TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

CARBON ACCOUNT FOR TRANSPORT NO. 5: 2013/14 EDITION

April 2014

Carbon Account for Transport

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This document provides an annual update of the Carbon Account for Transport, first published in August 2009. Future updates will be released as new data becomes available.

Contents

Executive Summary

The main findings and updates for the latest Carbon Account for Transport are:

- In 2011 total Scottish emissions from all sectors amounted to 51.3 mega-tonnes of carbon dioxide equivalent ($MtCO_2e$). Transport's share of this Scottish total is 13.0 $MtCO_2e$ – including emissions from international aviation and shipping. Transport thus accounts for just over one quarter of Scotland's total emissions.

- Transport emissions have fallen for four years running and over this period have reduced by 1.7 $MtCO_2e$.

- Road transport emissions account for 71.5% of all transport emissions and cars account for over half of this total. Emissions from cars account for 40% of all transport emissions.

- Maritime emissions account for 14% of all transport emissions.

- Aviation emissions account for 13% of all transport emissions.

- With the overall picture for transport emissions over the period 1990-2011:

  Emissions from cars are lower than in 1990.

  Emissions from aviation, and particularly international aviation, have risen.

  The rise in emissions from good vehicles is almost exclusively a result of a significant increase in emissions from Light Good Vehicles before 2007.

Chapter 1: Introduction

1.1 Policy Context

The Government Economic Strategy[1] states that the Purpose of the Scottish Government is to:

"focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth" (The Government Economic Strategy 2011, p12).

In support of the Strategy, the Climate Change (Scotland) Act[2] creates the statutory framework for greenhouse gas emissions reductions in Scotland by setting an interim 42% reduction target for 2020, and an 80% reduction target for 2050. To help ensure the delivery of these targets, the Act also requires Scottish Ministers to set batches of annual targets for Scottish emissions in the period 2010 to 2050. In October 2010, the Scottish Parliament passed legislation setting the first batch of annual targets for the years 2010 to 2022[3].

Finalised in March 2011, Low Carbon Scotland: Meeting the Emissions Reduction Targets 2010-2022: The Report on Proposals and Policies[4], and the Low Carbon Economic Strategy (LCES)[5] together set out how we can meet these climate change targets and secure the transition to a low-carbon economy.

In line with the requirements of the Climate Change (Scotland) Act, the next batch of annual targets covering the period 2023-27 were agreed in October 2011[6] and in June 2013 the Government published Low Carbon Scotland: Meeting the Emissions Reduction Targets 2013-2027: The Second Report on Proposals and Policies[7]

[1] http://www.scotland.gov.uk/Publications/2011/09/13091128/0
[2] http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/climatechangeact
[3] The Climate Change (Annual Targets) (Scotland) Order 2010, SSI 2010 no.359
[4] http://scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/lowcarbon/rpp
[5] http://www.scotland.gov.uk/Publications/2010/11/15085756/0
[6] http://www.legislation.gov.uk/ssi/2011/353/made
[7] The Second Report on Proposals and Policies

(RPP2) which set out a possible pathway and set of options to deliver the necessary reductions out to 2027.

Delivering both the interim and final emissions reduction target will be challenging. Tackling emissions from transport will require a combination of both reserved and devolved policies to ensure the sector plays its full and fair part in achieving each target.

1.2 Purpose of the Carbon Account for Transport

The National Transport Strategy (NTS)[8] outlines three key strategic outcomes for transport in Scotland:

- Improve journey times and connections
- Reduce emissions
- Improve quality, accessibility and affordability

The 'reduce emissions' outcome includes a commitment to develop a carbon balance sheet for transport with the expectation that:

"This will present the impact of all Scottish transport policies and projects that are expected to have a significant impact on carbon, whether positive or negative."(National Transport Strategy, p46)

This commitment is met by the regular publication of the Carbon Account for Transport (CAT). The CAT provides updates on the following information:

- Official Scottish transport emissions data from 1990 up to 2011
- Emissions efficiency estimates for passenger vehicles
- Key forward looking transport indicators
- Scottish transport infrastructure projects likely to have a significant impact upon emissions

[8] Scotland's National Transport Strategy (2006), The Scottish Executive.

- Assessments of likely impact of Scottish, UK and EU wide regulatory and fiscal measures

Each of these components can be used to monitor and review progress towards achievement of the 'reduced emissions' strategic outcome for transport and further support the development and implementation of actions to reduce emissions in accordance with the targets in the Climate Change (Scotland) Act.

It is important to be clear from the outset that the CAT is not a decision making tool at either the individual project or policy level. Nor is its function to reject those projects or policies that have a negative impact on emissions (i.e. lead to increased emissions). Instead, its purpose is to present in a clear and consistent manner relevant data and analysis to inform the Scottish Government and Transport Scotland's consideration of future transport options. The tool for appraising new transport policies and projects, where the impact on the environment is one of the five criteria considered alongside economy, safety, integration and accessibility and social inclusion remains the Scottish Transport Appraisal Guidance (STAG)[9].

The CAT continues to provide an estimate of the net impact of all devolved transport infrastructure interventions that fall within the competence of the Scottish Government or other Scottish public bodies. Details of the methodology and the results from the current assessment are set out in section 3.4.

In achieving its objectives, the CAT will also constitute an important element of a wider framework adopted across the Scottish Government to monitor the rate of emissions reduction.

[9] http://www.transportscotland.gov.uk/stag/home

Chapter 2: Historical emissions analysis

2.1 Background and data sources

The emissions data presented in this chapter are from the 'Greenhouse Gas Inventory for England, Scotland, Wales and Northern Ireland: 1990-2011'[10] (GHGI) unless otherwise stated. The GHGI is compiled on an annual basis and the full time series of all greenhouse gases is updated in each publication to take account of improved data and any advances in calculation methodology. The greenhouse gases associated with transport and recorded by GHGI are Carbon Dioxide (CO_2), Nitrous Oxide (N_2O) and Methane (CH_4)[11].

The transport category within the GHGI covers emissions from road, aviation, rail and maritime transport. While domestic aviation and shipping emissions are recorded in the GHGI, emissions associated with international aviation and shipping (IAS) were not originally reported. However, using existing data sources, an indicative assessment of the emissions from international aviation and shipping from each country in the United Kingdom was first published in 2009 and continues to be published as an appendix within the annual GHGI publication. Consequently, in line with the Scottish Government commitment to include emissions from IAS within the targets set by the Climate Change (Scotland) Act, references to aviation and maritime emissions in this document refer to both domestic and international, unless otherwise stated.

In line with the methodology used to report against the Climate Change (Scotland) Act, the transport emissions reported in this section only cover emissions at the point of use (tailpipe emissions). Consequently, no lifecycle impacts within the transport infrastructure and no displaced impacts, such as the emissions generated by the electricity used on electrified railways, are included.

[10] Greenhouse Gas Inventory for England, Scotland, Wales and Northern Ireland: 1990-2010 (2012), AEA Technology; http://www.naei.org.uk/reports.php

[11] While not relevant to the transport sector, the full inventory includes the three other greenhouse gases - Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF_6).

Greenhouse gas emissions for European Union Member States are reported in the 'European Union greenhouse gas inventory 1990-2011 and inventory report 2013'. This is compiled on an annual basis by the European Environment Agency and includes aggregate data for all member countries of the EU[12]. Data from other Member States has been included in the CAT for the first time for the purpose of comparing relative performance across countries.

2.2. Total emissions trends for Scotland and the Scottish transport sector

In 2011 total Scottish emissions from all sectors amounted to 51.3 mega-tonnes of carbon dioxide equivalent ($MtCO_2e$)[13]. This total represents a 5.6 $MtCO_2e$ or 9.9% fall from the equivalent 2010 figure. Compared to the 1990 base year Scotland has reduced its total emissions by 29.6%.

Transport's share of this Scottish total is 13.0 $MtCO_2e$. After an initial sequence of almost continual increases in emissions from 1990, the run peaked in 2007. Since reaching this peak of 14.7 $MtCO_2e$ transport emissions have fallen year on year and are now back to their 1990 base year level, 12% or 1.7 $MtCO2_e$ below their 2007 peak.

The recent falls in emissions has been as a result of a number of factors. Principal among them are the wider economic conditions and stagnating real household incomes, but factors such as investment in public transport infrastructure, improvements in fuel efficiency, government environmental policies, land-use planning and global oil prices will also have played a significant role.

The latest data on economic performance in Scotland shows a number of quarters of positive GDP growth. The close correlation between GDP and transport emissions

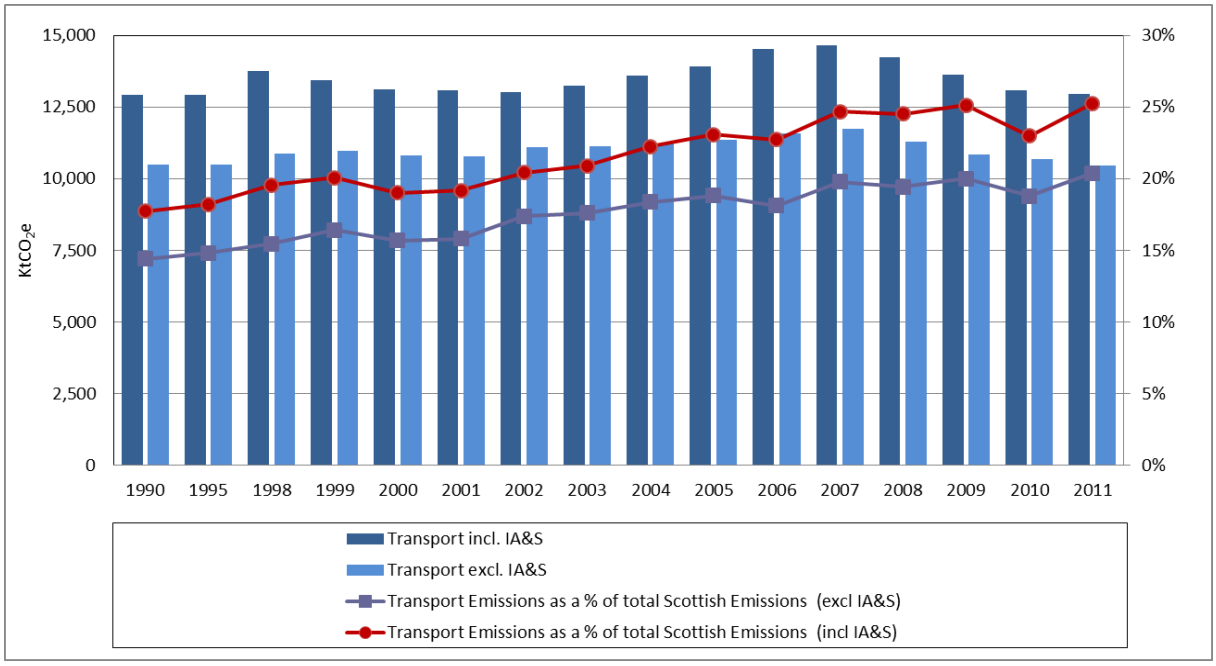
[12]'Annual European Union greenhouse gas inventory 1990-…2011 and inventory report 2013', EEA (2013) http://www.eea.europa.eu/publications/european-union-greenhouse-gas-inventory-2013

[13] This calculation uses the unadjusted Scottish emissions total for 2011- i.e. excluding the impact of the EU Emissions Trading System (ETS). Including the ETS would lower Scotland's net emissions total and it is this adjusted total that is used in assessing Scotland's performance under the Climate Change (Scotland) Act.

suggests that this will put pressure on the continuation of the recent trend of reducing emissions.

With IAS emissions excluded, the transport sector accounts for 20.4% of total Scottish emissions. With them included this figure rises to 25.3%. The respective shares in 2010 were 18.8% and 23% and 14.4% and 17.7% back in 1990. Figure 1 shows the growing relative importance of transport emissions in Scotland.

Figure 1: Total emissions from transport and transport emissions as a percentage of total Scottish emissions, 1990-2011



Source: Greenhouse Gas Inventory, NAEI, 2013, Transport Scotland. Total emissions calculation excludes the impact of the EU Emissions Trading System.

2.3 Emissions analysis by transport sector

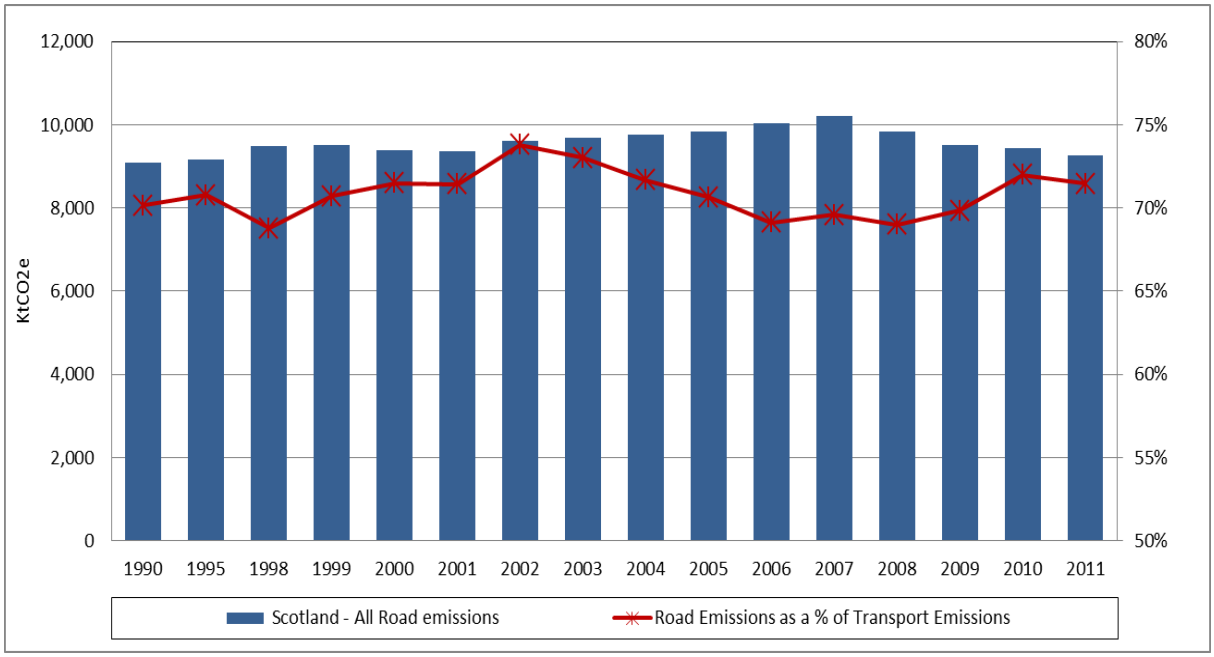
2.3.1 Road Transport

Road transport emissions include all private, public and commercial road vehicles. In total, this category accounts for 71.5% of total transport emissions. In 2011 total road emissions fell to 9.3 $MtCO_2e$ – a fall of 1.7% against the equivalent 2010 figure. Although total road emissions declined, Light Good Vehicles (LGVs) emissions

increased by 1% in 2011, and overall LGV emissions show an increase of 71% since the 1990 base year.

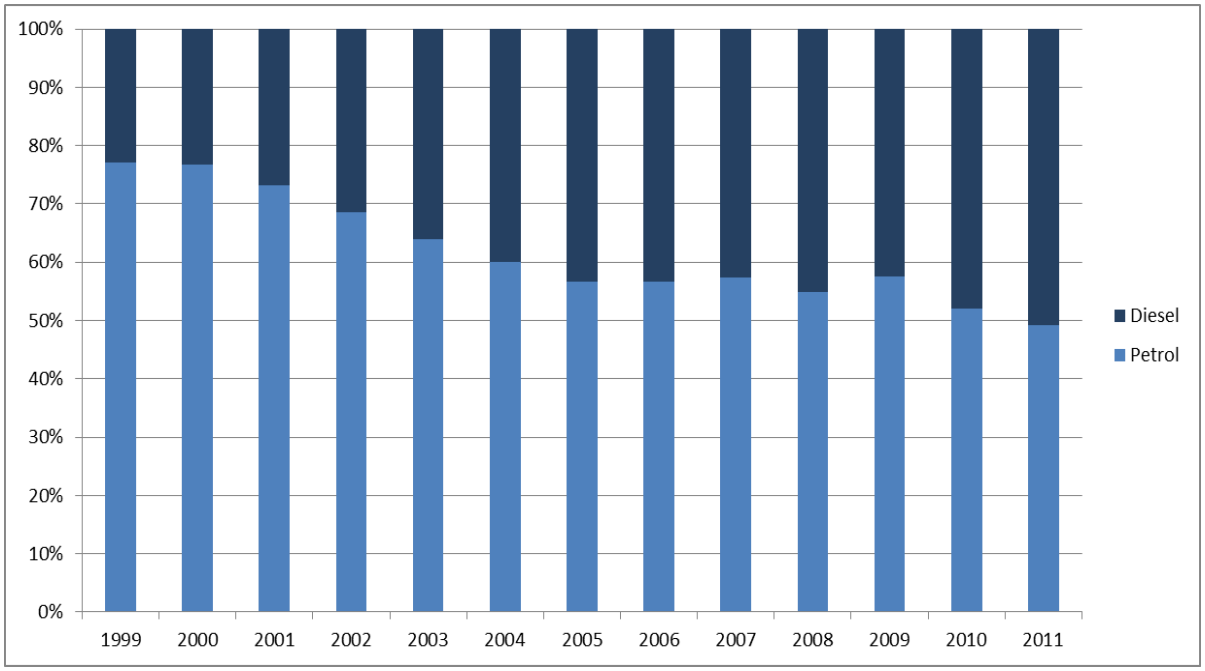
Figure 2 shows that road emission rose almost continuously from 1990 to a peak in 2007 of 10.2 $MtCO_2e$. Since this 2007 peak, road emissions have fallen for four years and in 2011 stand 9.2% below this peak. Road emissions are though still 1.8% above the 1990 equivalent figure.

Figure 2: Road transport emissions 1990-2011 and road transport emissions as a share of total transport emissions



As well as reflecting improvements in car energy efficiency, road transport emissions have been affected by changes in the make-up of the passenger car fleet. With diesel engines being more fuel efficient than their petrol equivalent (all other things being equal) the balance of the fleet moving in favour of diesel (see Figure 3) has improved the emissions situation. Further detailed analysis of road transport emissions by vehicle type and road type is undertaken in sections 2.4 and 2.5.

Figure 3: Distribution of new Scottish registrations between petrol and diesel 1999-2011 – all vehicle body types



2.3.2 Maritime Transport

Emissions from maritime transport[14] in 2011 are estimated to be 1.8 $MtCO_2e$ or 14% of total transport emissions. Figure 4 shows that emissions from this sector have been volatile, although this is due in part to methodological and GHG reporting changes.

Maritime emissions fell by over one million tonnes from their 1998 peak of around 2.8 $MtCO_2e$ to 1.7 $MtCO_2e$ in 2002. Thereafter they rose by 0.6 $MtCO_2e$ to reach 2.3 $MtCO_2e$ in 2008 before subsequently returning to near their 2002 low. The 2011 estimate is 31% or 0.8 $MtCO_2e$ below the equivalent 1990 figure. The volatility in the series can be attributed to the performance of international shipping sector (IS) as historically IS emissions account for more than 70% of all maritime emissions. Figure 5 also shows domestic maritime emissions are on a gentle downward pathway.

[14] Includes national navigation and international shipping

Figure 4: Maritime transport emissions and maritime transport emissions as a share of total transport emissions

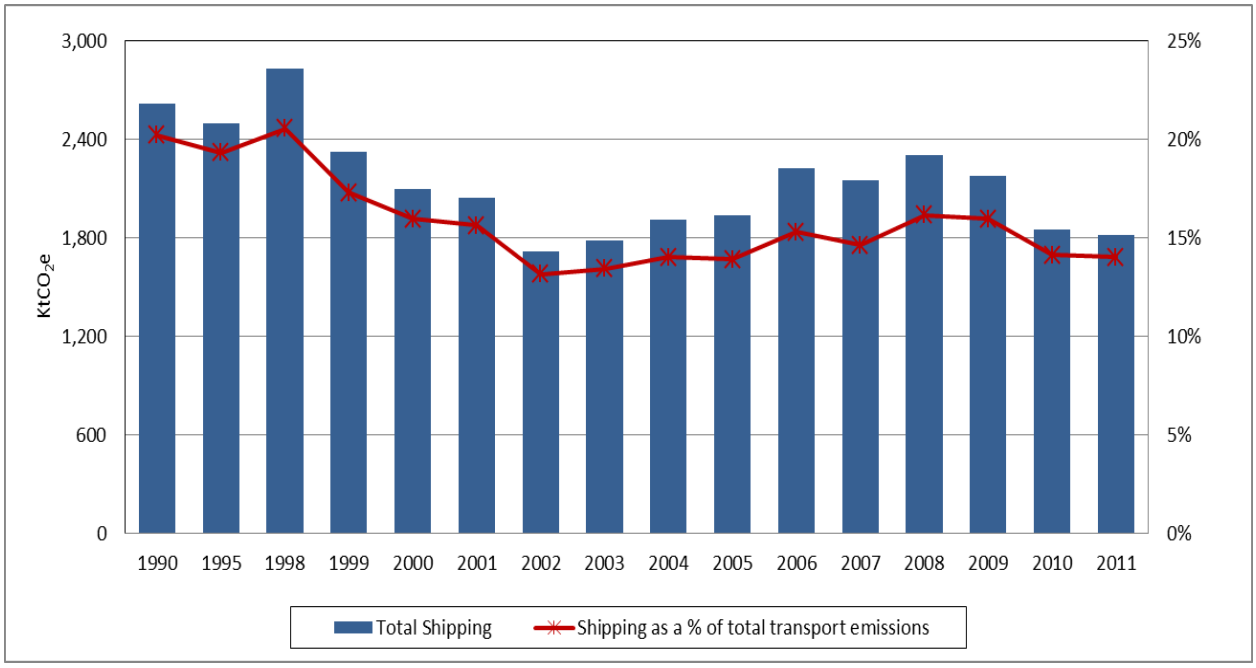
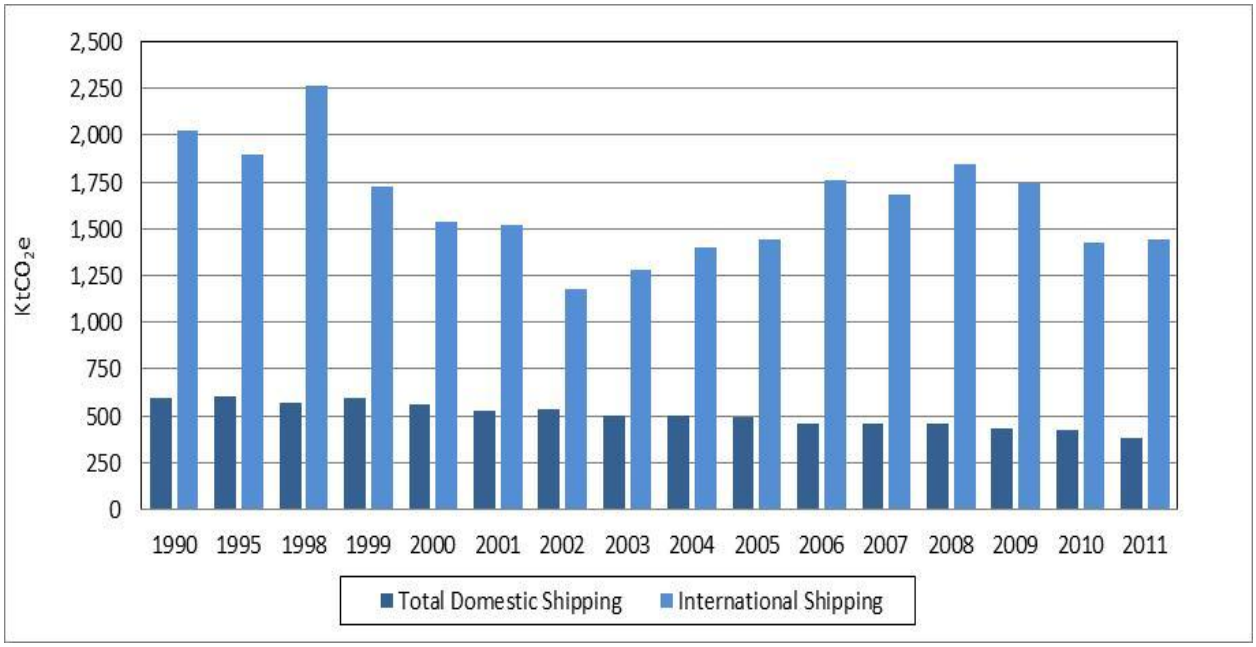


Figure 5: Comparison between domestic and international shipping emissions



2.3.3 Aviation

In 2011 aviation emissions increased by 3.4% over their 2010 level to 1.7 $MtCO_2e$, some 0.6 $MtCO_2e$ or 52% above the 1990 base year. Aviation emissions now

represent 13% of total transport emissions. Figure 6 shows the increasing trend in emissions from 1990 out to 2007 (2.2 $MtCO_2e$) before decreasing to 1.6 $MtCO_2e$ in 2010 – a level last recorded in 2003.

Figure 6: Aviation transport emissions and aviation transport emissions as a share of total transport emissions

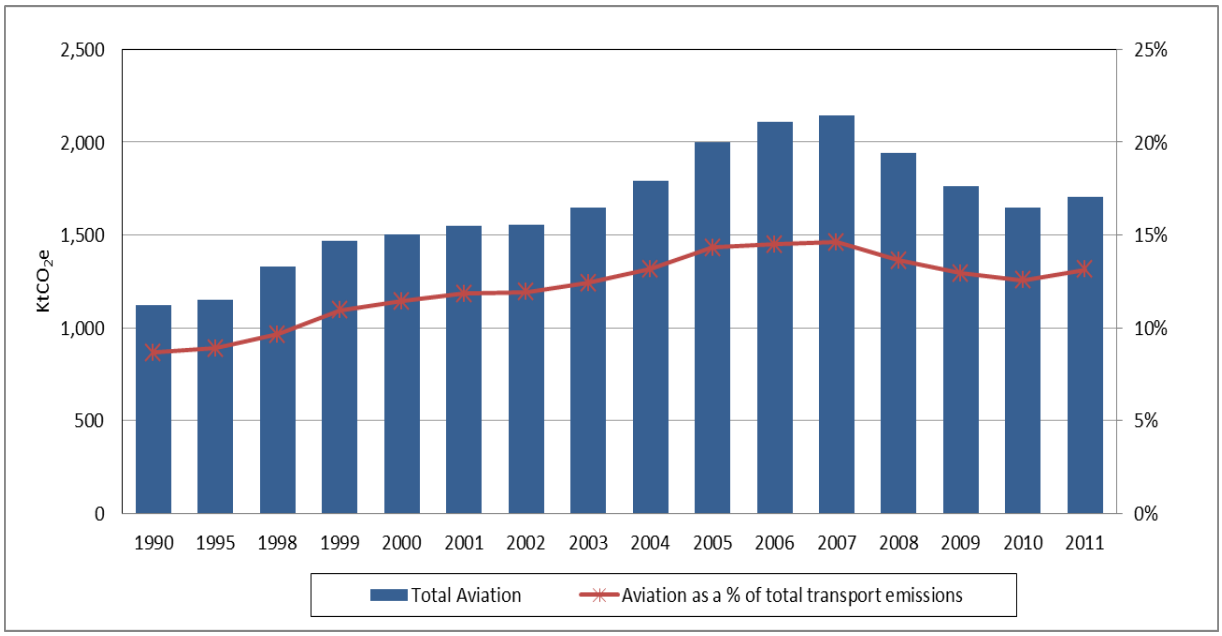
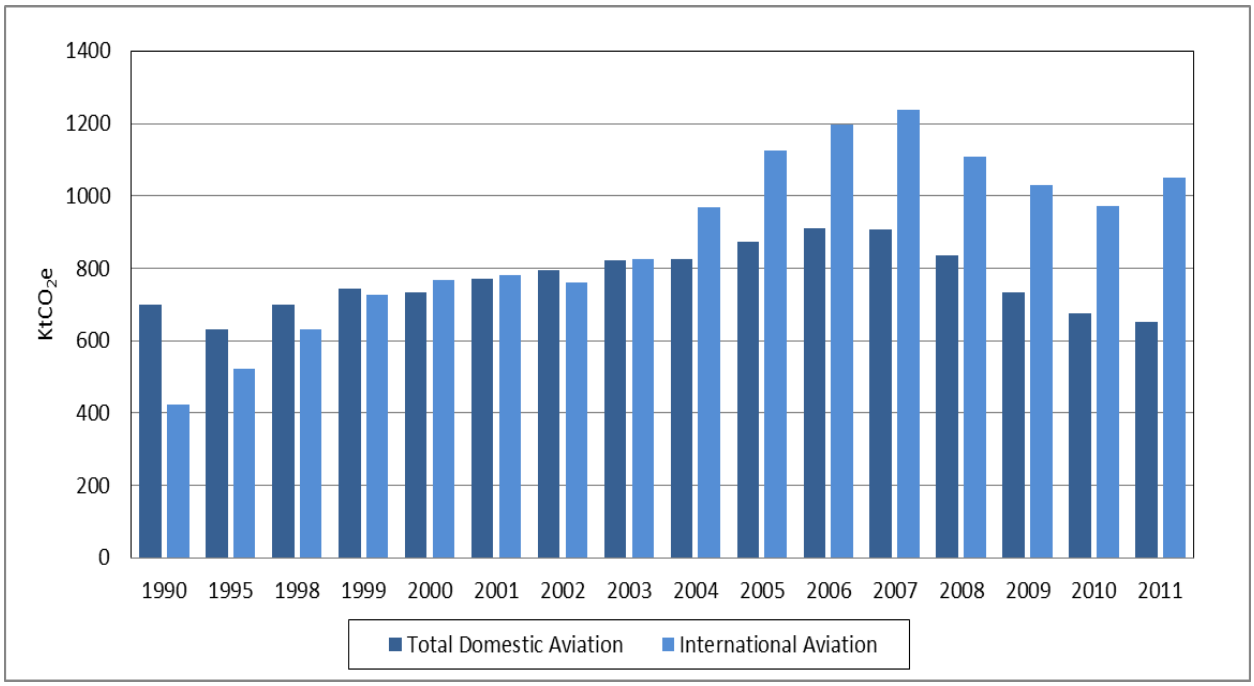


Figure 7 shows that from 1998 to 2003 emissions from domestic and international aviation were very similar. Since then the series have diverged. In 2011 international aviation emissions are estimated to account for 62% of total Scottish aviation emissions, almost the opposite of the situation in 1990 when domestic aviation emissions accounted for almost two-thirds of aviation's total. Between 2010 and 2011 domestic aviation emissions are estimated to have continued to decline (by 3.4%) while the emissions from international aviation rose by 8.1%.

Figure 7: Comparison between domestic and international aviation emissions



2.3.4 International Aviation and Shipping

After peaking in 2006 at 3.0 $MtCO_2e$, emissions from IAS were almost 0.6 $MtCO_2e$ lower in 2010 at 2.4 $MtCO_2e$. The 2011 estimate shows an increase of 8.1% for International Aviation (IA) and a 0.9% increase for International Shipping (IS) increasing the aggregate IAS total to just under 2.5 $MtCO_2e$. Between 2007 and 2010 the number of international flights from Scotland fell by 13.9% and emissions form international aviation fell by 21.4%. International flight departures rose by 8.9% between 2010 and 2011 and IA emissions increased by 8.1% over the same period.

The estimates for IS emissions rose marginally in 2011 but remain at 1.4 $MtCO_2e$. This is the first increase in the estimate for IS since 2006 although the current estimates are still significantly below those before 2000. Overall, the emissions estimate for 2011 is the same as for the base year although the split in emissions between the two has changed from 4:1 shipping to aviation to 3:2 in favour of shipping over aviation.

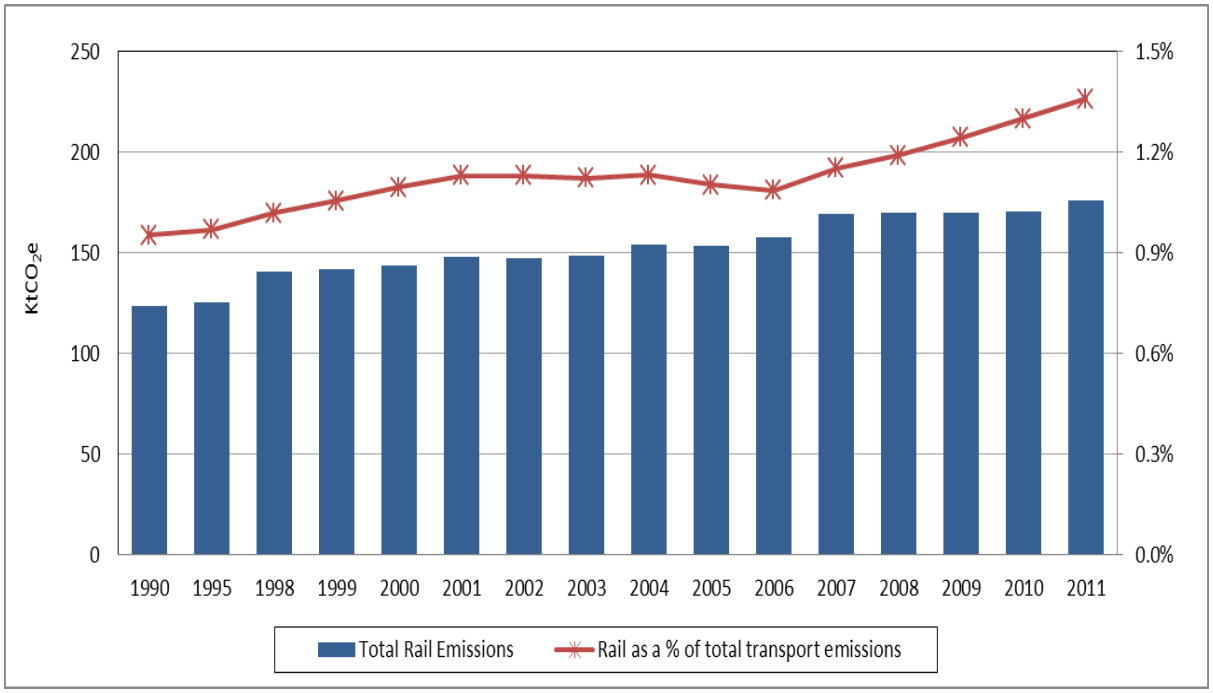
Figure 8: International maritime and aviation emissions 1990-2011

2.3.5 Rail

Rail emissions rose by 3.4% between 2010 and 2011 and the 2011 emissions total of 0.2 $MtCO_2e$ is 43% above the equivalent 1990 figure. Rail emissions show the steadiest increase over time but still only account for 1.4% of all transport emissions in Scotland. Total passenger kilometres travelled by rail have increased by over 34% for the period 2003-04 to 2012-13[15] and scheduled train kilometres have increased by over 19% over the same period.

[15] Source: Scottish Transport Statistics, No 32, 2013 Edition, Table 7.1

Figure 9: Rail transport emissions and rail transport emissions as a share of total transport emissions



2.4 Road emissions by vehicle type[16]

2.4.1 Cars

Emissions from cars have fallen from a peak of 6.0 $MtCO_2e$ in 2002 to an estimated 5.2 $MtCO_2e$ in 2011, a fall of around 14%. Over the same period (2002-2011) car kilometres have risen from 33.2 billion kms to 33.6 billion kms. Compared to the 1990 base year car emissions have fallen by around 0.6 $MtCO_2e$ or 10%. Despite this fall, car emissions continue to account for the greatest proportion of road transport emissions at 56%, and 40% of all transport emissions.

2.4.2 Heavy Goods Vehicles

HGV emissions make up the second largest proportion of road emissions and are estimated at 2.1 $MtCO_2e$ in 2011. HGV emissions fell slowly between 1990 and 2002 before growing rapidly. By 2006 HGV emissions surpassed their 1990 baseline figure of 2.1 $MtCO_2e$ reaching 2.2 $MtCO_2e$ in 2007. Emissions fell marginally in 2011 compared to 2010 but at 2.1 $MtCO_2e$ are still 2% above their 1990 level.

[16] For a full definition of exact vehicle types see: DfT vehicle definitions

2.4.3 Light Goods Vehicles

There has been a 71% increase in LGV emissions since 1990. Emissions also increased by 1% between 2010 and 2011. At 1.4 $MtCO_2e$ in 2011 they account for 15% of road emissions and 10% of total transport emissions.

2.4.4 Other - Buses and Motorcycles

Emissions from buses fell by 6.3% between 2010 and 2011 and now account for 0.5 $MtCO_2e$. Current bus emissions are though still 0.1 $MtCO_2e$ or 36% above the 1990 base year emissions estimate of less than 0.4 $MtCO_2e$. After rising in 2011-12 passenger boardings fell back in 2012-13.

Motorcycle emissions rose by 1% compared to 2010 but remain at 0.03 $MtCO_2e$ and account for just 0.4% of road emissions and 0.3% of total transport emissions.

Figures 10, 11 and 12 illustrate the changes in road emissions by vehicle type, the share of each vehicle type in total road emissions and the year in year change in car, HGV and LGV emissions respectively.

Figure 10: Breakdown of road emissions by vehicle type 1990-2011

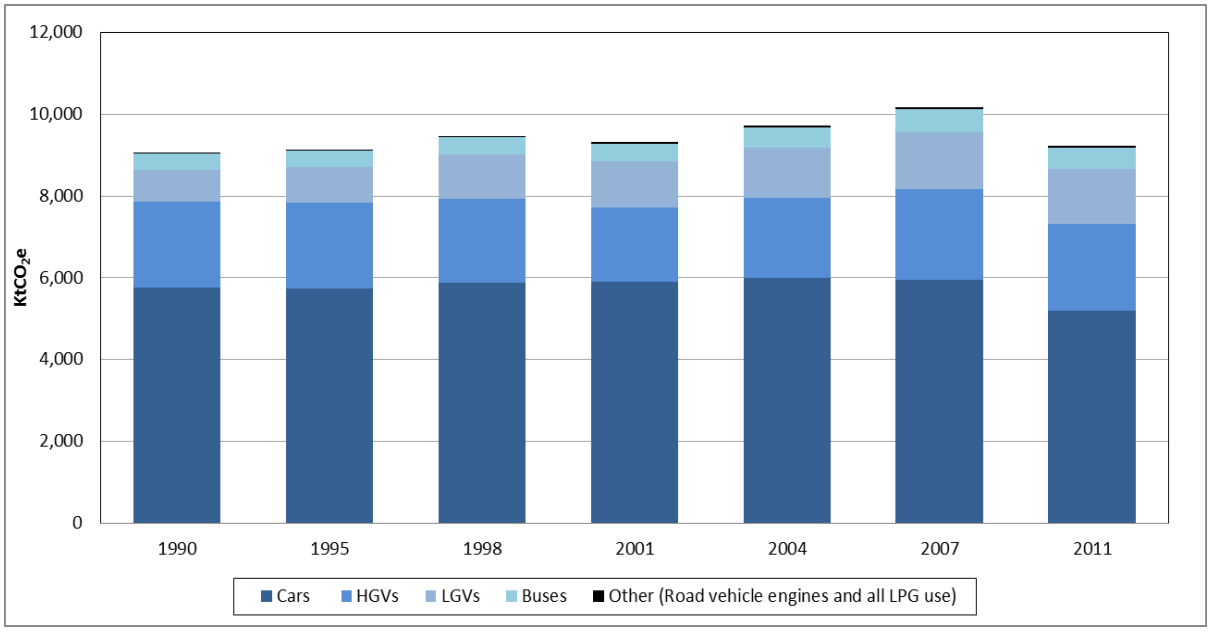


Figure 10 shows that goods vehicles were largely responsible for the increase in road emissions to 2007. Since then the decline in emissions from car has been behind the overall reduction in road emissions. The change in shares between vehicle types between 1990 and 2011 can be seen in Figure 11.

Figure 12 shows five consecutive year-on-year falls in car emissions from 2006. The pattern with goods vehicles is more mixed with 2008 and 2009 being the only years in which there was a reduction in emissions for both goods vehicle types.

Figure 11: Share of road emissions by vehicle type in 1990 and 2011

1990–total emissions 9.1 $MtCO_2e$ 2011–total emissions 9.2 $MtCO_2e$

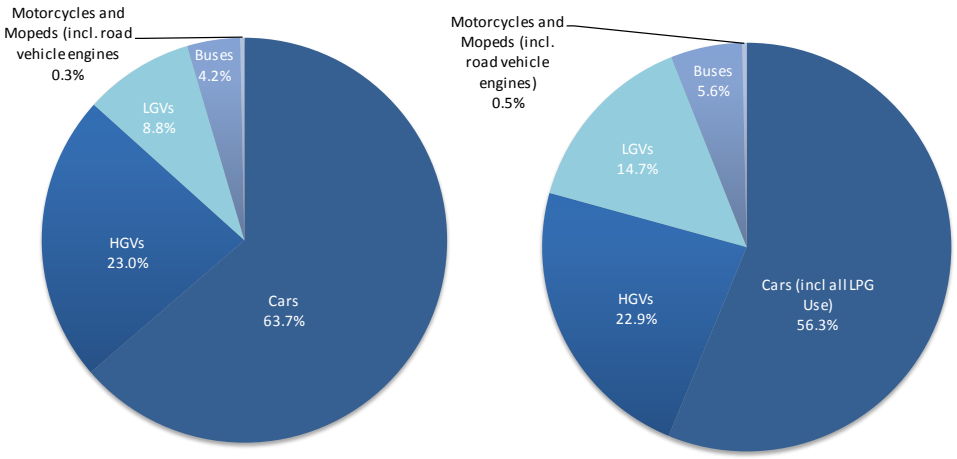
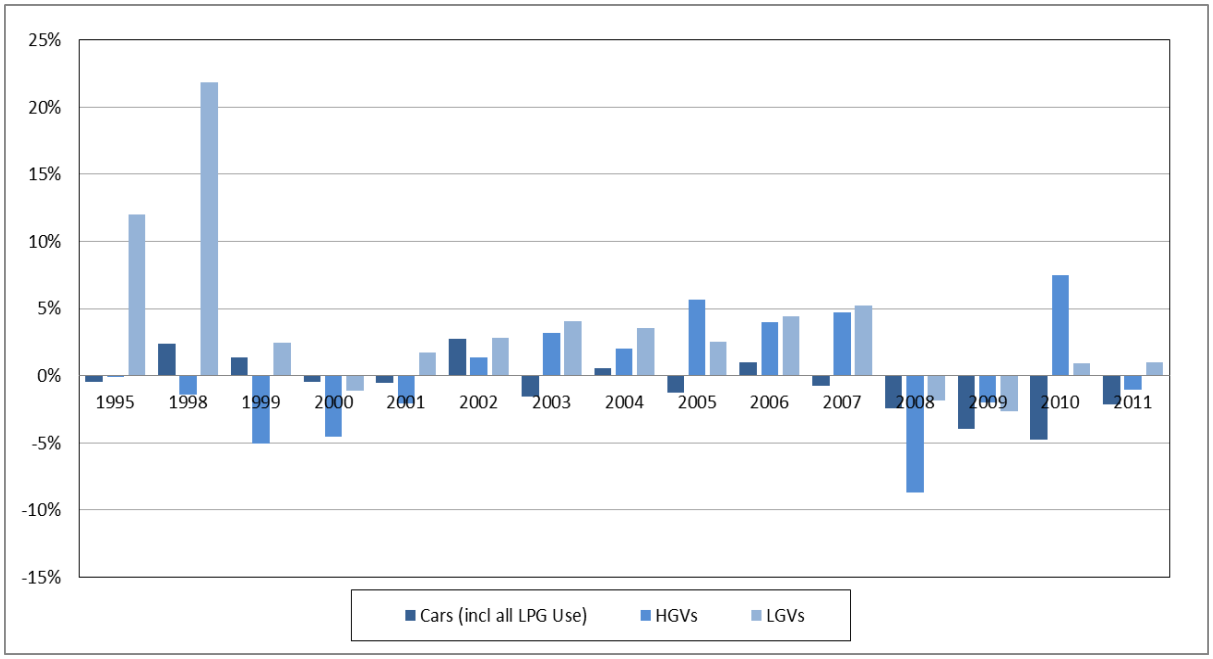


Figure 12: Year in year change in car, HGV and LGV emissions 1995-2011



2.5 Road emissions by road type

2.5.1 Rural

Emissions on rural roads have fallen for four consecutive years since 2007. In 2011 rural road emissions are estimated at 4.7 $MtCO_2e$, 0.1 $MtCO_2e$ or 2% below the 2010 figure. The latest year's estimate is just below the base year figure of 4.8 $MtCO_2e$. Rural emissions account for just over half of total road emissions.

2.5.2 Urban

2011 urban emissions are 7% below their 1990 level at an estimated 3.0 $MtCO_2e$, down from a peak of 3.2 $MtCO_2e$ in 2007. Emissions from urban traffic currently account for 31% of road emissions.

2.5.3 Motorway

Emissions from motorway traffic account for the smallest proportion in road emissions at just 19%. At 1.7 $MtCO_2e$ they are only marginally greater than the 2010 estimate, rising by just 0.1%. However the share in emissions from motorway traffic has been growing and shows a 41% increase over the share in 1990.

Figure 13: Emissions by road type (Index=1990 for each road type)

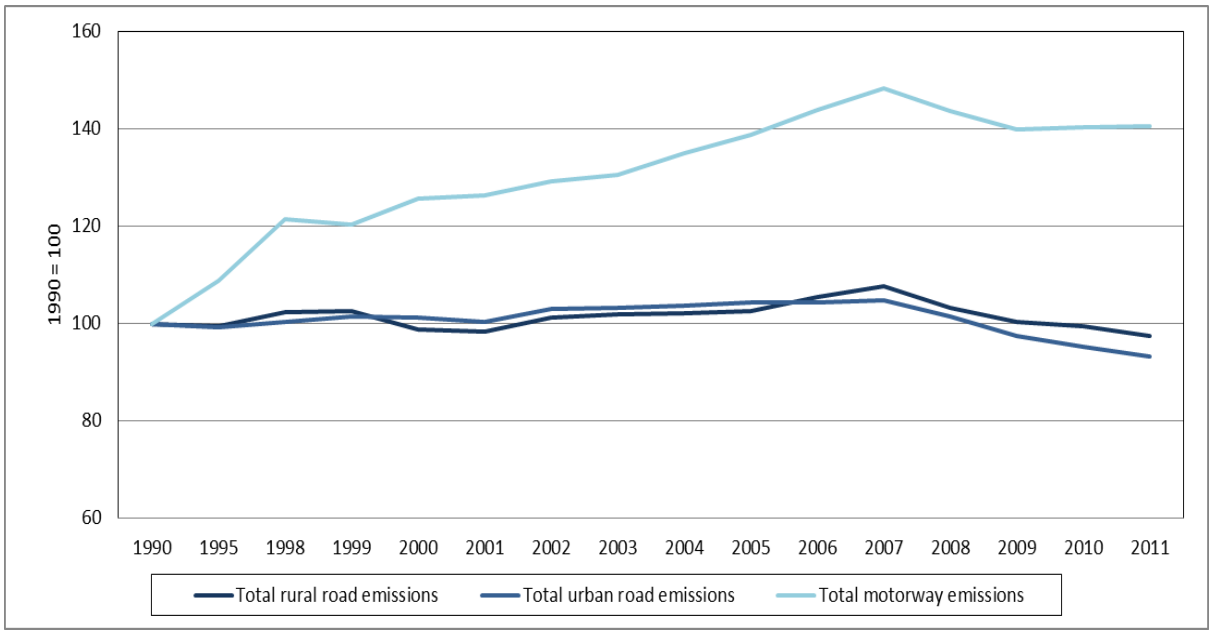
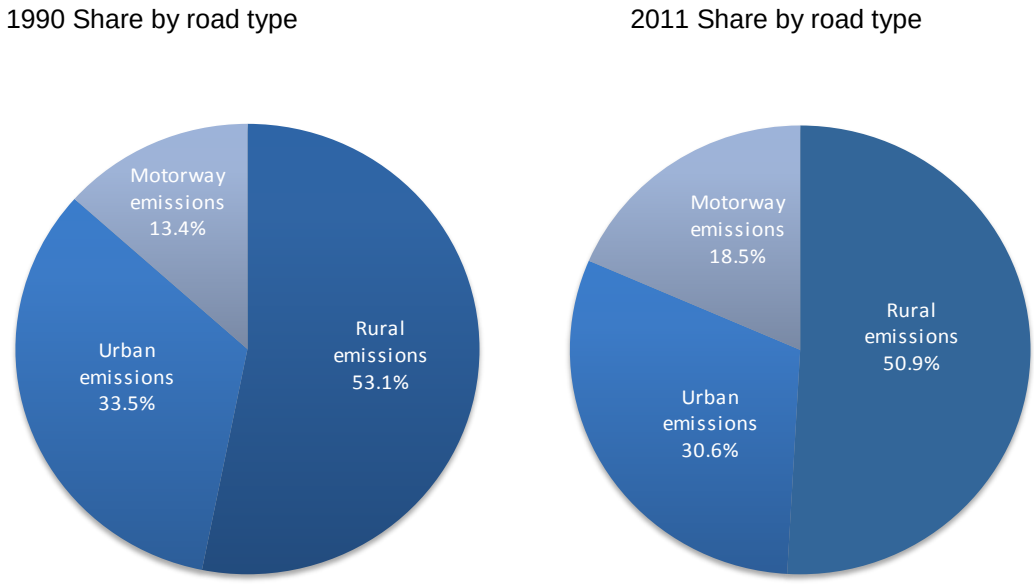


Figure 14: Share of road emissions by road type



2.6 Comparison of key Scottish and UK transport emission statistics

Table 1 sets out a number of comparisons between UK and Scottish emissions by broad sector or category, and over short term and longer term timescales.

Table 1: Comparison of Scottish and UK GHG emissions

	Scottish emissions	Scottish emissions as a % of UK emissions	Change in Scottish emissions	Change in UK emissions	Change in Scottish emissions	Change in UK emissions
	2011		2010-2011		1990-2011	
All Transport	12,963	8.1%	-1.0%	0.4%	0.1%	10.5%
All Transport (excl. IAS)	10,471	8.9%	-2.1%	-1.4%	-0.2%	-2.5%
Road Transport	9,265	8.5%	-1.7%	-1.4%	2.0%	-1.3%
of which:						
Cars	5,218	8.0%	-2.2%	-1.9%	-9.6%	-10.1%
HGVs	2,125	9.1%	-1.1%	-0.7%	2.0%	-2.7%
LGVs	1,358	8.9%	1.0%	1.6%	70.9%	61.1%
Buses	520	12.2%	-6.3%	-7.0%	36.2%	26.4%
Motorcycles	43	7.9%	-3.1%	0.1%	-16.4%	-11.8%
Rural	4,689	10.9%	-2.0%	-1.7%	-2.5%	-2.2%
Urban	2,821	7.3%	-2.3%	-1.6%	-6.9%	-12.3%
Motorway	1,702	6.6%	0.1%	-0.3%	40.5%	23.0%
Rail Transport	176	8.4%	3.4%	4.6%	42.6%	7.0%
Aviation Transport	652	16.3%	-3.4%	-3.1%	-6.6%	-26.0%
Aviation Transport (incl. IA)	1,704	4.6%	3.4%	3.4%	51.7%	75.7%
Maritime Transport	379	11.4%	-11.0%	-4.5%	-36.1%	-11.4%
Maritime Transport (incl. IS)	1,818	14.0%	-1.8%	7.4%	-30.5%	3.9%

- In 2011 Scottish transport emissions, including IAS, accounted for an estimated 8.1% of total UK transport emissions and 8.9% of emissions if IAS is excluded.
- The share of emissions from buses, traffic on rural roads, domestic and international maritime combined and from domestic aviation are disproportionately greater in Scotland than in the UK as a whole, with the opposite holding true for motorway emissions and aviation including international aviation emissions. The shares in other categories are broadly similar to the overall picture.
- Between the 1990 base year and 2011 transport emissions in Scotland have risen by 0.1% whereas for the UK as a whole the rise is 10.5%. Without the inclusion of IAS the change for the UK as a whole (-2.5%) is greater than for Scotland (-0.2%)
- Between 2010 and 2011 the fall in Scotland's transport emissions, with or without IAS included, outperformed the UK as a whole.
- Over time, all sub-categories of Scottish transport emissions have tended to change broadly in line with the equivalent UK series.
- Rail emissions in Scotland have increased significantly since 1990 albeit from a very small absolute base figure. In 2011 Scottish emissions are 42.6% above the 1990 equivalent accounting for 8.4% of UK emissions. The overall rail emissions in the UK rose by 7% between 1990 and 2011.
- Scottish aviation emissions (with IA included) account for only 4.6% of the total UK aviation emissions but this percentage rises to 16.3% if only domestic aviation emissions are considered. This is to be expected given the relative importance of international aviation traffic (and emissions) in England relative to Scotland.
- Emissions from maritime transport in Scotland fell by 1.8% between 2010 and 2011 whereas the UK equivalent percentage rose by 7.4% for the same period. Although maritime emissions in Scotland and in the UK are well below the 1990 figure (36.1% and 11.4% respectively), if IS is included UK emissions are by 3.9% above the 1990 level while Scotland's emissions are over 30% lower.

Breaking down the UK estimates to the four home countries sheds a little more light on Scotland's performance relative to England, Wales and Northern Ireland.

Table 2: Comparison of Scottish, English Welsh and Northern Irish GHG emissions 1990 – 2011 and 2010 – 2011

			Road	Rail	Aviation	Aviation (incl.IA)	Maritime	Maritime (incl. IS)	All Transport	All Transport (incl. IAS)
SCOTLAND	Emissions	2011	9,265	176	652	1,704	379	1,818	10,471	12,963
	Change in emissions	2010-11	-1.7%	3.4%	-3.4%	3.4%	-11.0%	-1.8%	-2.1%	-1.0%
		1990-2011	2.0%	42.6%	-6.6%	51.7%	-36.1%	-30.5%	-0.2%	0.1%
ENGLAND	Emissions	2011	90,097	1,775	3,031	35,039	2,545	9,114	97,448	136,025
	Change in emissions	2010-11	-1.3%	4.9%	-2.8%	3.5%	-3.8%	8.2%	-1.3%	0.6%
		1990-2011	-2.4%	2.4%	-29.9%	109.3%	-7.7%	10.5%	-3.6%	11.6%
WALES	Emissions	2011	5,387	98	88	81	272	1,491	5,846	7,145
	Change in emissions	2010-11	-2.0%	3.7%	-4.0%	-10.2%	-0.7%	15.0%	-1.8%	1.1%
		1990-2011	-2.8%	50.0%	-49.0%	46.6%	-1.2%	25.4%	-3.5%	1.7%
N.IRELAND	Emissions	2011	3,783	38	221	161	115	548	4,158	4,751
	Change in emissions	2010-11	-0.7%	0.7%	-4.9%	-2.9%	-4.6%	8.2%	-1.0%	0.0%
		1990-2011	26.4%	53.8%	12.4%	175.2%	3.5%	25.5%	25.1%	28.1%

- Compared with the 1990 base year, the Scottish aggregate emissions total (incl. IAS) shows only a 0.1% increase whereas the increases in England, Wales and N. Ireland are 11.6%, 1.7% and 28.1% respectively. Excluding IAS the performance of both England and Wales over the same period is better than in Scotland, and it is the same outcome considering road emissions alone.
- Scottish emissions reductions in 2011 exceed those from any other country of the UK, including or excluding IAS. All transport emissions reduced by 2.1% compared to 1.3%, 1.8% and 1% in England, Wales and N. Ireland respectively. If International Aviation and Shipping is included Scotland is the only country to reduce its emissions in 2011.

2.7 Comparison of key Scottish and Nordic transport emission statistics

Considering Scotland's geographic climatic and demographic similarities with the Nordic States a comparison between the transport emission figures is provided below. The trends in transport emissions are taken from Eurostat and cover road, rail, inland navigation and domestic aviation.

Scotland is the only country whose longer term performance shows an emissions decrease compared to 1990 and while its performance in the latest year on year comparison is not as good as Sweden or Denmark it still shows a significant reduction.

Table 3: Comparison of total and percentage change in Scottish and Nordic States GHG emissions $KtCO_2e$ 1990-2011[17]

	Base Year 1990	2010	2011	% change 2010-2011	% change 1990-2011
Scotland	10,497	10,698	10,471	-2.1%	-0.2%
Denmark	10,778	13,223	12,865	-2.7%	19.4%
Finland	12,757	13,430	13,228	-1.5%	3.7%
Sweden	19,301	20,459	20,000	-2.2%	3.6%
Norway	11,100	15,142	N/A	N/A	36.4%

Source: European Environment Agency (EEA, Greenhouse Gas Emissions from Transport 2013, http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdtr410

[17] Data for emissions in Norway in 2011 are not applicable. Hence for the sake of comparison the 2010 figure is used.

Figure 15: Comparison of transport emissions (excl. International Aviation and Shipping) in Scotland and the Nordic Countries

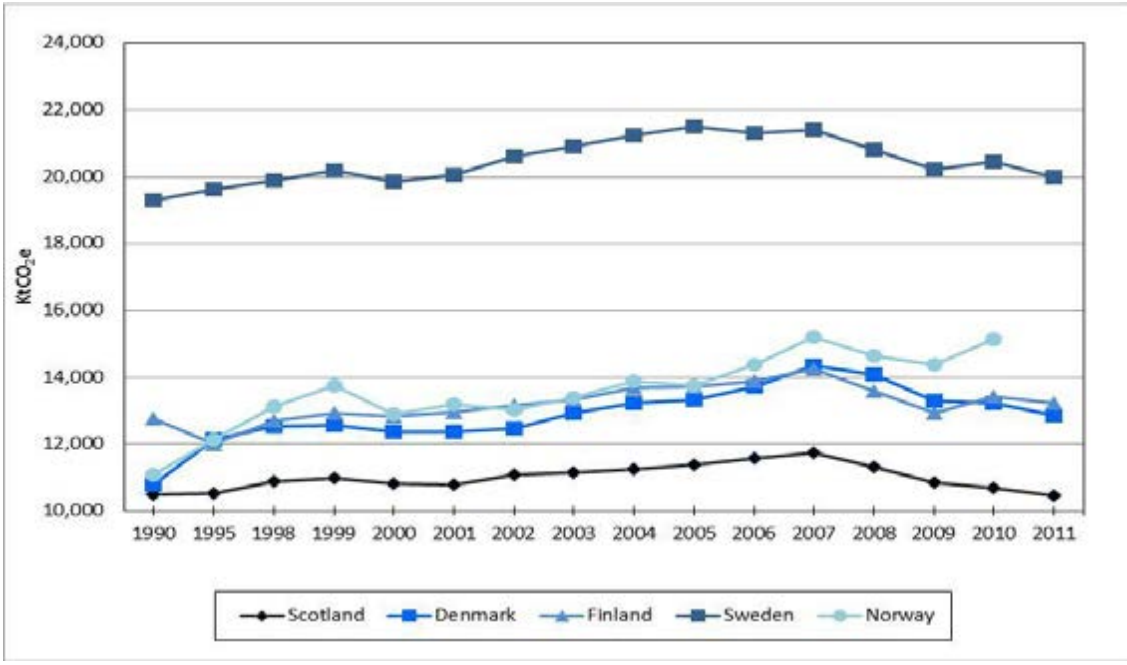


Figure 15 shows that all countries exhibited an increasing trend in transport emissions between 2000 and 2007. However, the increase in Scottish emissions over the period was lower and since 2007 there has been a consistent year on year reduction in Scotland unlike in Finland, Sweden and Norway.

2.8 Comparison of key Scottish and EU transport emission statistics

A further useful performance comparison is with EU member states. Table 4 shows that only three countries, Germany, Estonia and Lithuania have actually reduced their transport emissions comparing 2011 with their 1990 equivalent figure. Scotland has also seen a small emissions reduction based on the definition used in this EU estimate. Many of the other member states show a substantial increase in emissions over the period with 5 having increases of over 100%. The UK outcome is unchanged from its 1990 equivalent figure.

Table 4: Transport emissions in Scotland compare to transport emissions of EU- member states[18]

Member State	% change 1990-2011	Member State	% change 1990 - 2011
Belgium	29.9%	Hungary	36.6%
Bulgaria	19.6%	Malta	62.2%
Czech Republic	122.5%	Netherlands	34.1%
Denmark	19.4%	Austria	55.0%
Germany	-4.6%	Poland	137.8%
Estonia	-8.1%	Portugal	70.2%
Ireland	120.5%	Romania	21.9%
Greece	39.6%	Slovenia	108.8%
Spain	56.8%	Slovakia	27.0%
France	8.9%	Finland	3.7%
Croatia	n/a	Sweden	3.6%
Italy	14.3%	United Kingdom	0.0%
Cyprus	91.5%	EU (27 countries)	18.9%
Latvia	4.8%		
Lithuania	-40.7%		
Luxembourg	151.7%	Scotland	**-0.2%**

2.9 Efficiency of passenger vehicles

By measuring the efficiency of passenger vehicles in terms of the CO_2e per passenger kilometre (ppkm)[19] another useful picture for transport emissions emerges to help consider ways to reduce aggregate emissions. According to Defra's Company Reporting Guidelines[20] an average coach generates just under 30g CO_2e/ppkm, rail just under 50g CO_2e/ppkm and bus 112g CO_2e/ppkm. The average petrol car produces emissions of 129g CO_2e/ppkm. Since 1999 average car occupancy has fallen by 9.5% acting as a drag on the improved efficiency of the internal combustion engine. Domestic flights are estimated to be the most polluting

[18]Source:http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdtr410

[19] Emissions per passenger kilometre are calculated as the distance a vehicle travels and its fuel efficiency divided by the number of occupants travelling that distance.

[20] Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting (2013), produced by AEA for the Department of Energy and Climate Change (DECC) and the Department of Environment, Food and Rural Affairs (Defra).

per passenger kilometre followed by petrol cars, international long haul and diesel cars.

Table 5: CO_2e emissions per passenger kilometre by mode[21]

Sector	Mode	gCO2e/ppkm		
		2012	2013	% Change
Road	Average petrol car	129	129	0.7%
	Average diesel car	119	120	0.5%
	Average petrol hybrid car	85	86	0.3%
	Average petrol motorbike	119	119	0.0%
	Average bus	112	112	-0.3%
	Average coach	29	29	2.0%
Rail	National rail	58	49	-15.7%
	Light rail and tram	68	60	-11.1%
Ferry (Large RoPax)	Average foot and car passengers	116	116	0.0%
Aviation	Average domestic flights	180	173	-4.0%
	Average short haul international	104	102	-2.0%
	Average long haul international	119	120	0.9%

Source: 2013 Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting, http://www.ukconversionfactorscarbonsmart.co.uk/

2.10 Leading indicators

Data on greenhouse gas emissions emerges around 18 months after the end of the year in question. Unfortunately, there are not a huge number of readily available lead indicators, but those available are discussed below and reported in Table 6.

- *Road vehicle kilometres travelled*: Road emissions are directly related to the kilometres travelled. This indicator tracks vehicle kilometres travelled by all vehicle types on all roads. Since 2007 the trend in total kilometres travelled in Scotland has been a slow decline to 2011, although in 2012 total road kilometres travelled increased marginally.

[21] All car figures assume an average car occupancy rate of 1.53 passengers based on the Scottish Household Survey Travel Diary: 2010-2011. Bus and coach figures assume an average vehicle occupancy rate of 10.8 and 16.2 respectively based on Guidelines to Defra/DECC's GHG Conversion Factors for Company Reporting (2013).

- *Proportion of new road vehicles that are alternatively fuelled*: Alternatively fuelled vehicles, including electric and hybrid vehicles, produce fewer GHG emissions per kilometre. An increase in the proportion of those vehicles on the road will reduce emissions from the transport sector. This indicator tracks the proportion of vehicles newly registered that are alternatively fuelled. The latest data shows that there was a small decrease in the proportion of alternatively fuelled vehicle sold in 2012 (although actual sales increased).

- *Modal share of public transport and active travel*: Promoting the use of public transport or active travel as an alternative to the private car is an important element of reducing transport emissions. This indicator tracks the proportion of average distance travelled per person per annum by public transport, walking or cycling. The latest available survey data suggests a continued slow modal shift towards sustainable and active travel.

- *Aviation passengers*: Emissions from international aviation in particular have grown rapidly over the past 20 years. This indicator tracks the total number of aviation passenger - both terminal and transit - and shows another small pick-up in passenger numbers between 2011 and 2012. The number of aircraft movements at Scottish airports also increased.

- *Waterborne freight lifted in Scotland and moved*: Commercial shipping constitutes the greatest element of maritime emissions. This indicator tracks the total level of waterborne freight lifted in Scotland and moved, measured in million tonne-kilometres. The latest estimate to 2012 shows a further decline in million-tonne kilometres and the figure is now at its lowest level for well over a decade.

- *2012 UK emissions estimates*: Final UK emissions data for 2012 was published in February 2014 while final Scottish data for 2012 will not be published until June. The latest UK transport emissions estimate shows a small reduction in emissions of less than 1% in 2012 compared to 2011, continuing the downward trend begun after 2007. While not part of the

headline UK calculation, the estimate of UK emissions from IAS also fell in 2012 compared to 2011. Even though there tends to be a strong correlation between movements at the UK and Scottish levels there is no guarantee that this fall for the UK as a whole will be replicated in Scotland.

- *Road transport fuel consumption per vehicle kilometre*: Vehicle fuel efficiency is a key element in emissions reduction. By reducing fuel consumption per vehicle kilometre fewer emissions are emitted. This indicator tracks fuel consumption per vehicle kilometre and per 1000 population and shows a continuing improvement in both indicators.

Together, the available indicators suggest that downward pressure will continue to be felt on transport emissions in the short term although the small pick-up in airline passenger numbers and kilometres travelled by road will dampen that downward pressure.

Table 6: Trends in leading transport indicators[22]

Indicator	2012 level	Average growth p.a. (2003-2012)	Growth (2011-2012)
Road vehicle kilometres travelled (million vehicle kilometres)	43,549	0.4%	0.4%
Proportion of new road vehicles that are alternatively fuelled (%)[23]	0.6%	59.7%	-4.7%
Modal share of public transport and active travel (distance travelled) (%)[24]	23%	0.5%	16.7%
Aviation passengers (thousand passengers)	22,236	0.6%	0.6%
Waterborne freight lifted in Scotland and moved (million tonne-kilometres)	11,584	-4.0%	-25.1%
UK transport emissions (excl. IAS) ($MtCO_2e$)	118.0	-1.0%	-0.4%
UK petroleum consumption by transport (million tonnes)	50.2	-0.3%	-0.5%
GB Average new car fuel efficiency: Petrol Diesel	 48.6 mpg 56.2 mpg	 3.4% 2.4%	 4.4% 3.4%
	2011 level	Average growth p.a. (2005-2011)	Growth (2010-2011)
Road transport fuel consumption[25] Kilogrammes per 1000 vehicle kilometres; Kilogrammes per 1000 population.[26]	 66.9 547	 -1.1% -1.5%	 -2.2% -4.1%

[22] Source: Scottish Transport Statistics, No 31, 32, 2012 and 2013 edition. Tables 5.1, 1.1, 11.2, 8.1, 9.1, 5.11; 2012 STS dataset 2013 STS dataset

[23] Definition and series amended to include all vehicles not fuelled entirely by petrol and diesel, excluding mobility scooters.

[24] Latest available data is up to 2009/10

[25] Own calculation using population data from GROS, kilometres travelled from Scottish Transport Statistics and fuel data from DECC: Road fuel consumption at Local Authority level

[26] GROS population estimates for Scotland (mid 2011, 2010 and 2005) are 5,299,900, 5,222,100 and 5,094,800 respectively.

On the Move: car, rail and bus travel trends in Scotland

In June 2013 Transport Scotland published: *On the Move: car, rail and bus travel trends in Scotland*, a follow on to a similar GB wide study. While the first study used the National Travel Survey data collected across GB as a whole and thus has a small Scottish sample, this second study considered Scotland alone, using Scottish Household Survey data for its analysis. Scottish Household Survey data was available for the period up to and including 2008/10)

One of the main objectives of this two studies was to consider trends in car, bus and rail travel from the mid-1990's onwards, and within this to further ask whether individuals were showing signs of experiencing 'peak car' – a sustained period of flat or even downward trending levels of car use per person.

Both studies showed basically flat trends car use per period over the data period but neither could be shown to be statistically significant. For example the National Travel Survey shows that average annual car driving mileage per person rose by 3% but this increase is not statistically significant due to the small sample size. Traffic count data for both shows a slow steady growth in car traffic up to 2008 (2008/10 was the latest dataset available) and a gradual lengthening of journey distance.

While men's driving distances have been falling, women's have been increasing due primarily to more women driving. Young men's driving mileage has trended downwards more sharply than any other demographic group, but there is no evidence that they have been switching modes. Fewer of this demographic group hold licences while licence-holding for older groups has been increasing, particularly for women.

Bus use per person has grown slowly over the period and seems to be caused by more intense service use rather than use by new patrons. As with car journeys length of bus journey has been increasing but use of bus for commuting has been falling. Bus travel has risen most markedly amongst men aged 60 and over.

Rail use per person has grown driven mainly by more people using rail. There is some evidence to suggest Scottish residents are making longer distance journeys which is corroborated by a significant growth in cross-border ticket sales. Commuting by rail has increased over the period, and rail trips are, unsurprisingly on average several times longer than either car or bus journeys.

Chapter 3: Future emissions impact of transport interventions

3.1 Background

This chapter lists those transport interventions, whether devolved or reserved to the UK/EU, which are firm commitments and are expected to have a direct and significant impact on Scottish transport emissions after the time period captured by the GHGI (1990–2011). The interventions are separated between infrastructure projects and those that involve fiscal policy or regulation. Emissions impacts are taken from the original appraisal report or subsequent published document, where available, and have been rounded to the nearest 1 kilo-tonne of carbon-dioxide equivalent ($ktCO_2e$) where appropriate.

As well as reporting the emissions impacts, where possible the chapter outlines the general methodological approach for estimating the impact of both infrastructure projects and fiscal/regulatory policies. As independently commissioned projects, the precise estimation methodology may differ significantly depending upon the type of intervention and the original model used. Emissions estimates are frequently assessed in isolation, and so will not necessarily include the full interactions between measures or take account of the impact of any future measures on the project. Furthermore, for many interventions there are likely to be a number of localised impacts which may not be captured or presented consistently between appraisals. Where possible, the impacts presented here are the net emissions impact at a national level.

As a result of such methodological variation, the emissions estimates and related timescales are to be used as an informative guide to the direction of change and the order of magnitude only. The comparison, addition or netting off of emissions estimates between interventions or against the GHGI data is not statistically valid and may lead to incorrect conclusions being drawn**.**

3.2 Infrastructure projects

Methodology

Environmental impacts of infrastructure projects are taken from the latest available project documents. In most cases this will be the emissions estimate contained in the project specific Environmental Statement. Some recently announced projects will though not yet have begun a formal appraisal process. For reference, links to the project home page are also provided where an online assessment is available.

STAG recommends that greenhouse gas emissions from road traffic are calculated according to the methodology in the Design Manual for Roads and Bridges[27] (DMRB). DMRB was first introduced in 1992 in England and Wales, and subsequently in Scotland and Northern Ireland. It provides a comprehensive manual system which accommodates current Standards, Advice Notes and other published documents relating to Trunk Road Works.

For emissions associated with the running of diesel and electric trains, STAG recommends the use of the Rail Emission Model Final Report[28] that was produced for the Strategic Rail Authority. This is published on the Department for Transport website, and provides estimated emission factors and detailed data for individual diesel and electric train types.

There are no such established guidelines for estimating carbon estimates for other travel modes. Where projects do concern other modes, for example the Edinburgh Tram, the methodology used to estimate the carbon impact is tailored specifically to that individual project. Similarly, it is important to note that when considering the predicted emissions impacts of these infrastructure projects, the modelling procedures used to derive these predictions can differ significantly, particularly in the way in which they account for secondary impacts such as land-use changes resulting from the transport project. The Edinburgh tram model is an example where

[27] Design Manual for Roads and Bridges (2009): Highways Agency Design Manual for Roads and Bridges (DMRB)
[28] Rail Emission Model (2001), AEA Technology Environment

the secondary effects are assessed, and this may be one of the reasons why the assessment suggests an overall emissions increase.

Undertaken by Transport Scotland and announced by The Minister for Transport, Infrastructure and Climate Change in December 2008, the Strategic Transport Projects Review (STPR)[29] sets out the strategic transport investment priorities for the next twenty years and provides the basis on which Ministers can make informed decisions about future transport spending beyond the current programme. The nature of this publication means that many of the projects will be undertaken at a future date and thus lack a designated timetable and a formal appraisal process. Those projects that are being 'fast-tracked' (i.e. the Forth Replacement Crossing and Edinburgh-Glasgow (Rail) Improvements Programme) are assessed and there impacts included in the CAT. Other individual projects from within STPR likely to have a significant emission impact will be included in the CAT commentary as and when they become committed schemes.

Road

A75 Dunragit Bypass

www.transportscotland.gov.uk/projects/trunk-road-projects/a75-dunragit-bypass-project

- Document: Environmental Statement, Young Associates / Mouchel Parkman
- Anticipated construction completion: 2014
- Estimated emissions impact: +4ktCO_2e p.a. from 2022

Drivers currently experience limited overtaking opportunities along much of the A75, which leads to traffic congestion and creates driving conditions which lower average speeds and increase driver frustration and the potential for accidents. The proposed scheme will comprise an off-line road alignment and, in accordance with its stated objective, will provide guaranteed overtaking in both eastbound and westbound directions. The additional CO_2e emissions are expected as a result of the increase in distance that vehicles will travel due to the addition of the bypass.

[29] The final report from the STPR was published in October 2009

M8, M74 and M73 Improvements

http://www.transportscotland.gov.uk/road/projects/m8m73m74

The current programme for the M8 M73 M74 Motorway Improvements is due for completion in spring 2017, with main construction works programmed to commence early in 2014, subject to contract being finalised. This project bundles together three individual projects: M8 Baillieston to Newhouse, M74 Raith Interchange, and M8 M73 M74 Network Improvements.

The project is of a similar scale to the recent M74 completion which directly supported 900 construction jobs - the large majority of the workers employed came from the local area - and is expected to reduce the journey time for the 115,000 vehicles that use the busiest sections of the M8 each day.

It is predicted that the scheme will lead to a reduction of more than 100 accidents per year and more freely flowing traffic on these strategic routes will reduce the emissions associated with queuing traffic and improving both air quality and health.

M74 Raith Interchange

- Document: Environmental Statement (2007), Mouchel Fairhurst JV
- Anticipated construction completion: 2017
- Estimated emissions impact: +10ktCO_2e p.a. from 2017; +10ktCO_2e p.a. from 2020

The scheme is aligned with the M8 Baillieston to Newhouse works and the Associated Network Improvements**.** These are vital links in the trunk road network of Central Scotland and serve substantial existing developments as well as some of the most significant future development sites in Scotland.

Severe traffic problems exist at Raith Junction due to the interaction of heavy turning volumes from the A725 and the M74 at the signalised roundabout. This scheme aims to relieve traffic congestion at the junction.

M8 Associated Network Improvements

- Document: Environmental Statement, 2008 (Mouchel Fairhurst JV)
- Anticipated construction completion: 2017
- Estimated emissions impact: +; +2ktCO_2e p.a. by 2020

This scheme comprises capacity improvements on sections of the M73, M74 and M8 adjacent to Baillieston and Maryville interchanges as a result of changes to east-west traffic patterns once the extension to the M74 and improvements to the M8 are in place. The scheme will be procured as a package with the M8 Baillieston to Newhouse Scheme and M74 Raith Junction.

M8 Baillieston-Newhouse

- Document: Environmental Statement (2007), Mouchel Fairhurst JV
- Anticipated construction completion: 2017
- Estimated emissions impact: +30ktCO_2e p.a. from 2017; +30ktCO_2e p.a. from 2020

This project is a proposal to upgrade the existing A8 between Baillieston and Newhouse to dual three-lane motorway standard equivalent.

The DMRB was used to calculate the change in greenhouse gas emissions, therefore the assessment has included all traffic on the entire modelled network, not just links that were explicitly included in the local assessment. The increase in emissions is due to an increase in predicted traffic levels.

A90 Aberdeen Western Peripheral Route (AWPR) and A90 Balmedie-Tipperty

http://www.awpr.co.uk/

http://www.transportscotland.gov.uk/projects/trunk-road-projects/a90-balmedie-to-tipperty-dualling-project

- AWPR Document: Assessment of Effects of Updated Traffic Model submitted for PLI (2008), which updates previous source of 2007 Environmental Statement, Jacobs

- Balmedie - Tipperty Document: Environmental Statement (2007), Grontmij / Natural Capital
- Anticipated construction completion: It had been hoped to start construction of the AWPR in 2011 however, legal challenges submitted to the Court of Session challenging the decision to proceed with the project will delay construction until resolution of the challenges. AWPR has now been combined with B-T to form one project.
- Estimated emissions impact for AWPR: +8ktCO_2e p.a. from 2012; +10ktCO_2e p.a. from 2027. NO estimates available for Balmedie Tipperty

A peripheral route around Aberdeen is proposed to reduce the high volumes of traffic using the A90 in the centre of Aberdeen, and to reduce the traffic congestion that the city experiences as a result of the volume of traffic using the A90 and its associated radial roads. The overall increase in the number of road vehicles, however, is expected to lead to an increase in carbon dioxide emissions.

The AWPR will provide substantial benefits across the whole of the North East of Scotland and will provide a boost to the economy; increase business and tourism opportunities; improve safety; cut congestion as well as increasing opportunities for improvements in public transport facilities.

This proposed dualling of the A90 between Balmedie and Tipperty will provide continuous dual carriageway between Aberdeen and Ellon, which will remove the bottleneck caused by the existing single carriageway. The local community has been pressing for this upgrade for a number of years. The increase in emissions through Balmeddie -Tipperty is due to the increase in the road sections that make up the total road assessed.

Forth Replacement Crossing

http://www.transportscotland.gov.uk/projects/forth-replacement-crossing

- Document: Environmental Statement (2009), Jacobs Arup
- Anticipated construction completion: 2016
- Estimated emissions impact: +20ktCO_2e p.a. in 2032

The Forth Replacement Crossing (FRC) is a major road infrastructure project being delivered by Transport Scotland. The project was driven by uncertainty over the future viability of the existing Forth Road Bridge, and is designed to safeguard this vital connection in Scotland's transport network. It comprises a new cable-stayed bridge across the Firth of Forth, to the west of the existing Forth Road Bridge, and associated new and improved road infrastructure to the north and south of the bridge. The proposed scheme will retain the existing Forth Road Bridge as a public transport corridor for use by buses, taxis and other specified users and for continued use by pedestrians and cyclists. The new bridge will be used by all other traffic including private cars and heavy goods vehicles. Emergency vehicles will be able to use either bridge.

The FRC was identified as a key strategic investment project in Scotland's national transport network in the Strategic Transport Projects Review (STPR) undertaken by Transport Scotland in December 2008, and the National Planning Framework (NPF2) published by the Scottish Government in June 2009. There are eight specific transport planning objectives for the FRC which have underpinned the work on the proposals. These are to:

- maintain cross-Forth transport links for all modes to at least the level of service offered in 2006
- connect to the strategic transport network to aid optimisation of the network as a whole
- improve the reliability of journey times for all modes
- increase travel choices and improve integration across modes to encourage modal shift of people and goods
- improve accessibility and social inclusion
- minimise the impacts of maintenance on the effective operation of the transport network
- support sustainable development and economic growth
- minimise the impact on people, and the natural and cultural heritage of the Forth area.

Construction commenced in 2011 and that the FRC remains on target to open late 2016.

Dualling of A9

- Document: Environmental Statement: not yet available
- Anticipated construction completion: 2025
- Estimated emissions impact: not yet available

This programme will address issues of driver frustration on the A9 caused by the limited guaranteed overtaking opportunities that current exist, resulting in improved connections between Perth and Inverness. Options for the proposed dual carriageway are currently being developed but it is likely that it will largely comprise on-line widening due to the environmental and physical constraints in the corridor.

It is too early to say how CO_2e emissions may change as a result of the scheme. Further work will be undertaken during the design development to understand changes to vehicle speeds and their consequences for emissions before and after the scheme is in place.

Dualling of A96

- Document: Environmental Statement: not yet available
- Anticipated construction completion: 2030
- Estimated emissions impact: not yet available

This programme will address issues of driver frustration on the A96 caused by the limited availability of overtaking opportunities. It will also address issues of community severance by introducing bypasses to communities along the route. Both objectives will serve to improve connectivity between Inverness and Aberdeen. Baseline information and constraints mapping is currently being collated to support future option development for the proposed dual carriageway.

Given the likelihood of extended lengths of dual carriageway to provide bypasses it is likely that CO_2e emissions will increase as a result of the scheme. However further work will be undertaken during the design development to understand changes to vehicle speeds and their consequences for emissions before and after the scheme is in place.

Rail

Borders Railway

http://www.bordersrailway.com

- Document: Borders Railway Design Development Appraisal (2008), Transport Scotland
- Anticipated construction completion: 2014
- Estimated emissions impact: Cumulative impact of 32ktCO_2e by 2030, 2ktCO_2e by 2050 and -29ktCO_2e by 2070[30].

This project is to reinstate part of the former Waverley rail route from the Scottish Borders to Edinburgh.

The change in CO_2e emissions has been calculated in line with STAG guidelines. For road traffic, the calculations are based on changes to the number of car journeys between the different stations, with each journey modelled separately. The emissions from the railway have been calculated in line with the Rail Emissions Model produced by the Strategic Rail Authority.

Overall, the Borders Railway Project will have a beneficial impact on CO_2e levels but most recent assessments suggests that it will see a small net increase in emissions in the early years before removing approximately 29ktCO_2e over the appraisal period to 2070.

[30] Emissions figures have been updated since 2010 publication from Carbon emissions to CO_2 emissions.

Edinburgh-Glasgow (Rail) Improvements Programme

http://www.transportscotland.gov.uk/strategy-and-research/strategic-transport-projects-review

- Document: Edinburgh Glasgow Improvement Programme (EGIP) Appraisal and Analysis Model (2013), Transport Scotland
- Anticipated construction completion: Phased to 2016
- Embodied carbon emissions: +112ktCO_2 (Phase 1 only) or +157ktCO_2 (Phase 1&2) from construction and rolling stock provision
- Operational emissions [31]:
    - Average annual savings of -28ktCO_2 (Phase 1 only) or -30ktCO_2 (Phase 1&2) p.a. from 2017
    - Cumulative savings of:
        - -234ktCO_2 (Phase 1 only) or -236ktCO_2 (Phase 1&2) by 2025.
        - -946ktCO_2 (Phase 1 only) or -995ktCO_2 (Phase 1&2) by 2050.
        - -1,743ktCO_2 (Phase 1 only) or -1,843ktCO_2 (Phase 1&2) by 2075.

This intervention was identified early in the STPR and brought forward in a study which considered improvements to the capacity, frequency and journey time of rail services between Edinburgh and Glasgow.

The change in CO_2e emissions has been calculated in line with guidance from the Department for Energy and Climate Change. Previous estimates derived from the Network Modelling Framework (NMF) have been significantly revised to reflect the latest operational assumptions for the programme. There is estimated to be a reduction in road emissions of around -3ktCO_2e p.a. which is included in the overall figures presented.

[31] To be consistent with the scope of this document, these figures (both the average annual savings and the cumulative savings) relate to emissions in the transport sector only and *exclude* increased emissions in the electricity production and distribution sector associated with electrification. However, the estimated net impact at the overall Scottish level, even including these emissions, is to lower emissions over the longer term

The Edinburgh Glasgow Improvement Programme is expected to result in a significant reduction in emissions, through the electrification of approximately 350 km of single track and the resulting move from diesel to electric trains. The programme therefore achieves its emissions reductions reported here through transferring emissions from the non-traded sector to the traded sector, as demonstrated in the table below. If electricity emissions and those from embodied carbon are included, the total net impact of EGIP is -1,116 (-1,114 for Phase 1 only) $ktCO_2e$ by 2075. Of this total, -1,669 $ktCO_2e$ arises from diesel savings from trains removed from the network (same value for Phase 1 only), -174 (-74 for Phase 1 only) $ktCO_2e$ from cars removed from the road network, and +570 (518 for Phase 1 only) $ktCO_2e$ from the new electric trains added to the network. Table 4 demonstrates the precise breakdown of the emissions impact across the different sectors.

Table 7: Change in emissions from EGIP (Phase 1&2, 'Phase 1 only' impact in brackets) by sector ($ktCO_2e$)

Budget Period	Operational		Embodied**
	Transport sector	Non-transport sector*	
2013 - 2017	-17 (-17)	+16 (+16)	+105 (+105)
2018 - 2022	-132 (-132)	+129 (+129)	+7 (+7)
2023 onwards	-1,694 (-1,595)	+425 (+373)	+46 (+0)
UK Net	-1,843 (-1,743)	+570 (+518)	+157 (+112)

* Electricity production and distribution sector
** Primarily manufacturing and construction

Edinburgh Tram Lines 1a and 1b[32]

http://www.tiedinburgh.co.uk/

- Document: STAG part 2 appraisal (2006), Steer Davies Gleave / Colin Buchanan
- Anticipated construction completion: 2014
- Estimated emissions impact[33]: +90$ktCO_2e$ p.a. from 2011; +167$ktCO_2e$ p.a. from 2031.

[32] The Edinburgh Tram network is the responsibility of the City of Edinburgh Council who are both Statutory Undertaker and operator of the two proposed tram lines under the respective Edinburgh Tram (Lines One and Two) Acts of 2006.
[33] To be consistent with the scope of this document, these figures relate to emissions in the transport sector only and *exclude* increased emissions resulting from power consumption by the tram. If the

The proposed tram lines, Phases 1a and 1b, are covered by the respective Edinburgh Tram (Lines One and Two) Acts of 2006. Both were intended to open in 2011 but contractual disputes have caused severe delays, particularly in terms of certainty for completion and operational dates. Phase 1a, which is intended to run from Edinburgh Airport to Newhaven via Princes Street will now be partially completed from the Airport to York Place via Princes Street, and is scheduled for operations in 2014. No date has yet been set for the completion of the remaining stage(s) Phase 1b running between Haymarket and Newhaven via the Roseburn corridor has been postponed on affordability grounds.

In the project development stages, an Edinburgh based demand forecasting model was developed to predict use of the tram and the impact on other transport modes. The STAG reports that building the tram network would generate a higher level of development along the tram corridor than not building the network. The effect of this is to increase the overall volume of movements which could potentially include a higher number of car trips. The original modelling work demonstrated that both Phase 1a and 1a+1b would increase the level of CO_2e, as a result of traffic re-routing and demand redistribution.[34],[35]

Table 5 summarises the information from the projects listed above. Whilst this is a useful reference table, it should be reiterated that these emissions estimates are not produced using a single, consistent methodology and, therefore, are not directly comparable. That said, the pattern of expected relatively small increases in emissions from road infrastructure projects (not to forget the other economic benefits delivered in respect of journey time improvements set out in the project appraisal) will be more than compensated for in the long term through the modal shift can be

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CO_2 emissions resulting from power consumption by the tram are added to the additional emissions from road traffic, then the net emissions impact of the project increases by 8ktCO_2 and 11ktCO_2 p.a. in 2011 and 2031 respectively.

[34] It is worth noting that without the tram, it is possible that the developments referred to would take place elsewhere, most likely in peripheral locations with a higher proportion of car usage and longer trip lengths. These 'dis-benefits' have not been accounted for. Without the effect of the larger assumed travel market in the 'with-tram' scenario, the increases in emissions would be approximately half of those reported.

[35] All figures and analysis for the Edinburgh Trams Lines 1a and 1b refer to modelling of the original project scope and do not take account of decisions to be made through current contractual discussions.

offset through investment in rail. The investment in the Edinburgh- Glasgow Improvement project is expected to generate annual reductions in emissions of around 30 $ktCO_2e$ in the near term from a combination of removing diesel rolling stock and displacing cars from the road.

Table 8: Emissions impact estimates of transport infrastructure projects

Project title	Published emissions estimate
A75 Dunragit Bypass	+4 $ktCO_2e$ p.a. from 2022
M74 Raith Interchange	+10 $ktCO_2e$ p.a. from 2020
M8 Associated Network Improvements	+2 $ktCO_2e$ p.a. by 2020
M8 Baillieston-Newhouse	+30 $ktCO_2e$ p.a. from 2020
A90 Balmedie-Tipperty	+2 $ktCO_2e$ p.a. from 2013
A90 Aberdeen Western Peripheral Road	+10 $ktCO_2e$ p.a. from 2027
Forth Replacement Crossing	+20 $ktCO_2e$ p.a. in 2032
Stirling-Alloa-Kincardine Railway Line	+2 $ktCO_2e$ p.a. from 2009
Borders Railway	+32 $ktCO_2e$ total by 2030
	+2 $ktCO_2e$ total by 2050
	-29 $ktCO_2e$ total by 2070
Edinburgh-Glasgow (Rail) Improvements Programme	-28 $ktCO_2e$ average p.a. from 2017
	-1843 $ktCO_2e$ total by 2075
Edinburgh Tram Lines 1a and 1b	+90 $ktCO_2e$ p.a. from 2012
	+167 $ktCO_2e$ p.a. from 2031

The emission estimates within this table are forecast changes in carbon dioxide emissions with the project compared to without the project in a given future assessment year. These estimates have been calculated using a variety of methodologies and, consequently, it is not statistically valid to aggregate the individual figures or directly compare them with one another.

3.3 Fiscal / regulatory measures

The current split between devolved and reserved powers means that the majority of fiscal and regulatory decisions that impact on Scottish transport emissions are taken at either the UK or EU level.

Those areas over which Scottish Ministers have direct control are though still extremely important, particularly in respect of behaviour change, a vital component of long term emissions reductions, and the removal of certain key barriers that could affect the significant uptake of ultra-low or zero carbon vehicles by households.

Published in June 2013, the Second Report on Proposals and Policies provides the most up to date and comprehensive analysis and assessment of these Scottish policies and the potential impact these measures can have on emissions out until 2027[36]. The impact of tightening EU car and van emissions standards and the Renewable Fuels Transport Obligation are also covered within the RPP's analysis.

With a narrower focus on road transport emissions, and particularly on the transition from reliance on fossil-fuelled vehicles towards plug-in cars and vans, the recently published *Switched on Scotland* [37] sets out the necessary steps and barriers to be overcome on the pathway to the almost complete decarbonisation of road transport.

It is more difficult to ascertain the potential emissions impact of UK and (other) EU fiscal or regulatory measures in Scotland, not least because the impacts are analysed and estimated at a more aggregate level. That said, some Scottish estimates can be generated and where possible these are recorded below alongside the description of the policy intervention.

The best and most readily available sources of information for the aggregate UK emissions impacts include published Impact Assessments, associated documents accompanying the annual HM Treasury (HMT) Budget and Autumn Statement/Pre-

[36] http://www.scotland.gov.uk/Publications/2013/06/6387/9
[37] [http://www.transportscotland.gov.uk/files/Switched%20On%20Scotland%20.pdf

Budget reports, HMRC notes and the House of Commons Library for more general topic background and briefing.

Air Passenger Duty (APD)

- Documents: HMT and HMRC Impact Assessment (2009) http://www.hmrc.gov.uk/ria/apd-reform-ia.pdf
- House of Commons Library Note SN5094 Air Passenger Duty: recent debates and reform http://www.parliament.uk/briefing-papers/SN05094/air-passenger-duty-recent-debates-reform
- Implementation date: 1st November 2009 and 1st November 2010
- Estimated emissions impact: -0.6MtCO_2e in 2011-12 (UK)[38]

Air passenger duty (APD) is charged on all passenger flights from almost all UK airports[39]. The rate of tax varies according to passenger destination and the class of passenger travel. Since 1 November 2009 APD has been structured around four distance bands, set at intervals of 2,000 miles from London. The intention of the banding is that those flying further will pay more and in the latest available estimate APD was expected to deliver estimated emissions savings of 0.4MtCO_2e in 2010-11 rising to 0.6 MtCO_2e in 2011-12.

Following a consultation by the UK Government in 2010 it decided against switching to a per plane duty but did extend the scope to cover business jets with effect from April 2013.

APD rates were increased in line with inflation in the 2013 Budget and announced that for 2014/15 rates would rise in line with inflation from 1 April 2014. The 2014 Budget announced the abolition of highest APD bands (C and D) so that any flight to a country with a capital city more than 2000 miles from London would now be charged at the same band B rate. Very few current direct flights from Scotland are affected by this change.

[38] Figure is based on the impact assessment of the 2009 APD reform.
[39] Flights from Highland and Island airports are excluded

Inclusion of aviation in EU ETS

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:008:0003:01:EN:HTML
http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0818en01.pdf

- Document: http://www.parliament.uk/briefing-papers/SN05533
- Implementation date: 2012
- Estimated emissions impact: up to - 183 $MtCO_2e$ p.a. in 2020 across Europe relative to no cap

The Aviation Greenhouse Gas Emissions Trading Scheme Regulations 2010 came into force in the UK on 31 August 2010. The inclusion of aviation within the emissions trading system will allow the sector to take responsibility for its carbon emissions in the most cost effective way and will form the basis for wider, global action. While it is difficult to predict the exact impact of the scheme, particularly with the ongoing economic uncertainties, earlier estimates made by the Commission suggest that the cap could reduce emissions in 2020 by up to 183 million tonnes CO_2e.

In November 2012 the European Commission announced that it would "Stop the Clock" on the implementation of the "international" aspects of the Aviation Emissions Trading System. The effect of this is that only flights between European Economic Area (EAA) aerodromes need comply with the Aviation ETS. The key objective of the Commission's suspension is to encourage a wider international deal. This suspension is unlikely to have any material effect on the impact of the regulation on Scottish aviation emissions.

Fuel duty

http://www.hmrc.gov.uk/budget2013/tiin-2522.pdf
http://hmrc.gov.uk/tiin/2012/tiin1094.pdf

Documents: Tax Information and Impact Note 11 December 2012; Tax Information and Impact Note published alongside 2013 Budget 20 March 2013

Implementation date: 1 January and 1 September 2013

- Estimated emissions impact: +0.2 $MtCO_2e$ per year, +0.3 $MtCO_2e$ (UK).

To support fiscal consolidation and encourage fuel efficient behaviour Budget 2009 announced that fuel duty would increase by one penny per litre in real terms on 1 April each year from 2010 to 2013. Budget 2010 announced that the 2010-11 increase would be staged and that fuel duty will increase by a further penny per litre in real terms in April 2014. These measures were estimated to save 2 $MtCO_2e$ per year by 2014-15 compared to inflation only increases.

Due to high oil prices, Budget 2011 cut the fuel duty by one penny per litre and deferred the scheduled 2011 inflation-only increase until 1 January 2012. Subsequently, the increase of 3.02 pence per litre fuel duty increase deferred from August 2012 and due to come into effect on 1 January 2013 was cancelled and the 2013-14 increase due on 1 April 2013 was deferred to 1 September 2013. This rise was also subsequently cancelled as was the increase in the 2014 budget. Together, the removal of measures have been estimated to add 0.5 $MtCO_2e$ per annum to the UK emissions total compared to where it would otherwise have been, although this gross impact from the removal of the fuel duty rise does not take account of the dampening effect of the rise in wholesale fuel prices and therefore pump prices on demand and therefore emissions.

Reform to vehicle excise duty

http://webarchive.nationalarchives.gov.uk/+/http:/www.hm-treasury.gov.uk/prebud_pbr09_index.htm
http://www.hmrc.gov.uk/ria/reforms-vehicle.pdf
http://www.hmrc.gov.uk/budget2013/ootlar-main.pdf

- Document: Pre-Budget Report (2009), HMT; HMRC Impact Assessment; Budget 2013 HMRC documentation
- Anticipated implementation date: 2010
- Estimated emissions impact: -0.9 $MtCO_2e$ by 2020

From April 2010, the Government introduced a new first-year rate of VED. Under this system, all cars emitting up to 130 g CO_2e per km pay no VED in the first year. Cars emitting over 165 g CO_2e per km pay additional VED in the first year. First year rates are used to encourage the purchase of more fuel-efficient cars. Together, these changes are estimated to result in a cumulative UK saving of 0.9 MtCO_2e by 2020. However, this assessment only includes impacts in the new car market, and these figures will contribute to the delivery of the savings from the EU regulation on CO_2e from cars, rather than constitute additional savings. Budget 2011 announced that VED rates would increase by RPI indexation in 2011-12 with rates for HGVs frozen over the period. HGV rates were subsequently frozen again at the 2013 budget while rates for cars have been increased in line with inflation (RPI) in the latest budget. Cars in Band A (<100g CO_2e per km) pay no VED while those in Band B (100 - 110g CO_2e per km) and C (110 - 120g CO_2e per km) pay no VED at first registration and £20 and £30 respectively thereafter.

Company car tax

http://cdn.hm-treasury.gov.uk/budget2012_complete.pdf
http://www.hmrc.gov.uk/budget2013/ootlar-main.pdf

- Document: Pre-Budget Report (2009), Budget 2012 HMT
- Anticipated implementation date: Ongoing
- Budget 2013 HMRC documentation
- Estimated emissions impact: Not quantified

The UK Government's June 2010 budget set out further reform of company car tax to provide an incentive to purchase the lowest emitting vehicles on the market. This has been reinforced in recent budgets to incentivise the purchase and manufacture of ultra-low emission vehicles in the UK.

From April 2011, the basic threshold for the 15 per cent band of company car tax was reduced by 5 grams of carbon dioxide emitted per kilometre (g CO_2e per km), so that this band applies to cars emitting between 121 and 129g CO_2e per km. This threshold has subsequently been reduced further.

For 2015-16, this measure introduces two new appropriate percentage bands for company cars emitting 0-50g of carbon dioxide (CO_2e) per kilometre (5 per cent) and 51-75g CO_2e per km (9 per cent). In addition, as announced at Budget 2012, the remaining appropriate percentages are increased by two percentage points for cars emitting more than 75g CO_2e per km, to a new maximum of 37 per cent.

Budget 2013 also sets out rates for company cars emitting 75g CO_2e per km or less for 2016-17 and provides a commitment that in 2017-18 there will be a 3 percentage point differential between the 0-50 and 51-75 g/km CO_2e bands and between the 51-75 and 76-94 bands. The 2014 budget further lifted the percentage of a company car list price that would be subject to tax for cars emitting more than 75 g CO_2e /km.

This policy aims to encourage the purchase of ULEVs and hence contribute to the objectives of reducing greenhouse gas emissions from road transport. However, given that the market is at an early stage of development it is not possible to precisely estimate the impact on ULEV sales or emissions savings, but they are likely to be small to begin with.

Fuel benefit charge (FBC)

http://webarchive.nationalarchives.gov.uk/20100407010852/http://www.hm-treasury.gov.uk/budget2010_documents.htm
http://www.hmrc.gov.uk/budget2013/ootlar-main.pdf

- Document: Pre-Budget Report (2009), HMT
- Anticipated implementation date: 2010
- Estimated emissions impact: Not quantified

The provision of free fuel to company car drivers provides a perverse environmental incentive. The Government is committed to increasing the fuel benefit charge multiplier – which is used to calculate the tax payable on free fuel – at least in line with inflation each year. The Pre-Budget Report 2009 set out that from 6 April 2010, the multiplier would increase from £16,900 to £18,000. The van fuel benefit charge –

on which tax on free van fuel is payable – will also increase from £500 to £550. Budget 2011 announced that the fuel benefit charge multiplier for cars would increase by indexation to £18,800 in 2011.

Budget 2012 introduced a further rise from £18,800 to £20,200, and it will increase by 2 per cent above the RPI in 2013-14 before falling back to RPI in 2014-15. The Government also committed to pre-announcing the FBC multiplier one year in advance. The van FBC multiplier will be frozen at £550 in 2012 but will increase by the RPI in 2013–14. The 2014 budget confirmed that the car and multipliers would continue to rise in line with inflation in 2015-16.

Table 6 summarises the previous information. As with Table 5, these emissions are not produced using a single, consistent methodology so are not directly comparable.

Table 9: Emissions impact estimates of fiscal / regulatory measures

Project title	Published emissions estimate
Air passenger duty	-0.6MtCO_2e in 2011-12 (UK)
Inclusion of aviation in EU ETS	-183MtCO_2e p.a. in 2020 (Europe)
Fuel Duty	+0.5 MtCO_2e p.a. by 2013 from two freezes (UK)
Reform of Vehicle Excise Duty[40]	-0.9 MtCO_2e total savings by 2020 (UK)
Company car tax	Not quantified
Fuel benefit charge	Not quantified
RPP2 - Decarbonising Vehicles	-2.5 MtCO_2e in 2027
RPP2 - Sustainable Communities	-0.3 MtCO_2e in 2027
RPP2 - Business Transport Measures	-0.5 MtCO_2e in 2027
RPP2 - Network Efficiencies	<-0.1MtCO_2e in 2027
RPP2 - Additional Measures	-0.75 MtCO_2e in 2027

The emission estimates within this table are forecast increases or decreases in carbon dioxide emissions with the policy compared to without the policy in a given future assessment year. These estimates have been calculated using a variety of methodologies and, consequently, it is not statistically valid to aggregate the individual figures or directly compare them with one another.

[40] The impacts from both VED and company car tax contribute to the delivery of the savings from the EU regulation on CO_2 from cars, as opposed to representing additional savings.

3.4 Projected net emissions impact from Scottish projects

The Carbon Account for Transport collates information from a variety of sources and outputs with one of the key sources being the findings generated from the application of the Scottish Transport Appraisal Guidance (STAG) to transport proposals. Two key concepts in STAG are:

- It should be applied proportionately but comprehensively. The whole process should be used and the level of detail required will be determined by the scale of the impacts of the transport issue being addressed.

- It does not prioritise between options. Instead, it is an aid to decision makers to allow them to make informed choices. STAG may provide an initial rationale for investment and it is important that the STAG outcomes are revisited as the Business Case for an intervention develops.

As such, a study undertaken using STAG is not required to provide an absolute prediction of all of the outcomes of an intervention. Instead, it provides sufficient information to understand the relative impacts between different options. As such the results in Table 5 cannot simply be summed to produce an aggregate impact.

While these assessments provide one of the key purposes of the CAT - to improve transparency - something further is needed to monitor progress towards the NTS strategic outcome of reduced transport emissions. In 2010 a single model run of the Land-Use and Transport Integration in Scotland (LATIS) service was commissioned to estimate the net impact of all measures within the CAT that fall under the competence of the Scottish Government or other Scottish public body[41]. LATIS includes a strategic transport and land-use model covering all of Scotland and all motorised modes of transport so the use of LATIS to assess the carbon impacts of Scottish transport schemes ensures network consistency and takes full account of the potential displacement of developments between one area and another. The

[41] Including those measures whose expected emissions impacts has not been quantified on an individual basis, e.g. Freight Facilities Grant.

modelling of this set of projects over the timescale of their introductions also provides a greater understanding of the full impact that Scottish interventions are having, or are expected to have, on underlying emissions from transport. The model is not though a complete assessment of the likely impact as it does not include the impact of those measures taken at a reserved level, for example changes to fuel duty and some of the demand side measures outlined in RPP2.

A recent updating of the baseline data within LATIS has enabled a revised set of projections to be run 'with' and 'without' the CAT specific projects. The latest estimates from are shown in Table 10. The table shows that the combined impact of the projects is to generate a small increase in overall emissions, with the long-run impact estimated at an estimated additional 50 $ktCO_2e$ p.a. by 2027. The impact of these schemes is thus to add around a 0.4% to annual transport emissions in 2027 relative to where they would otherwise have been.

Table 10: Projected net emissions impact of Scottish projects[42]

Year	Annual Change in Emissions ($ktCO_2e$)
2017	30
2022	50
2027	50

This estimated increase in emissions is largely driven by a net increase in car vehicle emissions.

[42] The reduction in emissions within the non-traded sector that are a result of EGIP have been added to the modelled output, as these benefits sit outside the scope of the modelling framework.

Chapter 4: Conclusions

The Scottish Government is committed to tackling climate change, and has put in place a framework to deliver greenhouse gas emission reductions of 42% by 2020 and 80% by 2050 (compared to a 1990 baseline). The recently published RPP2 sets out a pathway that will keep Scotland on the trajectory to achieve this emissions reduction.

Transport has a significant role to play in meeting these national targets and RPP2 sets out the wide range of work underway to bring down transport emissions. Investment in public transport infrastructure and service delivery, initiatives to encourage active travel, improving the efficiency of freight movements and the use of low carbon vehicles are all decisions being taken at the devolved level with the clear intention of reducing transport emissions. Furthermore, there is strong support from the Scottish Government for those wider measures such as the new car CO_2e regulation and the UK Renewable Transport Fuels Obligation (RTFO). Together, these will make a long-lasting and permanent reduction in Scotland's transport emissions.

Section 2 of the CAT set out the latest outturn emissions data available. It demonstrated that whilst transport continued to make up a quarter of Scotland's total emissions, transport emissions fell for a fourth year.

Section 2 also demonstrates through a range of key indicators monitoring public transport use, use of alternatively fuelled vehicles and fuel efficiency in transport are showing encouraging movements towards more fuel efficient, less emitting transport behaviours.

Section 3 of the CAT explains the likely future impact from the infrastructure projects underway. While the emissions impacts from these projects are not measured on a like for like basis, and consequently cannot be compared against each other, it is clear that some interventions are expected to increase future emissions albeit by relatively small amounts. The STAG process is though about more than recording

emissions impact so an appraisal may show that an infrastructure improvement is, on balance, the best way to achieve the overall Government Purpose. That said, it is still important to quantify and to minimise the emissions impacts of each project.

Section 3 of the CAT also sets out the range of fiscal and regulatory measures, predominantly reserved, that have been committed to usually via the EU or UK Budget process. The intention behind these measures generally is to encourage shifts in travel behaviour towards active and more fuel efficient options through charging more for inefficient practices or offering reduced rates on efficient transport choices.

Moving forward, Transport Scotland has developed a Carbon Management Plan for the organisation and currently reports on the corporate operational carbon emissions performance within the Transport Scotland Sustainability Report 2012/13[43]. Transport Scotland's target is to reduce emissions by 16% by 2015-16 from a 2010/11 baseline. Detail of current progress against this target and the latest year's performance can be found in the Annual Report and Accounts and an updated Carbon Management Plan was published September 2013[44].

The purpose of the CAT is to bring greater transparency to Scotland's transport emissions and, therefore, greater emissions accountability in transport policy. This will mean promoting those measures which reduce emissions, as well as minimising the impact of policies and projects that increase emissions. Whilst the underlying factors set out in Chapter 2 will continue to have a major influence on overall transport emissions, the CAT will continue to report the marginal impact that projects and policies are likely to have upon the overall emissions pathway.

[43] Transport Scotland: Sustainability Report
[44] Carbon Management Plan

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Further copies of this document are available, on request, in audio and large print formats and in community languages (Urdu; Bengali; Gaelic; Hindi; Punjabi; Cantonese; Arabic; Polish).

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Gheibhear lethbhreacan a bharrachd ann an cruth ris an èistear, ann an clò mòr agus ann an cànain coimhearsnachd. Cuir fios gu:

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ਇਸ ਦਸਤਾਵੇਜ਼/ਕਾਗ਼ਜ਼ਾਤ ਦੀਆਂ ਹੋਰ ਕਾਪੀਆਂ, ਮੰਗੇ ਜਾਣ 'ਤੇ, ਆੱਡਿਓ ਟੇਪ ਉੱਪਰ ਅਤੇ ਵੱਡੇ ਅੱਖਰਾਂ ਵਿਚ ਅਤੇ ਕੰਮਿਉਨਿਟੀ ਭਾਸ਼ਾਵਾਂ ਦੇ ਵਿਚ ਮਿਲ ਸਕਦੀਆਂ ਹਨ, ਕ੍ਰਿਪਾ ਕਰਕੇ ਸੰਪਰਕ ਕਰੋ:

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