one kilometre.

For more information on the data collection and methodology used in this statistical release see the accompanying quality report.

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