

# Greenhouse gas emissions from transport

## Executive summary

### Main findings of transport report

- Between 1990 and 2002<sup>1</sup>, total UK greenhouse gas emissions declined 10 per cent from 777.3 million tonnes of carbon dioxide equivalent to 696.5 million tonnes. The transport industries were one of the few exceptions to this downward trend as greenhouse gas emissions from the transport industries were 47 per cent higher in 2002 than in 1990. This is despite a 3 per cent fall in emissions since 2000, reflecting a downturn in the air transport industry following the reaction to terrorist attacks on September 11. The level of greenhouse gas emissions from non-transport industries in 2002 was 15 per cent lower than in 1990, reflecting fewer emissions from the manufacturing industries.
- The UK transport industries were responsible for emitting the equivalent of 86.0 million tonnes of carbon dioxide in 2002 compared with 88.3 million tonnes in 2000 and 58.5 million tonnes in 1990. Greenhouse gas emissions from UK households' private vehicles were 59.2 million tonnes in 1990 and 62.8 million tonnes in 2002, a 6 per cent higher level.
- Total greenhouse gas emissions from all forms of road transport amounted to 125.3 million tonnes in 2002, an increase of 13 per cent since 1990. Greenhouse gas emissions from road transport now constitute 18 per cent of all greenhouse gas emissions compared with 14 per cent in 1990.
- Greenhouse gas emissions from the UK air transport industry have fallen 10 per cent from their peak in 2000 reflecting the downturn in the industry following the terrorist attacks on September 11. Despite the recent falls, the air transport industry still has the largest increase in emission levels since 1990. Between 1990 and 2002, greenhouse gas emissions from the air transport industry rose from 20.2 million tonnes to 37.5 million tonnes, an increase of just over 85 per cent. Greenhouse gas emissions from the air transport industry fell by 10 per cent over the past two years from a peak of 41.8 million tonnes in 2000.
- Greenhouse gas emissions from the road freight industry rose during the 1990-2002 period, from 15.8 million tonnes to 23.4 million tonnes, a rise of 48 per cent. This compares with a 59 per cent increase published in the spring edition of the Environmental Accounts, and reflects subsequent additional quality assurance work. Greenhouse gas emissions from all heavy goods vehicles used across all industries rose 39 per cent from 22.9 million tonnes in 1990 to 31.8 million tonnes in 2002.

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<sup>1</sup> Users should note that while all comparisons are made with 1990, the base year for the Kyoto Protocol, these data are compiled on a different conceptual basis to those used to measure performance against the Protocol.

- Greenhouse gas emissions from public transport sources such as railways, tubes, buses and taxis fell 7 per cent between 1990 and 2002 after some increases in the early 1990s.
- Greenhouse gas emissions from water transport have risen 6 per cent since 2000 but are still below their 1998 peak of 17.2 million tonnes. Since 1990, water transport emissions have risen 29 per cent to end the period at 15.0 million tonnes.
- Recent quality assurance work suggests the need for further work on the allocation of diesel purchased in the UK. Current use of vehicle kilometres may not take into account diesel purchased abroad in so called "tank tourism".

## **Background**

The spring 2004 edition of *Environmental Accounts* was published on 20 May with an accompanying News Release focusing on the new information available in that edition. The planned News Release, focusing on greenhouse gas emissions from transport, was not published as the growth in road freight industry emissions reported in the Accounts differed from the growth in heavy goods vehicle kilometres raising concerns over data quality. Since then, the ONS has worked in collaboration with transport statistics experts in reconciling the differences, which arise due to differences in data sources, coverage and methodology. During the quality checking work, an error was identified and has now been corrected. This report presents the findings following this quality assurance work.

The next section indicates how the Environmental Accounts combines various data in compiling transport emissions by industry. It is followed by an explanation of how the Environmental Accounts estimates of UK greenhouse gas emissions are consistent with the National Accounts, rather than with figures used to monitor progress against the Kyoto Protocol. This raises two conceptual differences. Firstly, National Accounts based estimates include emissions from international aviation and from fuels purchased abroad by UK residents including those purchased by road transport, international shipping and aircraft on international flights. They exclude emissions from fuels purchased in the UK by non-residents. Secondly, the Environmental Accounts publish emissions on an industry basis as opposed to an activity basis thus allowing direct comparison with National Accounts measures such as gross value added. This is particularly relevant for road freight where industries outside of transport also carry out road haulage activities.

The report then provides analysis of emissions from transport industry discussing the emissions from individual sub-industries. Comparisons have generally been made between the latest year (2002) and 1990, which is the base year for the Kyoto Protocol.

Following the quality checking work, there has been a correction to the allocation of emissions from heavy goods vehicles in 2002. The original figures were correct at the total level but there had been a misallocation between industry groups. The overall impact of the correction was to reduce the level of greenhouse gas emissions from the road freight industry from 25.1 million tonnes to 23.4 million tonnes. Total UK

greenhouse gas emissions remained unchanged with the 1.7 million tonne reduction from the road freight industry redistributed across the other industries using heavy goods vehicles.

### **Greenhouse gas emissions data sources**

The industry breakdown of atmospheric emissions is supplied to the ONS by National Environmental Technology Centre (Netcen) and is primarily based on information compiled for their *National Atmospheric Emissions Inventory (NAEI)* and their *Greenhouse Gas Inventory*. The NAEI and the Greenhouse Gas Inventory are compiled by Netcen on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the devolved administrations. Atmospheric emissions are estimated by multiplying detailed information on fuel consumption by emissions factors and then adding releases unrelated to fuel use such as methane arising from landfill. The NAEI data are used to identify the main processes and industries responsible for the atmospheric emissions. These are then allocated to individual industries using information from a variety of sources. For example, emissions from diesel combustion by heavy goods vehicles are allocated to industries using vehicle mileage information from the Department for Transport (DfT). Expenditure information is also used, for example emissions arising from the use of various industrial coatings are allocated to relevant industries in proportion to each sector's expenditure on paints, varnishes and similar coatings, printing ink and mastics, using ONS National Accounts Input-Output supply and use tables as the main source.

### **National accounts consistent emissions**

The Environmental Accounts published by the ONS are compiled on a National Accounts consistent basis. This allows for comparisons of emissions and material flows against mainstream National Accounts measures such as gross domestic product and gross value added. National Accounts consistent atmospheric emissions are also required by Eurostat for inclusion in their National Accounts Matrix including Environmental Accounts (NAMEA) tables. Data on a National Accounts basis requires that all emissions by UK residents, whether generated in the UK or abroad, are included and all emissions by non-residents, whether generated in the UK or abroad, are excluded. ONS greenhouse gas emissions estimates therefore differ from those published by Defra, who include emissions generated in the UK regardless of nationality of source.

National Accounts adjustments are made for the following vehicles; aircraft, ships, cars, lorries and coaches. The methodology for deriving these adjustments are explained in more detail in *Adjustments to the UK's atmospheric emissions and energy accounts to bring them on to a National Accounts "residents" basis* (ONS, 2002).

### **Greenhouse gas emission by industry and by activity**

Greenhouse gas emissions shown in the Environmental Accounts cover all emissions from a particular industry and not solely the emissions from the primary economic activity of that industry. For example, greenhouse gas emissions from the road freight industry not only comprise emissions from the primary source, heavy goods vehicles used for road haulage, but also include emissions from light goods vehicles, cars and other equipment used by that particular industry. Identifying emissions on an industry basis

produces different levels of emissions and different rates of change over the 1990-2002 time period when compared with greenhouse gas estimates compiled on an activity basis. For example, freight activity is undertaken by a number of industries outside of transport, such as retail and wholesale trade.

**Table 1** shows the differences between growth in emissions from heavy goods vehicle used in the UK and emissions on a National Accounts industry basis. The former measure differs from total freight activity because it excludes non-HGV transport vehicles. **Table 1** shows that the total increase in emissions from the road freight industry was 48 per cent. The exclusion of emissions from other sources and from fuels purchased outside the UK reduces that growth to 45 per cent and 36 per cent respectively. This implies the 'cross boundary' adjustments explain 9 per cent of the emissions growth. Taking emissions from all UK based HGV activity further reduces that growth to 31 per cent, suggesting that the difference between measures on an activity basis and an industry basis is about 5 per cent. The increase in HGV vehicle kilometres is given for comparison. Remaining differences between the increase in emissions and the increase in vehicle kilometres arise from rises in emissions per vehicle kilometre. These occur for a number of reasons, for example shifts towards heavier articulated vehicles.

Table 1 - Reconciliation between activity v industry		
	% change 1990-2002	Difference
<b>Total road freight industry</b>	<b>48%</b>	Excluding emissions from other sources e.g. cars, LGVs, etc.
Less other emissions	45%	
Less National Accounts adjustments	36%	Excluding fuels purchased outside UK (Cross-boundary adjustment)
<b>Total UK only HGVs activity</b>	<b>31%</b>	All UK heavy goods vehicles on activity basis
<b>Total road freight industry HGV km</b>	<b>20%</b>	Reconciling this with above needs information on changes in fuel use per kilometre.

The UK transport industry data shown on the next page in **table 2** include all greenhouse gas emissions from the specific industry and are presented in Environmental Account code order. A 93-industry breakdown of all UK greenhouse gas emissions is available on the National Statistics website.

**Table 2**  
**Greenhouse gas emissions from the UK transport industry**

Million tonnes of CO<sub>2</sub> equivalent

EA code and industry	1990	1995	1996	1997	1998	1999	2000	2001	2002
63 Railways	2.5	2.4	2.4	2.0	2.0	2.0	1.9	1.8	1.5
64 Buses and coaches	5.6	5.6	5.4	5.3	5.1	4.9	4.6	4.5	4.8
65 Tubes and trams	0.9	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8
66 Taxis & minicabs	1.5	2.3	2.4	2.5	2.7	2.8	2.8	2.8	2.7
67 Road freight	15.8	19.2	20.5	21.3	21.6	21.7	21.8	23.0	23.4
68 Transport via pipeline	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
69 Water transport	11.6	12.1	14.8	16.8	17.1	14.7	14.2	14.8	15.0
70 Air transport	20.2	26.0	28.5	30.5	34.4	37.2	41.8	38.2	37.5
<b>Total transport industry</b>	<b>58.5</b>	<b>68.9</b>	<b>75.2</b>	<b>79.7</b>	<b>84.3</b>	<b>84.5</b>	<b>88.3</b>	<b>86.3</b>	<b>86.0</b>
% of total UK emissions	8	9	10	11	11	12	12	12	12
92 UK households' vehicles	59.2	57.6	60.9	62.3	62.1	64.0	64.2	64.8	62.8
% of total UK emissions	8	8	8	8	8	9	9	9	9
Other emission sources	659.6	601.9	620.1	595.6	590.7	558.7	559.5	567.4	547.6
% of total UK emissions	85	83	82	81	80	79	79	79	79
<b>Total UK emissions</b>	<b>777.3</b>	<b>728.5</b>	<b>756.2</b>	<b>737.6</b>	<b>737.0</b>	<b>707.2</b>	<b>712.0</b>	<b>718.5</b>	<b>696.5</b>
of which									
Road transport <sup>1</sup>	111.2	114.1	119.1	121.3	121.6	123.3	123.8	124.9	125.3
% of total UK emissions	14	16	16	16	16	17	17	17	18

1. Greenhouse house gas emissions from road transport comprise emissions from all road transport sources i.e. cars, heavy goods vehicles, light goods vehicles, motorcycles, buses, coaches, etc.

**Source: ONS Environmental Accounts**

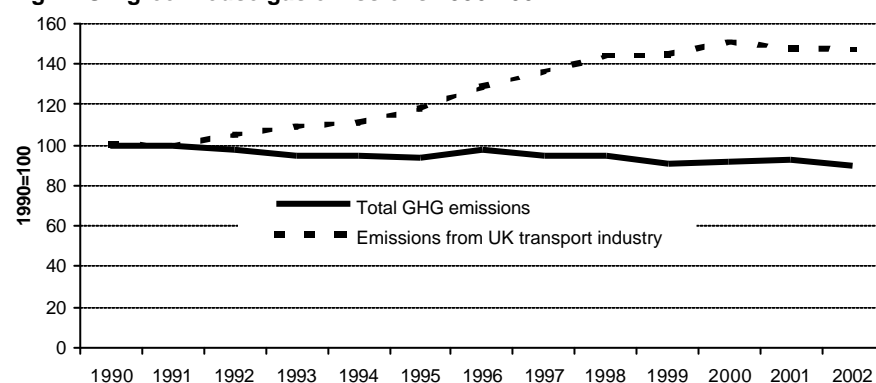
## Greenhouse gas emissions from the UK transport industry – EA code 63 to 70

Fig 1 shows that the level of greenhouse gas emissions<sup>2</sup> from the UK transport industries is 47 per cent higher in 2002 than 1990, the base year for measuring reductions in greenhouse gas emissions. This is

despite a 3 per cent fall in emissions since 2000. The recent decrease in emissions reflects a downturn in the air transport industry as a reaction to terrorist attacks. Between 1990 and 2002, total UK greenhouse gas emissions fell 10 per cent mainly driven by a fall in emissions from the

manufacturing industries. **Table 2**, taken from the *Environmental Accounts*, shows that, on a National Accounts consistent basis, the UK transport industries<sup>3</sup> were responsible for emitting 86.0 million tonnes of carbon dioxide equivalent<sup>4</sup> in 2002 (12 per cent of all UK emissions)<sup>4</sup> compared with 58.5 million tonnes in 1990 (8 per cent of all UK emissions).

**Fig 1 - UK greenhouse gas emissions 1990-2002**



<sup>2</sup> Greenhouse gases comprise CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFC, PFC and SF<sub>6</sub>.

<sup>3</sup> For purposes of this release, the UK transport industries comprise railways, tubes and trams, buses and coaches, taxis and mini cabs, road freight, air transport, water transport and transport via pipelines.

<sup>4</sup> To aggregate the greenhouse gases, a weighting based on the relative global warming potential (GWP) of each of the gases is applied, using the effect of CO<sub>2</sub> over a 100 year period as a reference. More information on GWP is shown in the background notes.

**Fig 2** shows the largest emitter of greenhouse gas emissions is the air transport industry. Greenhouse gas emissions from the air transport industry in 2000 were more than double those in 1990, before falling back in 2001 and 2002 following

the September 11 terrorist attacks to end the period up 85 per cent.

Greenhouse gas emissions from the road freight industry rose steadily from 1993 following the recession in the early nineties with the 2002

emissions 48 per cent higher than 1990 levels. Greenhouse gas emissions from water transport showed little change through the early nineties, increased to a peak in 1998 only to fall back again the following year and ended the period up 29 per cent. Annual greenhouse gas emissions from public transport including taxis and minicabs were 7 per cent lower by the end of the period mainly as a result of lower emissions from buses and coaches.

Greenhouse gas emissions from UK households' use of privately owned vehicles rose over the period from 59.2 million tonnes in 1990 to 62.8 million tonnes in 2002, a rise of 6 per cent.

Total greenhouse gas emissions from all forms of road transport and for all industries and households amounted to 125.3 million tonnes, an increase of 13 per cent since 1990. Greenhouse gas emissions from road transport now constitute 18 per cent of all greenhouse gas emissions compared with 14 per cent in 1990.

### Greenhouse gas emissions from public transport – EA codes 63 to 66

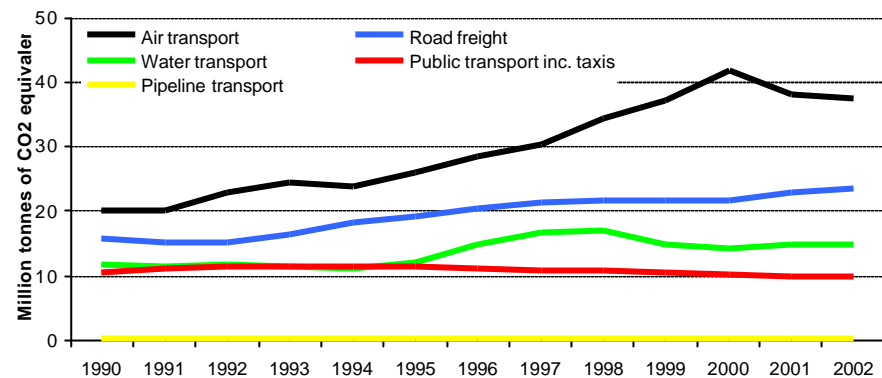
Greenhouse gas emissions from public transport sources such as railways, tubes, buses and taxis, shown in **Fig 3**, were 7 per cent lower in 2002 than in 1990. Greenhouse gas emissions from public transport initially

rose in the early nineties before declining steadily to 9.9

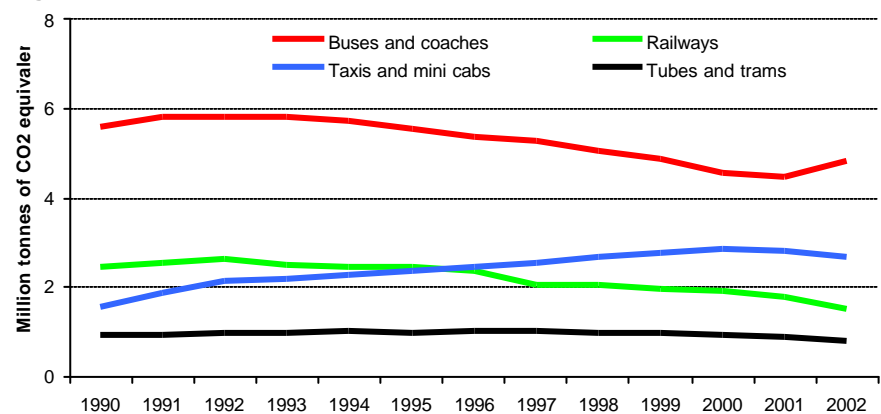
million tonnes in 2002, 1 per cent of all UK greenhouse gas emissions. Between 1990 and 2002 greenhouse gas emissions from the rail industry fell 38 per cent to 1.5 million tonnes. Over the same period, greenhouse gas emissions from the tube and

tram industry fell 15 per cent to 0.8 million tonnes. Greenhouse gas emissions from the bus and coach

**Fig 2 - GHG emissions from the UK transport industries 90-02**



**Fig 3 - GHG emissions from public transport 90-02**



industry fell 14 per cent from 1990 to 4.8 million tonnes in 2002 this is despite an increase in emissions in the latest year. Greenhouse gas emissions from taxis and mini cabs were 2.7 million tonnes in 2002, 75 per cent higher than in 1990 but down 5 per cent on their 2000 peak.

<b>Table 3 - Greenhouse gas emissions from the UK road freight industry</b>													
	Million tonnes of CO <sub>2</sub> equivalent												
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Heavy goods vehicles													
- articulated	10.4	10.0	9.9	11.1	12.8	13.8	15.1	15.8	16.2	16.1	16.0	16.9	17.3
- rigid	4.5	4.1	4.2	4.0	4.1	4.0	4.0	4.0	4.0	4.0	4.1	4.2	4.3
Total HGVs <sup>1</sup>	14.9	14.1	14.1	15.1	16.9	17.8	19.1	19.8	20.2	20.1	20.1	21.1	21.6
Non-HGV sources	0.9	0.9	1.0	1.1	1.2	1.4	1.4	1.5	1.4	1.6	1.6	2.0	1.8
<b>Total</b>	<b>15.8</b>	<b>15.1</b>	<b>15.1</b>	<b>16.3</b>	<b>18.1</b>	<b>19.2</b>	<b>20.5</b>	<b>21.3</b>	<b>21.6</b>	<b>21.7</b>	<b>21.8</b>	<b>23.0</b>	<b>23.4</b>
<b>Percentage change from 1990</b>													
		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Heavy goods vehicles													
- articulated		-4%	-5%	7%	22%	32%	45%	52%	55%	54%	54%	62%	66%
- rigid		-8%	-7%	-11%	-8%	-11%	-11%	-12%	-12%	-10%	-9%	-6%	-4%
Total HGVs		-5%	-6%	1%	13%	19%	28%	33%	35%	35%	35%	41%	45%
All non-HGV sources		9%	13%	29%	44%	58%	59%	70%	67%	79%	88%	127%	110%
<b>Total</b>		<b>-5%</b>	<b>-4%</b>	<b>3%</b>	<b>15%</b>	<b>21%</b>	<b>29%</b>	<b>35%</b>	<b>37%</b>	<b>37%</b>	<b>38%</b>	<b>46%</b>	<b>48%</b>
1. Please see comments on diesel consumption under methodological developments on page 11.													
<i>Source: National Environmental Technology Centre</i>													

### Greenhouse gas emissions from the road freight industry – EA code 67

Greenhouse gas emissions from the road freight industry rose during the period from 15.8 million tonnes in 1990 to 23.4 million tonnes in 2002, a rise of 48 per cent. Data users should be aware that the road freight industry comprises solely the specialist road haulage companies and not all road freight activities. **Table 3** shows that the 48 per cent increase in the level of greenhouse gas emissions from the road freight industry is primarily driven by a 66 per cent rise in emissions from articulated heavy goods vehicles. Greenhouse gas emissions from articulated vehicles amounted to 17.3 million tonnes in 2002 compared with 10.4 million tonnes in 1990. Greenhouse gas emissions from rigid heavy goods vehicles fell 4 per cent over the same period. Total emissions from the industry's use of heavy goods vehicles rose 45 per cent between 1990 and 2002. Greenhouse gas emissions from other sources such as light goods vehicles and cars amounted to 1.8 million tonnes in 2002. The rise in greenhouse gas emissions over the period can be partly attributed to the increase in kilometres travelled by heavy goods vehicles, particularly those driven by articulated vehicles that dominate the industry.

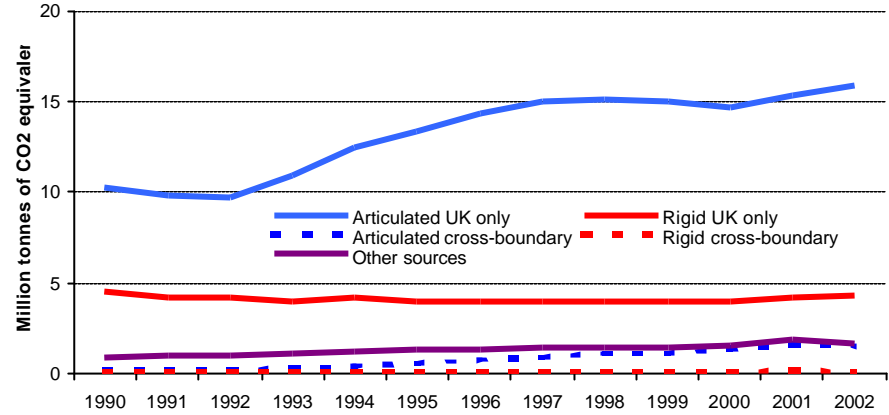
Greenhouse gas emissions from the road freight industry are derived from information supplied to Netcen by the Department for Industry (DTI) and the Department for Transport (DfT). The DTI supply Netcen information on petrol and diesel consumption, which feeds into the National Air Emissions Inventory. The DfT provide information on vehicle kilometres travelled by various types of vehicle from the National Traffic Census and by the industry owners of heavy goods vehicles from the Continuing Survey of Road Goods Transport (CSRGT). Recent quality assurance work suggests the need for further work on the allocation of

diesel purchased in the UK. Current use of vehicle kilometres may not take into account diesel purchased abroad in so called "tank tourism".

Fuel consumption estimates are adjusted to a National Accounts basis by excluding fuels purchased in the UK by non-resident hauliers and by including fuels purchased abroad by UK hauliers. These adjustments also reflect additional fuel

purchases on return journeys to the UK to capitalise on the cheaper diesel prices in France and Belgium, so called "tank tourism". Estimates of fuels purchased in the UK by non-resident hauliers and abroad by UK hauliers are not available and are modelled by the ONS using information on

**Fig 4 - GHG emissions from the road freight industry 90-02**



average journey length, vehicle type, fuel consumption rates and fuel tank capacities. **Fig 4** shows the size of the National Account cross-boundary adjustments as a proportion of the overall road freight industry emissions. Greenhouse gas emissions from UK only heavy goods vehicles amounted to 20.0 million tonnes in 2002, approximately 87 per cent of all emissions from the industry. Greenhouse gas emissions from the cross-boundary fuel adjustments, having been negligible in 1990, amounted to 1.6 million tonnes in 2002, around 7 per cent of all emissions from the industry.

The spring edition of the Environmental Accounts estimated greenhouse gas emissions from the road freight industry to be 25.1 million tonnes. The latest estimate of 23.4 million tonnes is the result of investigative work by the ONS, DfT and Netcen. The investigations focused on the allocation of greenhouse gas emissions from heavy goods vehicles and the estimation of the cross boundary adjustments. The revision of 1.7 million reflects the correction of an error in vehicle kilometre information supplied to Netcen and subsequently used to allocate emissions from heavy goods vehicles. The cross boundary adjustments remain unchanged from the spring publication.

**Greenhouse gas emissions from pipeline transport – EA code 68**

Greenhouse gas emissions from pipeline transport have been negligible throughout the period at around 0.3 million tonnes per annum.

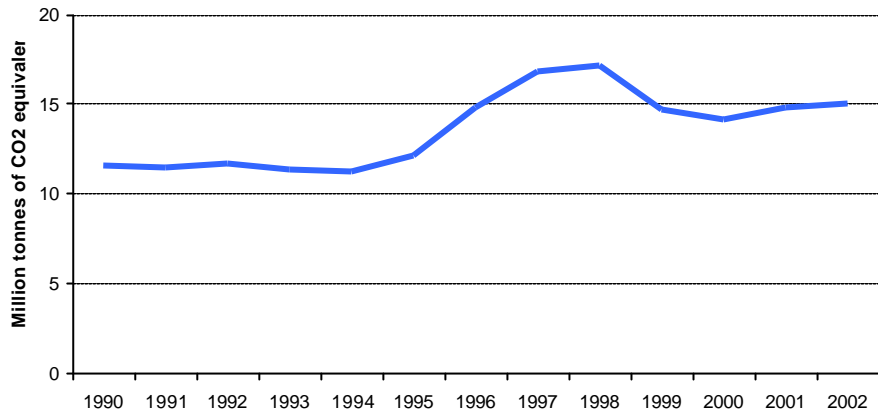


### Greenhouse gas emissions from water transport – EA code 69

Greenhouse gas emissions from water transport (Fig 5) have risen 6 per cent since 2000 but are still below their 1998 peak of 17.2 million tonnes. The steady increase in emissions between 1995 and 1998 reflects increased fuel purchases

during the period. In 2002, water transport emissions were 29 per cent higher than in 1990, and are now at 15.0 million tonnes, just over 2 per cent of total UK emissions. Greenhouse gas emissions from the water transport industry are again derived from fuel

Fig 5 - GHG emissions from sea transport 1990-2002



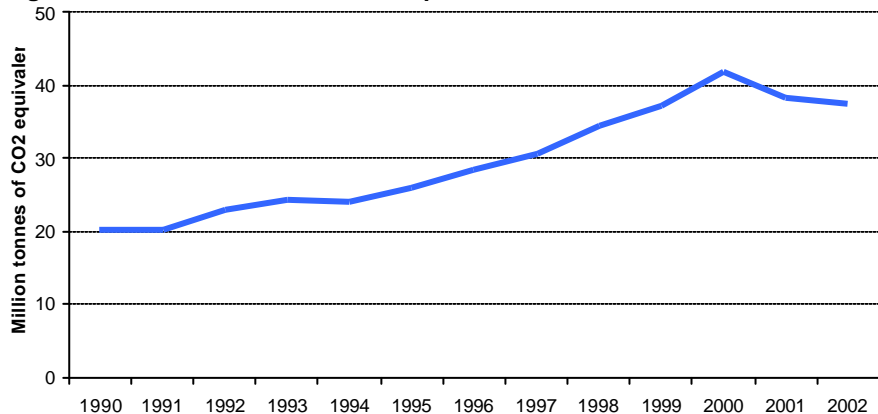
consumption estimates obtained from the DTI. Estimates of fuels supplied to UK marine bunkers are once again adjusted on to a National Accounts basis to exclude fuels purchased by foreign ships in the UK and to include fuels purchased by UK ships abroad. The primary data source for these adjustments are the UK's Balance of Payments which identify expenditure on marine bunkers both by UK and foreign residents. Using this expenditure information it is possible to derive the volume of fuel purchased. It is assumed that marine bunker prices in the rest of the world are the same as in the UK. This methodology is under review as new data sources, which can potentially provide a more direct estimate of fuel purchases, have recently been identified.

### Greenhouse gas emissions from the UK air transport- EA code 70

Greenhouse gas emissions from the UK air transport industry have fallen 10 per cent from their peak in 2000 reflecting the downturn in the industry following the reaction to the 11 September terrorist attacks. Despite the recent falls, the air

transport industry still has the largest increase in emissions since 1990. Fig 6 shows that in 2002, greenhouse gas emissions from the air transport industry were 37.5 million tonnes, a level change of just over 85 per cent from the 1990 level of 20.2

Fig 6 - GHG emissions from air transport 1990-2002



million tonnes. Greenhouse gas emissions from the air transport industry fell by 10 per cent over the past two years from a peak of 41.8 million tonnes in 2000.

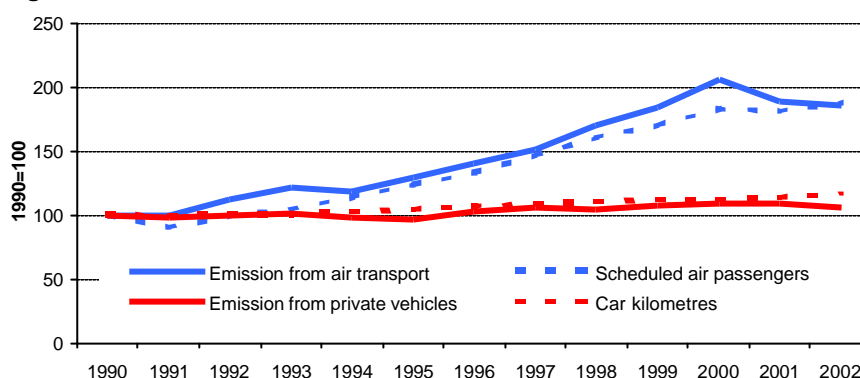
Greenhouse gas emissions from the aviation industry are derived from fuel consumption information used to compile the National Air Emissions Inventory adjusted to exclude fuel purchased in the UK by foreign airlines and to include fuel purchased abroad by UK airlines. The adjustments are based on aviation information on passengers travelling from the UK on UK and foreign airlines.

### Greenhouse gas emissions from UK households' travel – EA code 92

Greenhouse gas emissions from UK households' use of privately owned vehicles<sup>5</sup> rose to 62.8 million tonnes in 2002 compared with 59.2 million tonnes in 1990, a rise of 6 per cent. Greenhouse gas emissions from cars were the single largest

source contributing 99 per cent of all private vehicle emissions. **Fig 7** shows that car kilometres travelled have increased 17 per cent since 1990. **Fig 7** also shows that the increase in greenhouse gas emissions from the air transport industry can be

**Fig 7 - GHG emissions from UK households' travel**



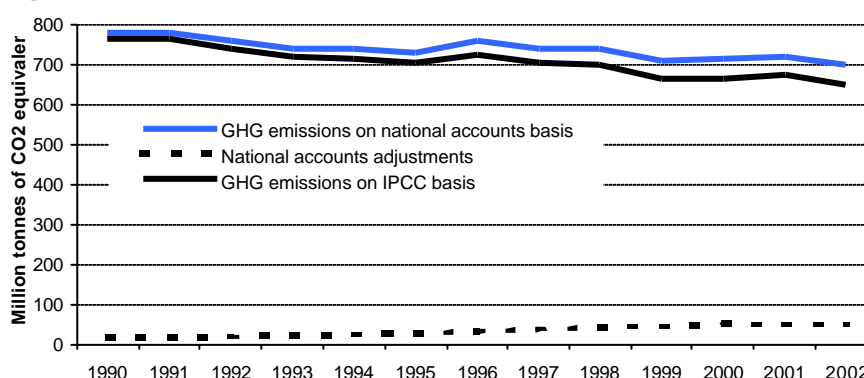
attributed to the increase in passenger miles flown by UK airlines. Between 1990 and 2002, greenhouse gas emissions from air transport increased by 85 per cent from 20.2 million tonnes in 1990 to 37.5 million tonnes in 2002. Over the same period, the number of scheduled passengers flown by UK airlines increased by 88 per cent from 38.4 million in 1990 to 72.2 million in 2002.

### National Accounts and IPCC measures of greenhouse gas emissions

Total greenhouse gas emissions published in the Environmental Accounts amounted to 696.5 million tonnes of carbon dioxide equivalent in 2002 compared with 648.4 million tonnes published by Defra on 25 March 2004 (**Fig 8**). The difference

reflects the fact that the Environmental Accounts are compiled on a National Accounts basis whereas the Defra dataset are published on an International Panel on Climate Change (IPCC) consistent basis. The IPCC

**Fig 8 - National accounts and IPCC GHG emissions**



basis is used to assess the UK's performance against targets set out in the Kyoto Protocol. The most significant National Accounts adjustments are to include greenhouse gas emissions from international transportation and to include emissions generated by UK residents from fuels purchased outside of the UK.

<sup>5</sup> Greenhouse gas emission from household transport are predominately from private cars, motorcycles, light goods vehicles but also include, to a far lesser extent, emissions from private aircraft.

More information on the differences between the two measures is contained in table 2.4 of the Environmental Accounts. Defra also publish greenhouse gas emissions on the United Nations Economic Commission for Europe (UNECE) basis which also has slightly different coverage. More information on how UK greenhouse gases are measured is available on Defra's website.

### Methodological developments

Estimates of greenhouse gas emissions from transport are derived from a variety of data sources, statistical models and assumptions on human behaviour. The data are therefore the best estimate given the information available at the time. Work is on-going at the ONS, DfT and Netcen to examine the appropriateness and accuracy of the current methodology. Any improvements to the compilation of greenhouse gas emissions will be introduced into the Environmental Accounts in subsequent publications.

Recent quality assurance work suggests the need for further work on the allocation of diesel purchased in the UK. Current use of vehicle kilometres may not take into account diesel purchased abroad in so called "tank tourism". The fairly recent phenomenon of tank tourism is where vehicle owners fill their tanks in the European Union Member States with the lowest rates of fuel duty. **Box 1** below, taken from a House of Lords Select Committee report on "The Taxation of Fuels in the European Union", shows the differing rates of duty on fuels across the European Union as at February 2002.

**Box 1**  
*Rates of excise duties on petrol and diesel fuel across the EU*

Excise duty varies greatly from one Member State to the next. The Table below illustrates the situation (in EUR/1000 litres, as at February 2002):

	B	DK	D	EL	E	F	IE	I	L	NL	A	P	SF	S	UK	Weighted average of the EU15
Diesel fuel	290	370	440	245	294	376	302	403	253	345	282	272	305	337	742	411
Eurosuper	507	548	624	296	396	574	401	542	372	627	414	479	560	510	742	581

Source: The Commission's Explanatory Memorandum to the proposal (COM (2002) 410 Final, pp 4-5).

Other areas under investigation include:

- the volumes of marine bunker fuels purchased by UK residents and non-residents;
- the consumption of diesel by heavy goods vehicles, light goods vehicles and cars;
- the use of the National Traffic Census and Continuous Survey of Road Goods Transport for allocating emissions from road transport;
- fuel consumption of heavy goods vehicles;
- journey distance on international road haulage;
- the sensitivity of the cross boundary adjustments.

## References

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House of Lords Select Committee on European Union: Twenty Fourth Report. 2003. The Taxation of Fuels in the European Union: <http://www.parliament.the-stationery-office.co.uk/pa/ld200203/ldselect/ldeucom/108/10801.htm>

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## Background notes

1. For the purpose of this news release, the UK transport industries comprise railways, tubes and trams, buses and coaches, taxis and mini cabs, road freight, air transport, water transport and transport via pipelines. The road freight industry covers road haulage companies as opposed to all types of road freight.
2. The Environmental Accounts are published on a National Accounts basis and differ from the basis used to monitor progress against the Kyoto Protocol in that they include emissions from international aviation and from fuels purchased abroad by UK residents, including those purchased by international shipping and aircraft on international flights. They exclude emissions from fuels purchased in the UK by non-UK residents.
3. The greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). To aggregate the greenhouse gases covered in the accounts, a weighting based on the relative global warming potential (GWP) of each of the gases is applied, using the effect of CO<sub>2</sub> over a 100 year period as a reference. This gives methane a weight of 21 relative to CO<sub>2</sub> and nitrous oxide a weight of 310 relative to CO<sub>2</sub>. SF<sub>6</sub> has a GWP of 23,900 relative to CO<sub>2</sub>. The GWP of the other fluorinated compounds varies according to the individual gas.

4. The estimated greenhouse gas emissions from air transport do not include the effects of increased radiative forcing at altitude. Estimates of the radiative forcing of aviation emissions at altitude vary between two and four times that of CO<sub>2</sub> alone. Radiative forcing is a change in the balance of energy absorbed and emitted by the Earth. Positive radiative forcing has a warming effect while negative forcing has a cooling effect.
5. The atmospheric emission and energy accounts draw upon data collected by the Department of Trade and Industry, the Department for Environment, Food and Rural Affairs (Defra) and the National Atmospheric Emissions Inventory maintained by the National Environmental Technology Centre on behalf of Defra. Further information on the inventory can be obtained from the National Atmospheric Emissions Inventory website at [www.naei.org.uk](http://www.naei.org.uk) . Latest figures showing greenhouse gas emissions compared with the Kyoto Protocol target were published by Defra on 25 March 2004 and can be found at: <http://www.defra.gov.uk/news/2004/040325a.htm>
6. Environmental accounts are 'satellite accounts' to the main national accounts. They provide information on air pollution, energy consumption, oil and gas reserves, trade in basic materials, environmental taxation and spending on environmental protection. These are related to the different industrial, commercial and domestic sectors. Environmental accounts use similar concepts and classifications of industries to those employed in the National Accounts, and they reflect the recommended European Union and United Nations framework for developing such accounts.
7. Further details on air emissions and energy use as well as information on other elements of the environmental accounts such as oil and gas reserves, material flows and environmental protection expenditure, can be found at: <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=3698>
8. The environmental accounts are used to inform sustainable development policy, to model impacts of fiscal or monetary measures and to evaluate the environmental performance of different industrial sectors.
9. **National Statistics** are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference. © Crown copyright 2004.