Addendum to 2020 Carbon Management Implementation Plan

Indirect (Scope 3) Carbon Emissions

The University of Warwick

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THE UNIVERSITY OF WARWICK

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Contents

Executive Summary

In early 2011, the University of Warwick officially launched its 2020 carbon reduction strategy. The 2020 Carbon Management Implementation Plan established the carbon reduction roadmap to meet a declared target of 34% reduction in Scopes 1 and 2 carbon emissions (against a 1990 baseline) by 2020.

Within this original plan, there was a commitment to incorporate Scope 3 indirect carbon emissions in due course. This Addendum supports the 2020 Carbon Management Implementation Plan and seeks to quantify the scale of indirect emissions arising from specific aspects of the University's activities and highlight the range of ongoing and planned management activities to mitigate their impact.

The following table summarises the calculations that have been undertaken:

Emission Source	Calculated Emission (Tonnes CO_{2e}) for 2010-11
Water	628 tonnes
International Student Travel	8,503 tonnes
Business Air Travel	2,768 tonnes
Commuting	15,799 tonnes
Waste/Recycling	3,927 tonnes
Total	**31,625 tonnes**

These indirect carbon emissions are not insignificant and although many are an inevitable consequence of the University's core business activities, a range of ongoing and future actions and initiatives to demonstrate management of these indirect carbon emissions have been identified.

As the University's carbon management strategy and carbon accounting techniques develop further, the University of Warwick will undertake further work to categorise and quantify other Scope 3 carbon emission sources and further develop plans to reduce emissions from these sources.

1. Introduction

1.1 Background

In March 2011, the University of Warwick published its 2020 Carbon Management Implementation Plan. This plan included direct Scope 1 and Scope 2 carbon emissions relating to the entire University's operation and established a roadmap to deliver the targeted reduction in carbon emissions by 2020.

The University is seeking to match the Government target of a 34% reduction against 1990 levels and is therefore committed to achieving a 60% reduction in emissions by 2020/21 compared to a 2005/6 baseline.

Within this original plan, there was a commitment to incorporate Scope 3 indirect carbon emissions in due course. The timescales for this were dependent upon the development of carbon accounting practices and the more ready availability of robust quantitative data relating to the University's operational activities.

1.2 Definitions

The terms "carbon", "carbon dioxide", "CO_2" and "CO_{2e}" are used interchangeably in this document to mean carbon dioxide gas that is emitted either directly from the fuel combustion process (such as engine exhaust fumes), or where appropriate as an equivalent for emissions of other greenhouse gases. It should be noted that over the last few years, greenhouse gas conversion factors have been revised annually (most recently in October 2011). In addition, calculation and reporting requirements (in terms of specific greenhouse gases) vary for different bodies

Through its carbon management programme, the University has identified the activities responsible for carbon emissions being released into the atmosphere. Convention divides these activities into three groups (known as "scopes"). The three scopes are:

Scope 1 (Direct emissions): Activities owned or controlled by the University that release emissions straight into the atmosphere. They are direct emissions. Examples of scope 1 emissions include emissions from combustion in owned or controlled boilers, CHP engines, vehicles; emissions from chemical production in owned or controlled process equipment.

Scope 2 (Energy indirect): Emissions being released into the atmosphere associated with the consumption of purchased electricity, heat, steam or cooling. These are indirect emissions that are a consequence of the University's activities but which occur at sources that are not owned or controlled.

Scope 3 (Other indirect): Emissions that are a consequence of the University's actions, which occur at sources which are not owned or controlled and which are not classed as scope 2 emissions. Examples of scope 3 emissions are business travel by means not owned or controlled by the University, waste disposal, water use and international student travel.

This Addendum to the 2020 Carbon Management Implementation Plan deals exclusively with Scope 3 emissions.

1.3 Purpose of the Addendum

This document provides an Addendum to the 2020 Carbon Management Implementation Plan and seeks to:

- quantify the scale of indirect emissions arising from the University's activities; and
- highlight the range of ongoing and planned management activities to mitigate the impact associated with these activities.

The Addendum considers the following indirect sources of carbon emissions:

- waste generated by the University;
- materials recycling (paper, glass, metals etc not entering the general waste stream);
- water use across the University;
- commuting (by staff and students);
- international student transfer to/from University; and
- business air travel (by staff).

Owing to the current absence of quantitative data, the following indirect sources of carbon emissions have not been included at the present time:

- suppliers' travel (for site works and goods supply);
- conference delegate travel; and
- embedded carbon of goods purchased on behalf of the University.

1.4 Process of Data Collation

The University has worked through a process in establishing robust indirect carbon emissions' data to input into this carbon management plan comprising:

- Key members of the University administration have provided quantitative data in relation to their areas of activity;
- Existing methods of capturing quantitative data have been used wherever possible – for example travel survey data, academic statistics etc; and
- Professional expertise in relation to specific areas of activity has been sought where required.

2. Carbon Management Strategy

The University of Warwick has developed its carbon management strategy in response to a range of drivers, both internal and external. These are outlined in this section and their significance discussed.

2.1 Context and drivers for carbon management

In 2005, the University of Warwick, in collaboration with the Carbon Trust, initiated its carbon management programme. Since this pioneering involvement in the Higher Education Carbon Management Programme, the University has sought to integrate low carbon considerations into its operational activities.

Over recent years, in response to the Climate Change Act 2008, HEFCE has commissioned a number of studies to quantify the scale of carbon emissions across the sector. From these studies, it has adopted a sector wide target of 43% reduction in Scope 1 and 2 carbon emissions by 2020/21 compared to 2005/6. It has also started the process of linking demonstrable carbon reduction to funding. The measuring, monitoring and reporting of emissions is integral to this.

2.2 Strategic themes

Sustainability remains a significant feature and core goal of the University Strategy, with the overall carbon reduction target constituting one of the key objectives therein. The carbon management strategy also links to other areas of policy, including energy, transport, waste, procurement, recruitment etc. Only by adopting a holistic approach to the management of this area can we realistically move towards lower carbon operations.

2.3 Existing Initiatives

At the time of publication of the 2020 Carbon Management Implementation Plan, , the University was already undertaking actions to minimize its emissions in many of these areas, setting targets as part of its overarching Environmental Policy. Some quantitative data was already available to enable the calculation of the associated carbon emissions. This was largely driven by the requirement to complete annual return as part of the Estates Management Statistics. Other areas however required processes to be set up to capture the required information and, in the intervening twelve month period, some of this work has been undertaken.

The following table provides a summary of the data that was already being collated across the University:

Emissions source	Status at March 2011
Waste generated by the University	Data available (tonnes of waste to landfill and incinerated). Waste minimisation activities have been undertaken and continue to reflect positively upon total waste volumes.
Materials recycling (paper, glass and metals not entering the general waste stream)	Data already available (tonnes of waste recycled, by material). Recycling targets have already been set and exceeded as recycling has increased and is in excess of 30%.
Indirect emissions associated with water use across the University	Data already available (m^3 water). Targets have been established to reduce relative water consumption.
Commuting (by staff and students)	A travel survey was done in 2005 and repeated in December 2010 with a high response rate. The impact of these journeys is being addressed by the Green Travel Plan through measures such as student car share, ensuring bus services cover campus, encouraging use of bikes, electric scooters and public transport. A target has been set to continue to introduce initiatives. Data relating to the transport of international students to and from the University is included in the Academic Statistics, but the environmental impact of this transport had not been quantified.
Travel (by staff)	A travel survey was done in 2005 and repeated in December 2010 with a high response rate. This had not been used together with the staff numbers to extrapolate the total number of daily commuting journeys. Data was to be made available on travel for business purposes from the approved travel suppliers. Investigations were being made to find the best way to capture information on business travel booked by individuals independently through travel expense reclaims.
Suppliers' travel (for site works and goods supply)	Data was not available for these journeys. Some work had however been undertaken, for example in the rationalisation of the stationery supply chain and waste compactor removal from across the campus to significantly reduce delivery vehicle movements onto and around the campus.
Conference delegate travel	Data was not available for these journeys.
Embedded carbon through procurement	Quantitative data relating to the goods and services procured on behalf of the University was not available.

3. Water Use

3.1 Background

The University of Warwick is aware of the direct and indirect effects associated with the water used in its day-to-day operational activities. Overall water use has been monitored, measured and reported in its Annual Energy Audit since the early 1980's. Water efficiency techniques have been deployed across the University's operation, primarily to reduce water use and consequently to make financial savings.

Severn Trent Water Ltd is responsible for supplying potable water to the University. In 2010-11, operations on the main campus consumed a total of 589,021 cubic metres of potable water. In the same period, the Wellesbourne campus consumed 15,235 cubic metres of potable water. Total potable water use across the University has therefore been calculated to be 604,256 cubic metres.

3.2 Emissions' calculation

In order to calculate Scope 3 emissions associated with the supply and treatment of water across the University, reference has been made to Annex 9 of DEFRA / DECC's GHG Conversion Factors for Company Reporting (2011).

The following carbon emission factors have been applied to the water supplied to and subsequently treated from the University:

- Water supply - 0.340 $kgCO_{2e}$ per cubic metre;
- Water treatment - 0.700 $kgCO_{2e}$ per cubic metre

The following Scope 3 total indirect greenhouse gases are therefore associated with the University's water use during academic year 2010-11:

	Volume (m^3)	**Total kg CO_{2e}**
Water supply	604,256	205,447
Water treatment	604,256	422,979
Total		**628,426**

The total indirect carbon emissions associated with the supply and treatment of water across the University of Warwick in 2010-11 was therefore **628 tonnes**.

3.3 Future Activities

As an integral part of its Environmental Policy, the University is committed to ongoing improvements in its use of water. The range of activities will include:

- Preventative maintenance of the University distribution network;
- Ongoing replacement of inefficient equipment with lower water use alternatives;
- Regular leak detection surveys;
- Logging of differential pressures and flows across the distribution network to identify anomalies;
- Completion of a water balance across the main campus to further define water distribution;
- Prioritisation of effort in worst performing areas of the University Estate.

4. Waste

4.1 Background

The University of Warwick is responsible for the production of a wide range of different waste streams. Waste volumes emanating from day to day operational activities are monitored, measured and reported annually. The figures for academic year 2010-11 have been used to estimate Scope 3 emissions arising from this source.

Although monitoring of hazardous waste and capital project-related construction waste is undertaken, these figures are not collated centrally and have not been incorporated at this stage.

4.2 Methodology

In order to calculate Scope 3 waste-related emissions, reference has been made to Annex 9 of DEFRA / DECC's GHG Conversion Factors for Company Reporting (2011). There were significant changes to the methodologies and assumptions used in deriving the emission factors between the previous (2010) and the 2011 update and, as a result, some of the factors changed significantly.

Data relating to the following waste streams, emanating from day to day operational activities, is collated centrally:

- Batteries (post consumer, non automotive)
- Glass
- Scrap Metal
- Mixed commercial and industrial waste
- Mixed municipal waste
- Paper
- Textiles
- Mixed WEEE (waste electrical and electronic equipment)
- Wood

The destinations of these materials having left the University are also recorded. With this information, it has been possible to complete Table 9d of Annex 9. The table including waste data from the University for 2010-11 is included as Appendix A.

The table is split into two halves, with the top half containing the emissions factors for different materials and treatment technologies. These are then used to calculate the emissions which are calculated in the bottom half of the table. A figure for the total net CO_{2e} emissions is produced, which can then be reported.

4.3 Emissions' calculation

The grand total net Scope 3 CO_{2e} emissions produced as a result of the operational waste and recycling activities across the University is **3,927 tonnes**.

4.4 Ongoing and Future Management

Over the last five years, the University has focused much attention on attempts to optimise its waste management processes. It has set targets to reduce the amount of waste materials emanating from its operational activity and also increase the percentage rate of recycling. During this time, the general waste volume has shown a downward trend and the recycling rate has risen from circa 22% to 35%.

The waste and recycling targets were reviewed in Autumn 2011 and now comprise:

- For the University recycling rate to exceed 50% by 2012-13; and
- To reduce waste to landfill to 5% of total "waste" produced by 2012-13.

The new operational waste and recycling contract (effective from 1st January 2012) will see even greater emphasis placed on the improvement of recycling processes across the University. A focus on the segregation of food waste and the removal of organic contaminants should enable dry mixed recycling rates to also increase. The University will continue to favour closed loop recycling over open loop recycling.

Work is also ongoing to effect front-end procurement modifications, such that the disposal of surplus materials (especially packaging) are not the University's responsibility. In specifying take-back clauses in supply contracts, it is hoped that these materials are diverted away from disposal and made available for reuse.

5. Commuting

During 2010-11, the University of Warwick employed over 4,300 members of staff and had 18,900 students (FTE). The environmental impact associated with the commuting journeys of these staff and student members to and from the University is significant. This section highlights the indirect carbon emissions associated with commuting to and from the University on a periodic (largely daily) basis.

5.1 Background

Through its planning obligations, Warwick's future strategic development depends on the successful implementation of a sustainable transport strategy and its Green Travel Plan. In terms of targets to demonstrate progress, there are a series of future modal share targets that the University must meet. Biennial comprehensive travel surveys of staff and students provide the evidence base. The original survey to support the development masterplan was undertaken by ARUP in 2005 and followed up by the same professional services consultancy in Autumn 2010.

The Autumn 2010 database provided the opportunity to estimate indirect carbon emissions associated with this travel. ARUP was therefore engaged to review the data, adopt a suitable methodology in line with industry-best practice and estimate the quantum of emissions involved. A copy of the full ARUP carbon assessment report is reproduced in Appendix B.

5.2 Methodology

A three stage methodology was developed to estimate the total carbon produced by staff and students, as a result of commuter journeys to the University:

- Stage 1 utilised the results of the 2010 survey to produce typical distances travelled by each transport mode;
- Stage 2 applied the Stage 1 results to the total staff and student populations in 2010 to produce a total annual distance travelled by each mode; and
- Stage 3 then converted the annual distance travelled to a carbon dioxide equivalent (CO_{2e}) of greenhouse gases.

Although there are inherent difficulties in the completion of such an exercise, the adopted methodology was considered as robust as could be expected and has been shown to be broadly in line with recommendations published on behalf of HEFCE in January 2012 (Measuring scope 3 carbon emissions – transport: A guide to good practice (HEFCE 2012/02)).

5.3 Emissions' Calculation

The detailed calculations undertaken to quantify total carbon emissions associated with staff and student commuting are reproduced in Appendix B. These are broken down into staff, undergraduate and postgraduate students. The results for 2010-11 showed that a total of **15,799 tonnes** of CO_{2e} was produced by staff and students commuting to the University. Per capita emissions were 1.36 tonnes for staff, 0.37 tonnes for undergraduate students and 0.79 tonnes for postgraduate students.

5.4 Ongoing and Future Management

The Green Travel Plan requirements are summarised as follows:

- Appoint Travel Co-ordinator (Completed);
- Reduce availability of car parking and increase cost (In progress);
- Encourage car sharing and improve social links across departments (In progress);
- Encourage public transport use, walking and cycling (In progress);
- Other measures - business mileage, pool vehicles, work practices (In progress).

By the end of 2010, the University had already exceeded its 2013 targets for car driver modal share (all), public transport use (all), walking (staff) and cycling (students). This bears testament to the ongoing promotion of sustainable transport alternatives and is backed up by traffic count data at key junctions in the vicinity of the main campus.

Progress against the requirements of the Green Travel Plan will continue to be regularly reported through the University's risk management and governance structures.

6. International Student Travel

This section highlights the indirect carbon emissions associated with air travel undertaken by international students to and from the UK to undertake studies at the University of Warwick.

6.1 Background

The ambition to make "every student an international student" forms an integral part of the University of Warwick's ongoing strategy. In 2010-11, approximately 34% of those students enrolling at the University were deemed to be overseas students (originating from countries outside the UK). As a consequence of this strategic aim, the University is indirectly responsible for emissions associated with the transport of these students to/from Warwick. Given the starting location of international students, this travel to/from the University for the start of the academic year and back home at the end of the year is predominantly by air.

6.2 Methodology

The International Office is largely responsible for monitoring and reporting the intake of international students to Warwick, together with their welfare whilst at the University. The country of origin of all students arriving at the University in 2010-11 is recorded in Table 2.4 of the annually-produced Academic Statistics. The figures for 2011 were used as the basis for the calculation of Scope 3 emissions associated with international student travel.

Given the current availability of data, the following assumptions were necessarily made:

- All international students travelled by air to the UK.
- UK students did not travel to the University by air;
- Each international student took a single flight to and a single flight from the UK during the academic year;
- Since information relating to the departure airport is currently not recorded, the distance calculation was based on a generic distance from the country of origin; and
- The arrival airport in the UK is Heathrow.

Using an air travel calculator, distances from countries to Heathrow were calculated for each student. These passenger air kilometres were then used to calculate indirect Scope 3 emissions using Table 6l of Annex 6 of DEFRA / DECC's GHG Conversion Factors for Company Reporting (2011).

Given the nature of the student population involved, it was considered safe to assume that the vast majority of flights would be in economy class. The passenger km distance was initially multiplied by 1.09 (9% km uplift factor) to take into account non-direct routes and then by the respective CO_{2e} emission factor for short haul international flights from European countries and long haul international flights from non-European countries. Table 6l show the following average figures:

- Short haul international (European) flights - 0.09229 $kgCO_{2e}$ per pkm
- Long haul international (non-European) flights - 0.08137 $kgCO_{2e}$ per pkm.

6.3 Emissions' Calculation

The detailed calculations undertaken to quantify total air kilometres are reproduced in Appendix C.

These calculations show that, in 2010-11, the total emission associated with international student air travel to and from the University was estimated to be **8,503 tonnes** of CO_{2e}.

6.4 Future Management

The indirect carbon emissions associated with international student travel are considered an inevitable consequence of the University's global leadership aspirations. Notwithstanding this, the University of Warwick is committed to:

- Sector-leadership in the provision of distance and online learning alternatives to traditional teaching methods;
- Awareness-raising regarding the variation in emissions associated with the fleets maintained by different airline operators.

7. Business Air Travel

This section highlights the indirect carbon emissions associated with business-related air travel undertaken by staff and some students through their work at the University of Warwick.

7.1 Background

As a leading global University, Warwick prides itself on its international connectivity. The University strategy articulates the desire "to make Warwick an international beacon by embedding internationalism into every area of the University's mission". Business travel by staff and students is an essential consequence of this strategy.

During 2008, the University conducted a tender exercise to provide the University of Warwick with travel advice and bookings. Co-operative Travel Management and Key Travel were successful in the tendering process. A stipulation of the contract award was that management information relating to the environmental impact of the travel undertaken was to be provided. As such, annual reports are now provided to the University detailing the travel bookings made and the resultant carbon emissions resulting from these bookings.

7.2 Methodology

The carbon-related management information reports for 2010-11 have been provided by both Co-op and Key. A selection of these reports is reproduced in Appendix D.

Data relating to travel booked independently by staff members (and reclaimed through expenses) and travel paid for by third parties is currently not collated centrally.

The calculations undertaken are based on data included in Table 6l of Annex 6 of DEFRA / DECC's GHG Conversion Factors for Company Reporting. The 9% km uplift factor (to take into account non-direct routes) has been applied to the distance figures and then multiplied by the respective carbon emission factor.

7.3 Emissions' Calculation

The detailed calculations undertaken to quantify total air kilometres are summarized below:

Travel Company	Total Passenger Air Kilometres Recorded	Calculated Emissions (Tonnes of CO_{2e})
Co-operative Travel Management	17,201,777	1,905 tonnes
Key Travel	7,185,256	863 tonnes
Total	24,387,033	**2,768 tonnes**

7.4 Ongoing and Future Management

Indirect carbon emissions associated with business travel are considered an inevitable consequence of the University's core business. Notwithstanding this, efforts are ongoing to reduce the requirement for staff members to travel.

A variety of communication methods are currently used to aid decision making. For example, the following information is displayed on the Purchasing Office website – "Please help reduce trips; please ensure staff travel only when necessary; where possible, travel should be avoided and video conferencing should be arranged as an alternative".

In recent years, the University has invested significantly in video conferencing and telepresence suites. In addition to five state-of-the-art videoconferencing suites, the following information is provided on the IT Services site: "Warwick is leading the way with telepresence and this service will be the first of its kind in UK higher education. The aims of providing such facilities are to significantly reduce travel expenditure and wasted time while supporting increased internal and external collaboration".

8. Conclusion

This Addendum to the 2020 Carbon Management Implementation Plan has sought to quantify the scale of indirect emissions arising from the University's activities and highlight the range of ongoing and planned management activities to mitigate the impact associated with these activities.

Using a variety of different methodologies, indirect Scope 3 carbon emissions have been estimated for a range of activities that are a consequence of the University's actions, which occur at sources which are not owned or controlled and which are not classed as Scope 2 emissions.

These indirect carbon emissions are not insignificant. Those sources considered in this report and relating to data from 2010-11 equate to a total emission of 31,625 tonnes CO_{2e}.

Through its comprehensive Environmental Policy, the University of Warwick acknowledges a responsibility for, and a commitment to, the protection of the environment at all levels. Although many of the indirect sources of carbon emissions are an inevitable consequence of the University's core business activities, a range of ongoing and future actions and initiatives to demonstrate management of these indirect carbon emissions have been identified.

As the University's carbon management strategy and carbon accounting techniques develop further, the University of Warwick will undertake further work to categorise and quantify other Scope 3 carbon emission sources and further develop plans to reduce emissions from these sources.

Appendices

Appendix I: Waste Calculation

Annex 9 - Other UK Conversion Factor Tables

Last updated:	Aug-11

Table 9d

Life-Cycle Conversion Factors for Waste Disposal	Scope 3								Additional information:		
Waste fraction	Production Emissions (avoidance excl disposal), kg CO_2e [2]	Net kg CO_2e emitted per tonne of waste treated / disposed of (including avoided impacts) by method [1]: (Preparation for) Re-use, kg CO_2e	Recycling		Energy Recovery		Composting	Landfill	Net Benefit of Recycling Versus Landfill	Net Benefit of Recycling Versus Landfill, Alternative	Recycling Open Loop (excl. avoided impacts)[6]
			Open Loop[3, 6]	Closed Loop[3]	Combustion	Anaerobic Digestion (AD)					
Aggregates (Rubble)	8		No Data	-4				0	-4		4
Batteries (Post Consumer Non Automotive)	No Data		No Data		No Data			75	-487		No Data
Books	955		No Data	-157	-529		57	580	-736		No Data
Glass	895	No Data	-197	-366	26			26	-392 (Col'r Sep'd)	-223 (Mix'd Col's)	
Metal: Aluminium cans and foil (excl forming)	9,844			-9,245	31			21	-9,267		
Metal: Mixed Cans	4,778			-3,889	31			21	-3,911		
Metal: Scrap Metal	3,169			-2,241	29			20	-2,261		
Metal: Steel Cans	2,708			-1,702	31			21	-1,723		
Mineral Oil	1,401			-725	-1,195			0	-725		
Mixed commercial and industrial waste	1,613			-1,082	-347	-50	-30	199	-1,281		
Mixed municipal waste	2,053		257	-1,679	-37	-50	-15	290	-1,969		257
Organic Waste: Food and Drink Waste	3,590				-89	-162	-39	450	-489 (Compost)	-612 (AD)	
Organic Waste: Garden Waste					-63	-119	-42	213	-255 (Compost)	-331 (AD)	
Organic Waste: Mixed Food and Garden Waste					-67	-126	-42	254	-296 (Compost)	-380 (AD)	
Paper and board: Board (Av. board: 78% corrugate, 22% cartonboard)	1,038		No Data	-240	-529		57	580	-820		798
Paper and board: Mixed (assumed 25% paper, 75% board)	1,017		No Data	-219	-529		57	580	-799		798
Paper and board: Paper	955		No Data	-157	-529		57	580	-736		798
Plasterboard	120			-67				72	-139		
Plastics: Average plastics	3,179		-282	-1,171	1,197			34	-1,205		714
Plastics: Average plastic film (incl bags)	2,591		-447	-1,042	1,057			34	-1,076		620
Plastics: Average plastic rigid (incl bottles)	3,281		-230	-1,170	1,057			34	-1,204		620
Plastics: HDPE (incl forming)	2,789		-433	-1,127	1,057			34	-1,161		620
Plastics: LDPE and LLDPE (incl forming)	2,612		-458	-1,064	1,057			34	-1,098		620
Plastics: PET (incl forming)	4,368		-187	-1,671	1,833			34	-1,705		620
Plastics: PP (incl forming)	3,254		12	-914	1,357			34	-948		620
Plastics: PS (incl forming)	4,548		368	-1,205	1,067			34	-1,240		1,957
Plastics: PVC (incl forming)	3,136		14	-854	1,833			34	-888		620
Silt / Soil	4		16		35			20	-24		16
Textiles [5]	22,310	-13,769		-13,769	600			300	-14,069		
Tyres	3,410	-2,900	23	0							31
WEEE - Fridges and Freezers	3,814	No Data	-656					17	-656		3,142
WEEE - Large	537	No Data	-1,249		No Data			17	-1,266		-712
WEEE - Mixed	1,149	No Data	-1,357		No Data			17	-1,374		-209
WEEE - Small	1,761	No Data	-1,465		No Data			17	-1,482		295
Wood	666	-599	No Data	-523	-817		285	792	-1,224		285

Annex 9 - Other UK Conversion Factor Tables

Last updated: Aug-11

Waste fraction	Total Tonnes of waste PRODUCED	Tonnes of waste treated /disposed of by method [4]:							Total Net kg CO_2e emissions by waste fraction
		(Preparation for) Re-use, kg CO_2e	Recycling		Energy Recovery		Composting	Landfill	
			Open Loop[3, 6]	Closed Loop[3]	Combustion (incl avoided impacts)	Anaerobic Digestion			
Aggregates (Rubble)	314.5		315						**2,516**
Batteries (Post Consumer Non Automotive)	11.1		11						**0**
Books									**0**
Glass	88.9			89					**46,969**
Metal: Aluminium cans and foil (excl forming)									**0**
Metal: Mixed Cans									**0**
Metal: Scrap Metal	56.8			57					**52,694**
Metal: Steel Cans									**0**
Mineral Oil	9.6			10					**6,490**
Mixed commercial and industrial waste	223.0							223	**404,076**
Mixed municipal waste	1,655.4		208	189	1,258				**3,086,904**
Organic Waste: Food and Drink Waste									**0**
Organic Waste: Garden Waste									**0**
Organic Waste: Mixed Food and Garden Waste									**0**
Paper and board: Board (Av. board: 78% corrugate, 22% cartonboard)									**0**
Paper and board: Mixed (assumed 25% paper, 75% board)									**0**
Paper and board: Paper	290.7			291					**231,979**
Plasterboard									**0**
Plastics: Average plastics									**0**
Plastics: Average plastic film (incl bags)									**0**
Plastics: Average plastic rigid (incl bottles)									**0**
Plastics: HDPE (incl forming)									**0**
Plastics: LDPE and LLDPE (incl forming)									**0**
Plastics: PET (incl forming)									**0**
Plastics: PP (incl forming)									**0**
Plastics: PS (incl forming)									**0**
Plastics: PVC (incl forming)									**0**
Silt / Soil									**0**
Textiles [5]	5.9	6							**50,394**
Tyres									**0**
WEEE - Fridges and Freezers									**0**
WEEE - Large									**0**
WEEE - Mixed	37.7	38							**43,313**
WEEE - Small									**0**
Wood	28.9	29							**1,928**
Total Net kgCO_2e emissions by category	**4,504,764**	**-98,546**	**53,513**	**-530,234**	**-46,612**	**0**	**0**	**44,377**	
Grand Total Net kgCO_2e emissions									**3,927,263**

Key

HDPE	High-density polyethylene
LDPE	Low-density polyethylene
LLDPE	Linear Low-density polyethylene
PET	Polyethylene terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
WEEE	Waste Electrical and Electronic Equipment

Sources: The life-cycle conversion factors for waste disposal were collated and developed by WRAP (2011)
More information on WRAP can be found at: http://www.wrap.org.uk/

Notes: The data summarised in the table covers the life cycle stages highlighted below. It excludes use of the product as this will be variable. For example, plastic may be used as automotive parts or as drinks packaging amongst other things. If it is used as drinks packaging it will require filling. As it is not known what the final use of the material is, this section of the life cycle is excluded for all materials. For some products forming is also excluded. Metals may be made into various products by different methods, excluded from these figures.

There have been significant changes to the methodologies and assumptions used in deriving the emission factors between the previous (2010) and the current (2011) update. As a result, some of the factors have changed significantly. Further more detailed information will be provided in the methodology paper for the 2011 update to be made available from Defra's website at: http://www.defra.gov.uk/environment/economy/business-efficiency/reporting

There are essentially zero Scope 1 emissions for waste.

[1] Impact of other treatments can be found in: http://www.defra.gov.uk/publications/files/pb13548-economic-principles-wr110613.pdf

[2] Savings from embodied fossil energy resulting from avoiding waste are the negative of these figures.

[3] Open loop recycling is the process of recycling material into other products. Closed loop recycling is the process of recycling material back into the same product.

[4] On average in the UK 88% of non-recycled waste goes to landfill and 12% goes to energy recovery (combustion).

[5] The waste production figure for textiles currently does not account for the split of material types on the UK market. Improvements will be made to this figure in future updates. Benefit of recycling and reuse is based on 60% reused, 30% recycled (replacing paper towels), 10% landfill. Of the items reused, 80% are assumed to avoid new items.

[6] For Open Loop Recycling, any calculation of impact should include the avoided raw material (e.g. if glass is used in aggregate, the impact is the open loop recycling emissions, minus the production of aggregates and any avoided waste management emissions). The figures presented in the main table include estimates resulting from avoided raw material based on the typical/average expected situation for different waste fractions.
The figures presented separately (under 'Additional Information') for *Open Loop Recycling excluding avoided impacts* have been provided for to facilitate more precise bespoke calculations (not included in these Annexes) consistent with PAS 2050 if this is required, as opposed to the default assumptions.

Annex 9 - Other UK Conversion Factor Tables

Last updated:	Aug-11

Further additional information on Life Cycle Conversion Factors for Waste Disposal:

Table 9d provides emissions factors for reporting on emissions from waste disposal. These emissions would fall into the Scope 3 emissions of a reporting company. As with all Scope 3 emissions, these are life-cycle emissions factors and therefore cannot be directly compared to Scope1 or 2 /direct emissions factors in other annexes. These figures are estimates to be used in the absence of data specific to your goods and services. If you have more accurate information for your products, then please refer to the more accurate data for reporting your emissions.

The table is split into two halves. The top half contains all the emissions factors which are used to calculate the emissions which are calculated in the bottom half of the table. The (yellow) box in the bottom right corner gives the total net CO_2 emissions which can be reported in your GHG emissions report.

It is essential that, where possible, data is used to cover both the production of the materials used by an organisation, and the waste generated by an organisation. See diagram below for the life cycle stages covered.

The first column of figures include emissions related to the materials purchased by an organisation that are subsequently transferred to the waste stream for treatment or disposal. This includes the emissions from the following life cycle stages: extraction, primary processing, manufacturing and transportation. It excludes the use phase. The first column (yellow) will automatically total the tonnes of material sent through for waste treatment or disposal and is used to calculate the emissions associated with the production of the original materials. The rest of the blue columns deal with the emissions from different waste disposal routes. Enter the tonnes of waste sent to each waste disposal stream in the relevant blue boxes. The totals are calculated in the yellow boxes.

By quantifying both material use and emissions from waste management, the benefits of waste prevention and more effective management may be estimated. If only waste management emissions are calculated, the benefit of waste prevention will not be adequately covered.

Some of the figures in table 9d are negative numbers. This is because the recycling or energy recovery process avoids the production of primary materials and combustion of fossil fuels. The figures do not include avoided emissions from alternative waste management.

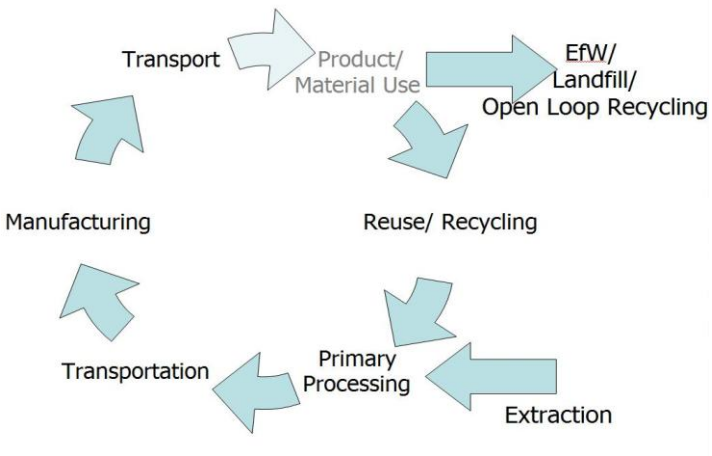
These figures should be used for site based reporting only. They should not be added together along a supply chain, as material use would be counted several times along a supply chain.

The data provided for recycling, energy recovery and landfill are based on absolute emissions for these options. Therefore, to identify the benefit of one option versus another (e.g. recycling versus landfill), the benefit is the difference between the two columns.

For further information on the factors in table 9d, please refer to the methodology paper for the 2011 update, which will be made available from:
http://www.defra.gov.uk/environment/economy/business-efficiency/reporting

A high level overview of the life cycle of materials and products is shown in figure 1 below.

Figure 1:



Appendix II: ARUP Carbon Assessment Report – Commuting

The University of Warwick

Carbon Assessment

Carbon Produced as a Result of Commuting by Staff and Students 2010

Rev A | 8 November 2011

Ove Arup & Partners Ltd
The Arup Campus
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B90 8AE
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ARUP

Contents

Appendices

Executive Summary

As part of its 2020 Carbon Management Programme, the University of Warwick commissioned Arup to undertake an initial assessment of the emissions resulting from commuting to the University by staff and students. A methodology was developed to calculate the average distances commuted by each mode using postcode and mode information from the 2010 staff and student travel survey. The results were then factored to represent the total staff and student populations of the University and a further factor applied to convert distance by mode into Green House Gas emissions of CO2E in accordance with Defra guidelines.

The results for **2010** showed that **15,799.4 metric tonnes of CO2e** in total was produced by staff and students commuting to the university. Per capita emissions were 1.36 metric tonnes for staff, 0.37 metric tonnes for undergraduate students and 0.79 metric tonnes for postgraduate students.

Future staff and student travel surveys, planned in order to measure the impact of the Travel Plan, will facilitate monitoring of GHG emissions. The 2010 travel survey data is robust and gives a good baseline for going forward and future assessments.

1 Introduction

For some years the University of Warwick (the University), along with 19 similar institutions, has been involved in a voluntary programme to consider carbon emissions resulting from its activities. In 2006, the University produced its first Carbon Management Implementation Plan which ran for 5 years from 2006-07 to 2010-11 and resulted in the successful completion of a wide variety of projects aimed at reducing the University's carbon footprint.

In January 2010, the Higher Education Funding Council for England (HEFCE) published its Statement of Policy: 'Carbon reduction target and strategy for higher education in England' and subsequently established a link between capital funding and demonstrable carbon reduction. This included a requirement for institutions to set targets for direct emissions (Scope 1) and indirect energy emissions (Scope 2). In terms of Scope 3 emissions, (indirect emissions that are a consequence of the University's actions but which occur at sources which are not owned or controlled) HEFCE has commissioned consultants to consider appropriate baselines and targets.

The University's second Carbon Management Implementation Plan, covering the period up to 2020, was launched in March 2011 and aims to reduce Scope 1 and 2 emissions by 60% (against 2005-06 levels) by 2020. The plan sets out actions to facilitate capture of information in order to incorporate Scope 3 emissions in the University's future carbon reduction programme and prepare for the likely requirement to include Scope 3 targets in future HEFCE submissions.

In July 2011 the University commissioned Arup to undertake an initial assessment of the emissions resulting from commuting to the University by staff and students.

Following this introduction;

Chapter 2 sets out the methodology followed,

Chapter 3 provides the results, and

Chapter 4 gives a summary and conclusions.

Appendices are provided at the back of the report.

2 Methodology and Analysis

2.1 Source Data

The key sources of data on which this assessment is based are:

- '2010 Staff and Student Travel Survey' (Arup, May 2011) containing details of travel mode, postcode and days travelled per week;
- Staff information comprising postcodes and numbers in Full Time Equivalents provided by the University
- Student postcode information provided by the University;
- Student numbers in Full Time Equivalents taken from the statutory accounts 2010/11; and
- '2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' (AEA, August 2011).

2.2 Methodology

A three-stage methodology has been developed to estimate the total carbon produced by staff and students as a result of commuter journeys to the University.

Stage 1 utilises the results of the 2010 survey to produce typical distances travelled by each mode.

Stage 2 then applies the Stage 1 results to the total staff and student populations in 2010 to produce a total annual distance travelled by each mode.

Stage 3 then converts the annual distance travelled to a Carbon Dioxide equivalent (CO_2e) of green house gases (GHG).

The outputs are presented in a series of tables and graphs showing GHG as CO_2e in total and disaggregated by mode and staff/students.

2.3 Key Assumptions

The key assumptions used in this assessment are listed below:

- The staff and students that responded to the 2010 travel survey are representative of the total staff and student populations in that year in terms of travel patterns;
- Walking and cycling do not produce CO2 impact in terms of commuting and have not been assessed. However, they have been retained in the survey population to maintain the correct modal shares;
- Staff and students that normally travel to the Life Sciences site at Wellesbourne are excluded as insufficient data was available;
- It is assumed that staff attend the University for 46 weeks of the year; and
- It is assumed that undergraduate and postgraduate students attend the University for 30 weeks of the year.

2.4 Utilising the 2010 Survey

The 2010 Travel Survey provided the basis for calculating the typical distance travelled by the following modes to the University:

- Car;
- Motorcycle;
- Taxi;
- Bus; and
- Rail

All road-based modes were assessed using the same methodology but a different approach was employed for rail travel in order to include the non-rail portions of the journey between home and station, and the University and station.

2.4.1 Road-based Modes Methodology

The general methodology used for all modes (excluding rail) is detailed below:

- The data was filtered to remove any incomplete data entries;
- Based on the postcodes entered in the survey, the direct distance between the home location and the University was calculated based on national grid coordinates;
- These distances were then calculated into a typical daily commute distance, factored by the number of days travelled to the University by each mode; and
- A random sample of 50 postcodes was used to generate a conversion factor of 1.46 in order to factor up the direct distance to the true driven distance.

The typical journey distance by each non-rail mode is shown in Table 1.

Table 1: Typical Daily Distance (km) Travelled by (Non –Rail) Mode

	Car	Car Share	Taxi	Motorcycle	Bus
Staff	36.4	12.9	11.0	30.4	20.8
Undergraduate Student	35.9	8.3	0.0	9.8	24.1
Postgraduate Student	38.3	7.5	0.0	0.0	16.2

2.4.2 Rail Mode Methodology

The available data does not contain information about the modes used to travel from home location to origin rail station for those who travel the majority of their commute by train. The mode used for the home to station part of the journey was estimated based on the home postcode location compared to the origin railway station. These assumptions are shown in Appendix A.

Based on these assumptions the following process was followed;

- The rail travel distance was measured between origin and destination stations (given in the survey);
- The distance from destination station to the University was calculated by mode (given in the travel survey);
- The travel distances for the various modes used for the complete journey were calculated; and
- The road based modes used for the journey to the station were factored to take into account differences between direct distance and driven distance.

The typical complete journey travel distances for rail users are shown in Table 2.

Table 2: Typical Daily Distance (km) Travelled by Mode for Rail Users

	Train	Car	Bus	Tube	Taxi
Staff	88.6	0.7	13.8	3.1	0.3
Undergraduate Student	52.8	0.0	12.7	0.0	0.0
Postgraduate Student	40.5	3.8	14.7	7.1	0.0

2.4.3 2010 Annual Distance Calculation

Following the calculation of the typical daily distance by each mode, the outputs were converted to annual distance by applying the following steps. The Full Time Equivalents of staff and student numbers provided by the University are shown in Table 3.

Table 3: 2010 Staff and Student Numbers

	2010
Staff (FTE)	**4375**
Undergraduate (FTE)	**12,392**
Postgraduate (FTE)	**6759**

The number of people who travel by each mode has been calculated based on the modal split from the travel survey. This is shown in Table 4.

Table 4: Number of people by each CO2 producing mode (ie. excludes walking & cycling)

	Car	Car share as driver or passenger	Taxi	Motorcycle	Bus	Train
Staff	2476	580	3	31	518	139
Undergraduate	1084	1207	61	20	7321	41
Postgraduate	836	563	0	0	2560	154

The figures in Table 4 are combined with Tables 1 and 2 to calculate the distance travelled by each mode for a typical day, as shown in Table 5.

Table 5: Typical Day Commuted Distance (km)

	Car	Taxi	Motorcycle	Bus	Train	Tube
Staff	97,688.20	78.60	937.80	12,675.31	12,288.32	431.63
Undergraduate	48,932.70	0.00	200.79	177,214.56	2,161.02	0.00
Postgraduate	36,879.87	0.00	0.00	43,754.22	6,223.09	1,095.37

Based on the assumption that staff attend site 46 weeks of the year and students 30 weeks of the year, the daily commuted distance has been factored to give the annual figures shown in Table 6.

Table 6: Annual Commuted Distances (km)

	Annual Total (km)					
	Car	Taxi	M/c	Bus	Train	Tube
Staff	22,468,287	18,077	215,694	2,915,321	2,826,313	99,276
Undergraduate	7,339,905	0	30,119	26,582,183	324,153	0
Postgraduate	5,531,981	0	0	6,563,133	933,463	164,306
Total	35,340,173	18,077	245,813	36,060,637	4,083,929	263,581

3 Results

3.1 Total GHG Emissions 2010

The annual commuted distances have been combined with rates in the '2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' (see Appendix B) to provide the following outputs, as shown in Table 7.

- Carbon dioxide (CO_2) - calculated as part of the direct emissions;
- Methane (CH_4) and Nitrous Oxide (N_2O) - both calculated as part of the direct emissions and expressed as CO_2e;
- Direct emissions – from the combustion of the fuel, it is assumed that these will also fall into Scope 3 as vehicles are not owned or controlled by the University. These are expressed as CO_2e;
- Indirect emissions – those associated with production, transport and retail of the fuel. These are expressed as CO_2e; and
- Grand total GHG expressed as CO_2e.

Table 7: Annual carbon outputs for staff and students 2010 (metric tonnes)

Popn	Mode	CO2 (m tonnes CO2)	CH4 (m tonnes CO2e)	N2O (m tonnes CO2e)	Total Direct GHG (m tonnes CO2e)	Total Indirect GHG (m tonnes CO2e)	Grand Total GHG (m tonnes CO2e)
Staff	Car	4,568.3	2.7	25.8	4,596.8	830.7	5,427.4
	Taxi	2.1	0.0	0.0	2.1	0.4	2.6
	M/C	25.0	0.5	0.1	25.7	4.5	30.2
	Bus	249.7	0.2	1.6	251.6	48.0	299.5
	Train	150.9	0.2	8.6	159.7	23.0	182.7
	Tube	7.3	0.0	0.0	7.3	1.0	8.3
U/G	Car	1,492.3	0.9	8.4	1,501.7	271.4	1,773.0
	Taxi	0.0	0.0	0.0	0.0	0.0	0.0
	M/C	3.5	0.1	0.0	3.6	0.6	4.2
	Bus	2,277.0	2.1	14.9	2,294.0	437.3	2,731.3
	Train	17.3	0.0	1.0	18.3	2.6	21.0
	Tube	0.0	0.0	0.0	0.0	0.0	0.0
P/G	Car	1,124.8	0.7	6.4	1,131.8	204.5	1,336.3
	Taxi	0.0	0.0	0.0	0.0	0.0	0.0
	M/C	0.0	0.0	0.0	0.0	0.0	0.0
	Bus	3,089.0	2.9	20.2	3,112.0	593.2	3,705.2
	Train	218.1	0.2	12.4	230.7	33.3	264.0
	Tube	12.0	0.0	0.1	12.1	1.6	13.7

This gives the total **GHG for commuting to the university in 2010 of 15,799.4 metric tonnes of CO2e**, as shown in Table 8.

Table 8: Total GHG emissions 2010 (metric tonnes)

Mode	Total GHG CO2e (metric tonnes)
Car	8,536.8
Taxi	2.6
Motorcycle	34.4
Bus	6,736.1
Train	467.6
Tube	22.0
Total	**15,799.4**

Figures 1, 2 and 3 show the proportion of GHG CO2e produced by the commuting of staff, undergraduate and postgraduate students.

Figure 1: Staff Commuting – Total GHG (2010)

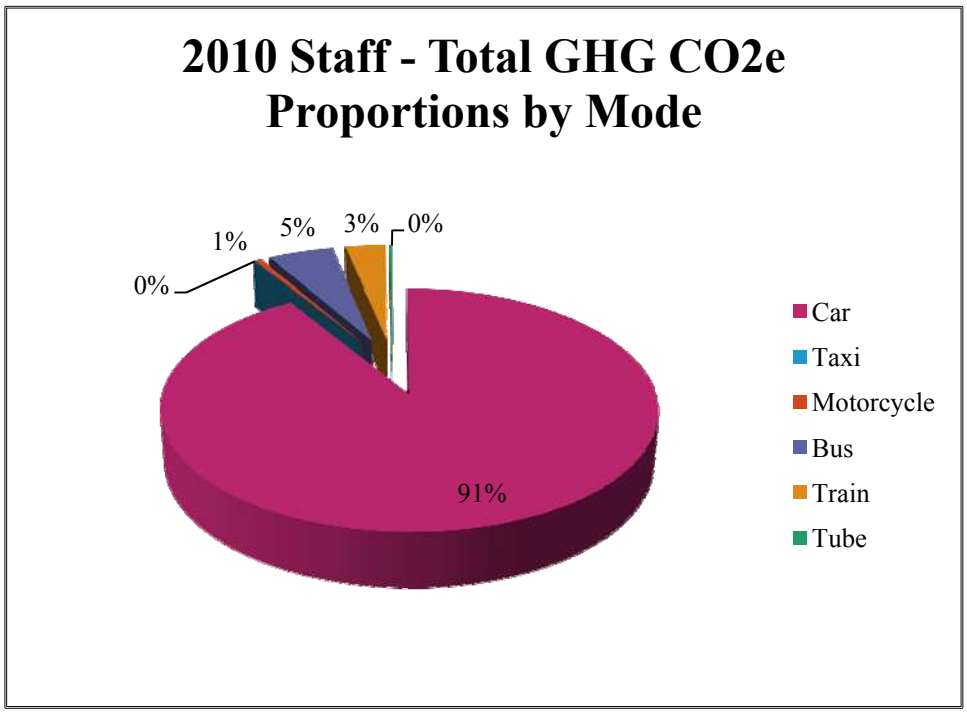


Figure 2: Undergraduate commuting – Total GHG (2010)

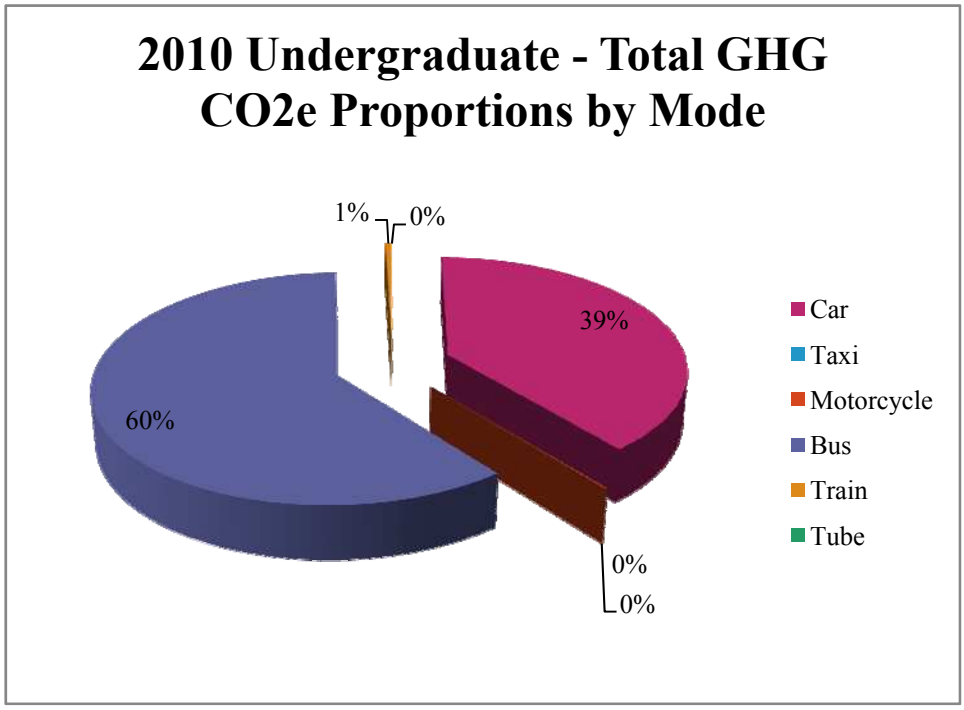
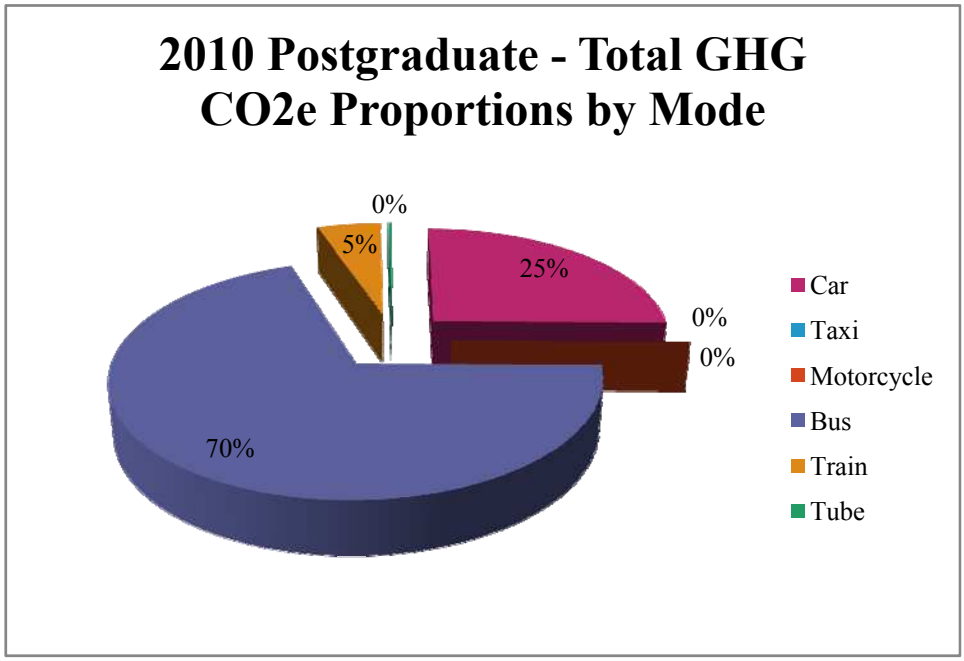


Figure 3: Postgraduate commuting – Total GHG (2010)



In summary, the major source of GHG emissions for staff comes from commuting by car. This is in contrast to undergraduate and postgraduate students where the major source of GHG emissions results from commuting by bus.

3.2 Per Capita GHG Emissions 2010

The total GHG emissions have been divided by the FTE numbers of staff, undergraduate students and postgraduate students in 2010 as shown in Table 3 to produce 2010 GHG emissions per head of population, as shown in Table 9.

Table 9: Annual per capita GHG emissions 2010 (metric tonnes)

Annual GHG CO2e per capita 2010 (metric tonnes)	
Staff	1.360186
Undergraduate Student	0.365512
Postgraduate Student	0.787046

Commuting by staff produce the largest amount of GHG emissions per head of population at 1.36 metric tonnes, followed by postgraduate students at 0.79 metric tonnes and by undergraduate students 0.37 metric tonnes. This reflects the relatively high level of car use by staff compared to the student groups.

4 Summary and Conclusions

As part of its 2020 Carbon Management Programme, the University of Warwick commissioned Arup to undertake an initial assessment of the emissions resulting from commuting to the University by staff and students. A three-stage methodology was developed:

- Stage 1 utilised the results of the 2010 staff and student travel survey to produce typical distances travelled by each mode;
- Stage 2 then applied the Stage 1 results to the total staff and student populations for 2005 and 2010 to produce a total annual distance travelled by each mode; and
- Stage 3 then converted the annual distance travelled to a Carbon Dioxide equivalent (CO_2e) of green house gases (GHG).

The results for **2010** showed that **15,799.4 metric tonnes of CO2e** in total was produced by staff and students commuting to the university. Per capita emissions were 1.36 metric tonnes for staff, 0.37 metric tonnes for undergraduate students and 0.79 metric tonnes for postgraduate students.

Future staff and student travel surveys, planned in order to measure the impact of the Travel Plan, will facilitate monitoring of GHG emissions. The 2010 travel survey data is robust and gives a good baseline for going forward and future assessments.

Appendix A

Rail - Journey to Origin Station Mode Assumptions

Respondent ID	Origin Station	Mode for 1st leg of journey
1246579034	London	Tube
1246521283	London	Tube
1246510257	New Street	Bus
1245162769	Derby	Bus
1245009106	Rugby	Cycle
1244908676	London	Tube
1244901140	London	Tube
1244899093	New Street	Bus
1244898723	Rugby	Cycle
1243658619	Banbury	Cycle
1241370960	Leicester	Walk
1241008690	New Street	Bus
1240953962	Long Eaton	Car
1238558414	Oxford	Cycle
1238554192	Bedworth	Cycle
1237147971	New Street	Bus
1235751538	New Street	Bus
1234596839	Reading	Bus
1234498535	London	Tube
1234322532	London	Cycle
1234101361	New Street	bus
1233236406	London	Tube
1244937811	New Street	Bus
1242301652	New Street	Bus
1237739913	London	Tube
1237729093	Leicester	Cycle
1233070113	London	Tube
1248621108	New Street	Bus
1246199971	New Street	bus
1244911902	New Street	Cycle
1244895930	New Street	bus
1238551053	New Street	Bus
1237443043	Rugby	Walk
1237184017	New Street	Bus
1235691184	New Street	Bus
1234258528	New Street	Bus
1234159745	New Street	Bus
1233545767	New Street	Bus
1233161795	New Street	Bus
1233046469	New Street	Cycle
1242564519	New Street	Cycle
1238633889	Berkswell	Car
1236526980	Derby	Cycle
1233216288	Bedworth	Car
1235479028	Leamington Spa	Bus
1240934508	Oxford	Bus
1245689984	Paddington	Tube
1243601606	Bicester	Car
1241461600	Oxford	Bus
1233653727	Oxford	Bus
1235445052	Leamington Spa	Car

Appendix B

2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting

Annex 6 - Passenger Transport Conversion Tables

Last updated:	Jun-11

How to use this Annex

Emissions can be calculated *either* from fuel use (see Table 6a), which is the most accurate method of calculation, or estimated from *distance* travelled using UK average emission factors for different modes of transport (other Tables 6b - 6j). For public transport (Tables 6k and 6l) emissions are presented per passenger, rather than per vehicle. Therefore enter *passenger kilometres travelled* to calculate emissions (e.g. if one person travels 500km, then *passenger kilometres travelled* are 500. If three people travel the same distance *passenger kilometres travelled* are 1500).

Simply multiply activity (either fuel used, kilometres travelled or passenger kilometres travelled) by the appropriate conversion factor. An excel spreadsheet is provided for ease of use at http://www.defra.gov.uk/environment/economy/business-efficiency/reporting

Annex 6 Scopes & Boundaries:

Scope 1: Direct emissions of CO_2, CH_4 and N_2O from the combustion of fuel from owned/controlled transport.

Scope 3: Indirect emissions associated with the extraction and transport of primary fuels as well as the refining, distribution, storage and retail of finished fuels. Emission factors are based on data from the JEC Well-To-Wheels study, for further information see:
http://ies.jrc.ec.europa.eu/jec-research-collaboration/about-jec.html

Scope 1 OR Scope 3: Direct emissions from transport can fall into either Scope 1 or Scope 3, depending on the vehicle ownership/level of control. For vehicles owned or directly controlled by a reporting company, direct emissions should be reported under Scope 1. However, emissions resulting from transport-related activities in vehicles not owned or controlled by the reporting entity should be reported under Scope 3. Examples of direct emissions from passenger transport that would be reported under Scope 3 include:

- Employee business travel by non-owned means, i.e. public transport such as: bus, rail, ferry and taxi and air travel (except for the companies actually owning/controlling the fleet / operating the services);
- Employees commuting to and from work;

In general it is recommended that the 'control' approach is used in order to decide whether to report emissions as Scope 1 or Scope 3. The control approach is itself divided into two methods – financial and operational (where the financial control approach is the one most commonly recommended).

- A company has financial control over an operation if the company has the ability to direct the financial and operating policies of the operation with a view to gaining economic benefits from its activities.
- A company has operational control over an operation if the company or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation.

In the transport sector, 'open book accounts' provide a very good illustration of the financial and operational control methods. In the case of an open book account, a transport operator provides vehicles to a customer, but the customer pays the fuel bill for those vehicles directly, rather than simply paying the transport operator for the logistics service.
In the open book situation, the customer has financial control, but the transport operator has operational control. The customer and the transport operator will have to decide whether the emissions resulting from these transport operations are the customer's or the transport operator's Scope 1. Whichever method is used, it is very important that it is clearly stated in all reporting, and that it is consistently applied by both organisations.

A further consideration is the treatment of leased assets (e.g. vehicles), which depends on the organisational boundaries set and the control approach.
Further information on scopes, control and leased assets is available in the introduction to these Annexes, and from Defra's website in the guidance on reporting at:
http://www.defra.gov.uk/environment/economy/business-efficiency/reporting
OR from the Greenhouse Gas Protocol's website at:
http://www.ghgprotocol.org/standards/corporate-standard

How do I determine UK rail travel distances (in miles) where start and destination stations are known?

1. Click on web link: http://www.networkrail.co.uk/aspx/3828.aspx
2. Select the Route Index under Train Timetables
3. Use your mouse cursor to click on the appropriate train route in the 'Table' column that matches your starting and destination stations. This should open a corresponding timetable with rail distances.
4. In the timetable, refer to the 'Miles' columns on the left to determine mileage between your starting and destination stations.

How were these factors calculated?

For further explanation on how these emission factors have been derived, please refer to the GHG conversion factor methodology paper available here:
http://www.defra.gov.uk/environment/economy/business-efficiency/reporting

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6a

Standard Road Transport Fuel Conversion Factors

Fuel used*	Total units used	Units	x	Scope 1 OR Scope 3: kg CO_2 per unit	kg CH_4 per unit	kg N_2O per unit	Total Direct GHG: kg CO_2e per unit	Scope 3 Total Indirect GHG: kg CO_2e per unit	All Scopes Grand Total GHG: kg CO_2e per unit	Total kg CO_2	Total kg CH_4	Total kg N_2O	Total Direct GHG: Total kg CO_2e	Scope 3 Total Indirect GHG: Total kg CO_2e	All Scopes Grand Total GHG: Total kg CO_2e
Petrol (retail station biofuel blend)		litres		2.2352	0.0034	0.0064	2.2450	0.4220	2.6670						
Petrol (100% mineral petrol)		litres		2.3018	0.0034	0.0065	2.3117	0.4110	2.7227						
Diesel (retail station biofuel blend)		litres		2.5530	0.0012	0.0183	2.5725	0.5348	3.1073						
Diesel (100% mineral diesel)		litres		2.6480	0.0012	0.0184	2.6676	0.5085	3.1761						
Compressed Natural Gas (CNG)		kg		2.7020	0.0040	0.0016	2.7076	0.3988	3.1064						
Liquid Petroleum Gas (LPG)		litres		1.4884	0.0010	0.0023	1.4918	0.1868	1.6786						
Total										**0**	**0**	**0**	**0**	**0**	**0**

Sources

UK Greenhouse Gas Inventory for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/
Digest of UK Energy Statistics 2010 (DECC), available at:
http://www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx
Carbon factors for fuels (UKPIA, 2004)

Notes

1 imperial gallon (UK) = 4.546 litres
Emission factors for petrol and diesel from public refuelling stations have been estimated based on information from the most recent reporting on the Renewable Transport Fuels Obligation (RTFO). See Annex 1 for more detailed information.
* **Note:** *In the UK biofuels are added to virtually all of the transport fuel sold by filling stations (and by most fuel wholesalers) and this has the effect of slightly reducing the greenhouse gas emissions of the fuel. This is reflected in the emission factors above. For fuel purchased at filling stations you should use the factor labelled "retail station biofuel blend". If you are purchasing pure petrol or diesel which you know has* ***not*** *been blended with biofuels then you should use the factor labelled "100% mineral fuel".*

Table 6b

Passenger Road Transport Conversion Factors: Petrol Cars

Size of car	Total units travelled	Units	x	Scope 1 OR Scope 3: kg CO_2 per unit	kg CH_4 per unit	kg N_2O per unit	Total Direct GHG: kg CO_2e per unit	Scope 3 Total Indirect GHG: kg CO_2e per unit	All Scopes Grand Total GHG: kg CO_2e per unit	Total kg CO_2	Total kg CH_4	Total kg N_2O	Total Direct GHG: Total kg CO_2e	Scope 3 Total Indirect GHG: Total kg CO_2e	All Scopes Grand Total GHG: Total kg CO_2e
Small petrol car, up to 1.4 litre engine		miles	x	0.27378	0.00026	0.00135	0.27539	0.04888	0.32427						
		km	x	0.17012	0.00016	0.00084	0.17112	0.03037	0.20149						
Medium petrol car, from 1.4 - 2.0 litres		miles	x	0.33972	0.00026	0.00135	0.34133	0.06066	0.40199						
		km	x	0.21109	0.00016	0.00084	0.21209	0.03769	0.24978						
Large petrol cars, above 2.0 litres		miles	x	0.47970	0.00026	0.00135	0.48131	0.08563	0.56694						
		km	x	0.29807	0.00016	0.00084	0.29907	0.05321	0.35228						
Average petrol car		miles	x	0.33416	0.00026	0.00135	0.33577	0.05966	0.39543						
		km	x	0.20764	0.00016	0.00084	0.20864	0.03707	0.24571						
Total for petrol cars										**0**	**0**	**0**	**0**	**0**	**0**

Table 6c

Passenger Road Transport Conversion Factors: Diesel Cars

Size of car	Total units travelled	Units	x	Scope 1 OR Scope 3: kg CO_2 per unit	kg CH_4 per unit	kg N_2O per unit	Total Direct GHG: kg CO_2e per unit	Scope 3 Total Indirect GHG: kg CO_2e per unit	All Scopes Grand Total GHG: kg CO_2e per unit	Total kg CO_2	Total kg CH_4	Total kg N_2O	Total Direct GHG: Total kg CO_2e	Scope 3 Total Indirect GHG: Total kg CO_2e	All Scopes Grand Total GHG: Total kg CO_2e
Small diesel car, up to 1.7 litre or under		miles	x	0.23064	0.00008	0.00269	0.23340	0.04424	0.27764						
		km	x	0.14331	0.00005	0.00167	0.14503	0.02749	0.17252						
Medium diesel car, from 1.7 to 2.0 litre		miles	x	0.28844	0.00008	0.00269	0.29121	0.05535	0.34656						
		km	x	0.17923	0.00005	0.00167	0.18095	0.03439	0.21534						
Large diesel car, over 2.0 litre		miles	x	0.38877	0.00008	0.00269	0.39154	0.07459	0.46613						
		km	x	0.24157	0.00005	0.00167	0.24329	0.04635	0.28964						
Average diesel car		miles	x	0.30870	0.00008	0.00269	0.31147	0.05922	0.37069						
		km	x	0.19182	0.00005	0.00167	0.19354	0.03680	0.23034						
Total for diesel cars										**0**	**0**	**0**	**0**	**0**	**0**

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6d

Passenger Road Transport Conversion Factors: Alternative Fuel Cars

Type of alternative fuel car	Total units travelled	Units	x	Scope 1 OR Scope 3: CO_2 kg CO_2 per unit	CH_4 kg CO_2e per unit	N_2O kg CO_2e per unit	Total Direct GHG kg CO_2e per unit	Scope 3 Total Indirect GHG kg CO_2e per unit	All Scopes Grand Total GHG kg CO_2e per unit	Scope 1 OR Scope 3: CO_2 Total kg CO_2	CH_4 Total kg CO_2e	N_2O Total kg CO_2e	Total Direct GHG Total kg CO_2e	Scope 3 Total Indirect GHG Total kg CO_2e	All Scopes Grand Total GHG Total kg CO_2e
Medium petrol hybrid car		miles	x	0.18870	0.00014	0.00135	0.19019	0.03370	0.22389						
		km	x	0.11725	0.00009	0.00084	0.11818	0.02094	0.13912						
Large petrol hybrid car		miles	x	0.33722	0.00018	0.00135	0.33875	0.06021	0.39896						
		km	x	0.20954	0.00011	0.00084	0.21049	0.03741	0.24790						
Average petrol hybrid car		miles	x	0.22217	0.00017	0.00135	0.22370	0.03967	0.26337						
		km	x	0.13805	0.00011	0.00084	0.13900	0.02465	0.16365						
Medium LPG car		miles	x	0.30574	0.00055	0.00185	0.30814	0.03829	0.34643						
		km	x	0.18998	0.00034	0.00115	0.19147	0.02379	0.21526						
Large LPG car		miles	x	0.43172	0.00055	0.00185	0.43412	0.05406	0.48818						
		km	x	0.26826	0.00034	0.00115	0.26975	0.03359	0.30334						
Average LPG car		miles	x	0.34049	0.00055	0.00185	0.34289	0.04263	0.38552						
		km	x	0.21157	0.00034	0.00115	0.21306	0.02649	0.23955						
Medium CNG car		miles	x	0.27177	0.00129	0.00185	0.27491	0.03985	0.31476						
		km	x	0.16887	0.00080	0.00115	0.17082	0.02476	0.19558						
Large CNG car		miles	x	0.38375	0.00129	0.00185	0.38689	0.05626	0.44315						
		km	x	0.23845	0.00080	0.00115	0.24040	0.03496	0.27536						
Average CNG car		miles	x	0.30265	0.00129	0.00185	0.30579	0.04437	0.35016						
		km	x	0.18806	0.00080	0.00115	0.19001	0.02757	0.21758						
Total for alternative fuel cars										0	0	0	0	0	0

Table 6e

Passenger Road Transport Conversion Factors: Cars (unknown fuel)

Size of car	Total units travelled	Units	x	Scope 1 OR Scope 3: CO_2 kg CO_2 per unit	CH_4 kg CO_2e per unit	N_2O kg CO_2e per unit	Total Direct GHG kg CO_2e per unit	Scope 3 Total Indirect GHG kg CO_2e per unit	All Scopes Grand Total GHG kg CO_2e per unit	Scope 1 OR Scope 3: CO_2 Total kg CO_2	CH_4 Total kg CO_2e	N_2O Total kg CO_2e	Total Direct GHG Total kg CO_2e	Scope 3 Total Indirect GHG Total kg CO_2e	All Scopes Grand Total GHG Total kg CO_2e
Average small car (unknown fuel)		miles	x	0.26659	0.00023	0.00166	0.26847	0.04781	0.31628						
		km	x	0.16565	0.00014	0.00103	0.16682	0.02971	0.19653						
Average medium car (unknown fuel)		miles	x	0.32224	0.00019	0.00187	0.32430	0.05863	0.38293						
		km	x	0.20023	0.00012	0.00116	0.20151	0.03643	0.23794						
Average large car (unknown fuel)		miles	x	0.43129	0.00016	0.00211	0.43356	0.07936	0.51292						
		km	x	0.26799	0.00010	0.00131	0.26940	0.04931	0.31871						
Average car (unknown fuel)		miles	x	0.32721	0.00019	0.00185	0.32926	0.05950	0.38876						
		km	x	0.20332	0.00012	0.00115	0.20459	0.03697	0.24156						
Total for average cars										0	0	0	0	0	0

Sources: Factors developed by AEA and agreed with Department for Transport (2011)

Notes: These factors are estimated average values for the UK car fleet in 2010 travelling on average trips in the UK. They are calculated based on data from SMMT on new car CO_2 emissions from 1998 to 2010 combined with factors from TRL as functions of average speed of vehicle derived from test data under real world testing cycles and an uplift of 15% agreed with DfT to take into account further real-world driving effects on emissions relative to test-cycle based data. Further work is ongoing to understand this uplift in more detail and revise it if necessary in the future.

According to the Energy Saving Trust (EST), LPG and CNG cars results in 10-15% reduction in CO_2 relative to petrol cars, similar to diesel vehicles. New factors for LPG and CNG cars were calculated based on an average 12.5% reduction in CO_2 emissions relative to the emission factors for petrol cars from Table 6b. Due to the significant size and weight of the LPG and CNG fuel tanks only medium and large sized vehicles are available.

Real world effects not covered in regular test cycles include use of accessories (air conditioning, lights, heaters, etc), vehicle payload (only driver +25kg is considered in tests, no passengers or further luggage), poor maintenance (tyre under inflation, maladjusted tracking, etc), gradients (tests effectively assume a level road), weather, harsher driving style, etc.

More accurate calculation of emissions can be made using the actual fuel consumed, where available, and the emission factors in Table 6a. Alternatively if a figure for a specific car's fuel consumption (e.g. in miles per gallon, mpg) is known, then the CO_2 can be calculated from the total mileage and the Table 6a factors.

Emission factors for CH_4 and N_2O are based on UK Greenhouse Gas Inventory values for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6f

Passenger Road Transport Conversion Factors: Petrol Cars by Market Segment

Market segment of car	Total units travelled	Units	x	Scope 1 OR Scope 3: kg CO_2 per unit	kg CH_4 per unit	kg N_2O per unit	Total Direct GHG: kg CO_2e per unit	Scope 3 Total Indirect GHG: kg CO_2e per unit	All Scopes Grand Total GHG: kg CO_2e per unit	Scope 1 OR Scope 3: Total kg CO_2	Total kg CH_4	Total kg N_2O	Total Direct GHG: Total kg CO_2e	Scope 3 Total Indirect GHG: Total kg CO_2e	All Scopes Grand Total GHG: Total kg CO_2e
A. Mini		miles	x	0.25233	0.00026	0.00135	0.25394	0.04506	0.29900						
		km	x	0.15679	0.00016	0.00084	0.15779	0.02800	0.18579						
B. Supermini		miles	x	0.27357	0.00026	0.00135	0.27518	0.04884	0.32403						
		km	x	0.16999	0.00016	0.00084	0.17099	0.03035	0.20134						
C. Lower Medium		miles	x	0.32272	0.00026	0.00135	0.32433	0.05763	0.38196						
		km	x	0.20053	0.00016	0.00084	0.20153	0.03581	0.23734						
D. Upper Medium		miles	x	0.36799	0.00026	0.00135	0.36960	0.06571	0.43531						
		km	x	0.22866	0.00016	0.00084	0.22966	0.04083	0.27049						
E. Executive		miles	x	0.43559	0.00026	0.00135	0.43719	0.07778	0.51497						
		km	x	0.27066	0.00016	0.00084	0.27166	0.04833	0.31999						
F. Luxury		miles	x	0.55593	0.00026	0.00135	0.55754	0.09926	0.65681						
		km	x	0.34544	0.00016	0.00084	0.34644	0.06168	0.40812						
G. Sports		miles	x	0.40950	0.00026	0.00135	0.41111	0.07311	0.48422						
		km	x	0.25445	0.00016	0.00084	0.25545	0.04543	0.30088						
H. Dual Purpose 4x4		miles	x	0.46006	0.00026	0.00135	0.46167	0.08214	0.54381						
		km	x	0.28587	0.00016	0.00084	0.28687	0.05104	0.33791						
I. MPV		miles	x	0.37091	0.00026	0.00135	0.37251	0.06622	0.43874						
		km	x	0.23047	0.00016	0.00084	0.23147	0.04115	0.27262						
Total for petrol cars										0	0	0	0	0	0

Table 6g

Passenger Road Transport Conversion Factors: Diesel Cars by Market Segment

Market segment of car	Total units travelled	Units	x	Scope 1 OR Scope 3: kg CO_2 per unit	kg CH_4 per unit	kg N_2O per unit	Total Direct GHG: kg CO_2e per unit	Scope 3 Total Indirect GHG: kg CO_2e per unit	All Scopes Grand Total GHG: kg CO_2e per unit	Scope 1 OR Scope 3: Total kg CO_2	Total kg CH_4	Total kg N_2O	Total Direct GHG: Total kg CO_2e	Scope 3 Total Indirect GHG: Total kg CO_2e	All Scopes Grand Total GHG: Total kg CO_2e
A. Mini		miles	x	0.16620	0.00008	0.00269	0.16897	0.03191	0.20088						
		km	x	0.10327	0.00005	0.00167	0.10499	0.01983	0.12482						
B. Supermini		miles	x	0.22845	0.00008	0.00269	0.23121	0.04387	0.27509						
		km	x	0.14195	0.00005	0.00167	0.14367	0.02726	0.17093						
C. Lower Medium		miles	x	0.26207	0.00008	0.00269	0.26483	0.05032	0.31516						
		km	x	0.16284	0.00005	0.00167	0.16456	0.03127	0.19583						
D. Upper Medium		miles	x	0.28868	0.00008	0.00269	0.29145	0.05544	0.34689						
		km	x	0.17938	0.00005	0.00167	0.18110	0.03445	0.21555						
E. Executive		miles	x	0.33993	0.00008	0.00269	0.34269	0.06527	0.40797						
		km	x	0.21122	0.00005	0.00167	0.21294	0.04056	0.25350						
F. Luxury		miles	x	0.40069	0.00008	0.00269	0.40346	0.07694	0.48041						
		km	x	0.24898	0.00005	0.00167	0.25070	0.04781	0.29851						
G. Sports		miles	x	0.27933	0.00008	0.00269	0.28210	0.05364	0.33574						
		km	x	0.17357	0.00005	0.00167	0.17529	0.03333	0.20862						
H. Dual Purpose 4x4		miles	x	0.42467	0.00008	0.00269	0.42744	0.08155	0.50899						
		km	x	0.26388	0.00005	0.00167	0.26560	0.05067	0.31627						
I. MPV		miles	x	0.32932	0.00008	0.00269	0.33209	0.06325	0.39534						
		km	x	0.20463	0.00005	0.00167	0.20635	0.03930	0.24565						
Total for diesel cars										0	0	0	0	0	0

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6h

Passenger Road Transport Conversion Factors: Cars (unknown fuel) by Market Segment				Scope 1 OR Scope 3				Scope 3	All Scopes	Scope 1 OR Scope 3				Scope 3	All Scopes
				CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG	CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG
Market segment of car	Total units travelled	Units	x	kg CO_2 per unit	kg CO_2e per unit	kg CO_2e per unit	kg CO_2e per unit	kg CO_2e per unit	kg CO_2e per unit	Total kg CO_2	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e
A. Mini		miles	x	0.25112	0.00024	0.00145	0.25281	0.04406	0.29688						
		km	x	0.15604	0.00015	0.00090	0.15709	0.02738	0.18447						
B. Supermini		miles	x	0.26866	0.00023	0.00166	0.27055	0.04772	0.31826						
		km	x	0.16694	0.00014	0.00103	0.16811	0.02965	0.19776						
C. Lower Medium		miles	x	0.30397	0.00021	0.00175	0.30594	0.05539	0.36133						
		km	x	0.18888	0.00013	0.00109	0.19010	0.03442	0.22452						
D. Upper Medium		miles	x	0.33143	0.00019	0.00187	0.33349	0.06177	0.39525						
		km	x	0.20594	0.00012	0.00116	0.20722	0.03838	0.24560						
E. Executive		miles	x	0.38945	0.00016	0.00211	0.39171	0.07068	0.46240						
		km	x	0.24199	0.00010	0.00131	0.24340	0.04392	0.28732						
F. Luxury		miles	x	0.51336	0.00016	0.00211	0.51563	0.08658	0.60222						
		km	x	0.31899	0.00010	0.00131	0.32040	0.05380	0.37420						
G. Sports		miles	x	0.40472	0.00016	0.00211	0.40699	0.06206	0.46904						
		km	x	0.25148	0.00010	0.00131	0.25289	0.03856	0.29145						
H. Dual Purpose 4x4		miles	x	0.43787	0.00016	0.00211	0.44014	0.08180	0.52194						
		km	x	0.27208	0.00010	0.00131	0.27349	0.05083	0.32432						
I. MPV		miles	x	0.34828	0.00018	0.00198	0.35043	0.06481	0.41524						
		km	x	0.21641	0.00011	0.00123	0.21775	0.04027	0.25802						
Total for cars (unknown fuel)										0	0	0	0	0	0

Sources: Factors developed by AEA and agreed with Department for Transport (2011)

Notes: The market segment categories are the standard segments as defined by SMMT (UK Society of Motor Manufacturers and Traders). These factors are estimated average values for the UK car fleet in 2010 travelling on average trips in the UK. They are calculated based on data from SMMT on new car CO_2 emissions from 1998 to 2010 by SMMT. An uplift of 15% agreed with DfT to take into account further real-world driving effects on emissions relative to test-cycle based data (as under Tables 6b-6e). Further work is ongoing to understand this uplift in more detail and revise it if necessary in the future.

There is a substantial variation in emission factors across market classes due to significant variations in engine size and vehicle weight. The Department for Transport considers the emission factors by fuel and engine size to often be a closer match to actual emissions. It is preferable to use the emission factors by engine size provided in Tables 6b and 6c over the market class based factors where possible.

More accurate calculation of emissions can be made using the actual fuel consumed, where available, and the emission factors in Table 6a. Alternatively if a figure for a specific car's fuel consumption (e.g. in miles per gallon, mpg) is known, then the CO_2 can be calculated from the total mileage and the Table 6a factors.

Emission factors for CH_4 and N_2O are based on UK Greenhouse Gas Inventory values for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/

Annex 6 - Passenger Transport Conversion Tables

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Table 6i

Passenger Road Transport Conversion Factors: Vans (Light Commercial Vehicles)

Type of van	Total units travelled	Units	x	Scope 1 OR Scope 3: CO_2 kg CO_2 per unit	Scope 1 OR Scope 3: CH_4 kg CO_2e per unit	Scope 1 OR Scope 3: N_2O kg CO_2e per unit	Scope 1 OR Scope 3: Total Direct GHG kg CO_2e per unit	Scope 3 Total Indirect GHG kg CO_2e per unit	All Scopes Grand Total GHG kg CO_2e per unit	Scope 1 OR Scope 3: CO_2 Total kg CO_2	Scope 1 OR Scope 3: CH_4 Total kg CO_2e	Scope 1 OR Scope 3: N_2O Total kg CO_2e	Scope 1 OR Scope 3: Total Direct GHG Total kg CO_2e	Scope 3 Total Indirect GHG Total kg CO_2e	All Scopes Grand Total GHG Total kg CO_2e
Petrol van (Class I), up to 1.305 tonne		miles	x	0.32292	0.00052	0.00204	0.32548	0.06251	0.38799						
		km	x	0.20065	0.00032	0.00127	0.20225	0.03884	0.24109						
Petrol van (Class II), 1.305 to 1.74 tonne		miles	x	0.33980	0.00052	0.00204	0.34236	0.06574	0.40810						
		km	x	0.21114	0.00032	0.00127	0.21273	0.04085	0.25358						
Petrol van (Class III), 1.74 to 3.5 tonne		miles	x	0.41326	0.00057	0.00458	0.41842	0.08035	0.49877						
		km	x	0.25679	0.00035	0.00285	0.25999	0.04993	0.30992						
Petrol van up to 3.5 tonne		miles	x	0.34287	0.00052	0.00237	0.34577	0.06640	0.41217						
		km	x	0.21305	0.00033	0.00148	0.21485	0.04126	0.25611						
Diesel van (Class I), up to 1.305 tonne		miles	x	0.25049	0.00009	0.00173	0.25232	0.04846	0.30078						
		km	x	0.15565	0.00006	0.00108	0.15678	0.03011	0.18689						
Diesel van (Class II), 1.305 to 1.74 tonne		miles	x	0.36201	0.00009	0.00250	0.36460	0.07002	0.43462						
		km	x	0.22494	0.00006	0.00155	0.22655	0.04351	0.27006						
Diesel van (Class III), 1.74 to 3.5 tonne		miles	x	0.43163	0.00009	0.00298	0.43470	0.08348	0.51818						
		km	x	0.26820	0.00006	0.00185	0.27011	0.05187	0.32198						
Diesel van up to 3.5 tonne		miles	x	0.40252	0.00009	0.00278	0.40539	0.07784	0.48323						
		km	x	0.25011	0.00006	0.00173	0.25190	0.04837	0.30027						
LPG van up to 3.5 tonne		miles	x	0.42265	0.00111	0.00325	0.42701	0.05359	0.48060						
		km	x	0.26262	0.00069	0.00202	0.26533	0.03330	0.29863						
CNG van up to 3.5 tonne		miles	x	0.38239	0.00262	0.00325	0.38826	0.05731	0.44557						
		km	x	0.23761	0.00163	0.00202	0.24126	0.03561	0.27687						
Average van up to 3.5 tonne		miles	x	0.39882	0.00012	0.00276	0.40169	0.07714	0.47883						
		km	x	0.24781	0.00007	0.00171	0.24960	0.04793	0.29753						
Total for vans										0	0	0	0	0	0

Sources: Factors developed by AEA and agreed with Department for Transport (2011)

Notes: Emission factors for petrol and diesel light good vehicles (vans up to 3.5 tonnes) were calculated based on the new emission factors used in the National Atmospheric Emissions Inventory (NAEI) and Greenhouse Gas Inventory for 2009 (AEA, 2011). These test cycle based emission factors were then uplifted by 15% to represent 'real-world' emissions, consistent with the approach used for cars agreed with DfT. Emission factors for LPG and CNG vans were estimated to be similar to diesel vehicles, as indicated by EST for cars. The average van emission factor was calculated on the basis of the relative NAEI vehicle km for petrol and diesel LGVs for 2009.

Emission factors for CH_4 and N_2O are based on UK Greenhouse Gas Inventory values for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/

Table 6j

Passenger Road Transport Conversion Factors: Motorcycles

Size of motorcycle	Total units travelled	Units	x	Scope 1 OR Scope 3: CO_2 kg CO_2 per unit	Scope 1 OR Scope 3: CH_4 kg CO_2e per unit	Scope 1 OR Scope 3: N_2O kg CO_2e per unit	Scope 1 OR Scope 3: Total Direct GHG kg CO_2e per unit	Scope 3 Total Indirect GHG kg CO_2e per unit	All Scopes Grand Total GHG kg CO_2e per unit	Scope 1 OR Scope 3: CO_2 Total kg CO_2	Scope 1 OR Scope 3: CH_4 Total kg CO_2e	Scope 1 OR Scope 3: N_2O Total kg CO_2e	Scope 1 OR Scope 3: Total Direct GHG Total kg CO_2e	Scope 3 Total Indirect GHG Total kg CO_2e	All Scopes Grand Total GHG Total kg CO_2e
Small petrol motorbike (mopeds/scooters up to 125cc)		miles	x	0.13678	0.00393	0.00058	0.14128	0.02443	0.16571						
		km	x	0.08499	0.00244	0.00036	0.08779	0.01518	0.10297						
Medium petrol motorbike (125-500cc)		miles	x	0.16602	0.00436	0.00100	0.17138	0.02964	0.20102						
		km	x	0.10316	0.00271	0.00062	0.10649	0.01842	0.12491						
Large petrol motorbike (over 500cc)		miles	x	0.22087	0.00332	0.00100	0.22518	0.03945	0.26463						
		km	x	0.13724	0.00206	0.00062	0.13992	0.02451	0.16443						
Average petrol motorbike (unknown engine size)		miles	x	0.18678	0.00396	0.00097	0.19171	0.03335	0.22506						
		km	x	0.11606	0.00246	0.00060	0.11912	0.02072	0.13984						
Total for motorcycles										0	0	0	0	0	0

Sources: Factors developed by AEA and agreed with Department for Transport (2011)

Notes: These factors are based on calculations of average emissions data by size category, based data provided by Clear (http://www.clear-offset.com) of almost 1200 datapoints, over 300 different bikes from 50-1500cc, and from 25 manufacturers from a mix of magazine road test reports and user reported data.

More accurate calculation of emissions can be made using the actual fuel consumed, where available, and the emission factors in Table 5a. Alternatively if a figure for a specific motorbike's fuel consumption (e.g. in miles per gallon, mpg) is known, then the CO_2 can be calculated from the total mileage and the Table 6a factors.

Emission factors for CH_4 and N_2O are based on UK Greenhouse Gas Inventory values for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6k

Taxi, Bus, Rail and Ferry Passenger Transport Conversion Factors				Scope 3				Scope 3	All Scopes	Scope 3				Scope 3	All Scopes
				CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG	CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG
Method of travel		Vehicle km travelled (vkm)[1]	x	kg CO_2 per vkm[1]	kg CO_2e per vkm[1]	kg CO_2e per vkm[1]	kg CO_2e per vkm[1]	kg CO_2e per vkm[1]	kg CO_2e per vkm[1]	Total kg CO_2	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e
Taxi[2]	Regular taxi		x	0.21040	0.00005	0.00167	0.21212	0.02431	0.23643						
	Black cab		x	0.24157	0.00005	0.00167	0.24329	0.04639	0.28968						
Method of travel		Passenger km travelled (pkm)	x	kg CO_2 per pkm	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	Total kg CO_2	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e
Taxi[2]	Regular taxi		x	0.15029	0.00004	0.00119	0.15151	0.02886	0.18038						
	Black cab		x	0.19871	0.00011	0.00056	0.19938	0.03548	0.23486						
Bus	Local bus (not London)[3]		x	0.18433	0.00020	0.00135	0.18588	0.03540	0.22128						
	Local London bus[4]		x	0.08566	0.00008	0.00056	0.08630	0.01645	0.10275						
	Average local bus		x	0.14754	0.00016	0.00107	0.14877	0.02833	0.17710						
	Coach[5]		x	0.03000	0.00007	0.00057	0.03064	0.00576	0.03641						
Rail	National rail[6]		x	0.05340	0.00006	0.00303	0.05649	0.00815	0.06464						
	International rail (Eurostar)[7]		x	0.01502	0.00001	0.00009	0.01512	0.00200	0.01712						
	Light rail and tram[8]		x	0.07101	0.00003	0.00044	0.07148	0.00944	0.08092						
	London Underground[9]		x	0.07313	0.00003	0.00045	0.07361	0.00972	0.08333						
Ferry (Large RoPax)[10]	Foot passengers		x	0.01912	0.00001	0.00015	0.01928	0.00324	0.02252						
	Car passengers		x	0.13216	0.00004	0.00102	0.13322	0.02243	0.15565						
	Average (all passengers)		x	0.11516	0.00004	0.00088	0.11608	0.01954	0.13562						
Total										**0**	**0**	**0**	**0**	**0**	**0**

Sources: Department for Transport, Transport for London and AEA (2011)

Notes

[1] vkm (vehicle-km) is a measure of vehicle activity, representing the movement of a vehicle over a distance; pkm (passenger-km) is a measure of the total distance travelled by passengers on a vehicle and is calculated by multiplying the number of passengers by the vehicle-km.

[2] Emission factors for taxis were estimated on the basis of an average of the emission factors of medium and large cars from Table 6c and occupancy of 1.4 (CfIT, 2002). The emission factors for black cabs are based on the large car emission factor (consistent with the VCA dataset for London Taxis International vehicles) and an average passenger occupancy of 1.5 (average 2.5 people per cab from LTI website, 2008).

[3] The factor for local buses was calculated based on actual fuel consumption data submitted by bus operators to the DfT as part of their Bus Service Operators Grant (BSOG) claims and DfT bus statistics.

[4] The London bus factor is calculated using the same methodology as for other local buses using DfT's BSOG dataset and statistics.

[5] The emission factor for coach transport is the figure from the National Express Group's Corporate Responsibility Report, available at: http://www.nationalexpressgroup.com/nx1/corporate/environment/climate . National Express are responsible for the majority of long-distance coach services in the UK, so this figure is expected to be broadly representative of the overall average.

[6] The national rail factor refers to an average emission per passenger kilometre for diesel and electric trains in 2007/08. The CO_2 value for passenger rail is based on currently available information on CO_2 emissions by diesel and electric passenger trains in the UK in 2007/08 produced by ORR (Office of the Rail Regulator) and is available in Chapter 9 of National Rail Trends at http://www.rail-reg.gov.uk/server/show/nav.2026
Emission factors for freight rail (from the same source) are provided in Annex 7, Table 7f.

[7] The emission factor for international rail is based on electricity grid average emission factors. Eurostar's published figures differ from the figure quoted in the table above as they are calculated using the individual conversion factors as specified by each electricity supplier across each network section upon which they operate. For further information please visit:
http://www.eurostar.com/UK/uk/leisure/about_eurostar/environment/greener_than_flying.jsp

[8] The light rail and tram factors were based on an average of factors for the Docklands Light Rail (DLR) service, the Manchester Metrolink, Tyne and Wear Metro, Glasgow Underground, Supertram, Midland Metro and the Croydon Tramlink. The factors for the Tyne and Wear, Glasgow, Midland, Supertram and Manchester tram and light rail systems were based on annual electricity consumption and passenger km data provided by the network operators in 2008 (referring mostly to consumption in 2007/08) and a CO_2 emission factor for grid rolling average electricity from Table 3c. DLR and Croydon Tramlink figures were recalculated using the updated 2009 grid rolling average from those available in the Transport for London 2010 environmental report available at: http://www.tfl.gov.uk/corporate/about-tfl/publications/1478.aspx

[9] The London Underground rail factor is recalculated using the updated 2009 grid rolling average from figures in the Transport for London 2010 environmental report available at: http://www.tfl.gov.uk/corporate/about-tfl/publications/1478.aspx

[10] The factors for RoPax ferries (Roll-on Roll-off ferries with additional passenger capacity) are based on data provided by Best Foot Forward from work for the Passenger Shipping Association (PSA) carried out in 2007/8. The calculated figure is based on ferry service operator provided data on fuel consumption and passengers transported, but does not include any data for passenger only ferry services, which would be expected to have significantly higher emission factors per

All: Emission factors for CH_4 and N_2O are based on UK Greenhouse Gas Inventory values for 2009 (AEA, 2011), available at: http://naei.defra.gov.uk/

Annex 6 - Passenger Transport Conversion Tables

Last updated: Jun-11

Table 6l

Air Passenger Transport Conversion Factors[10]						Scope 3				Scope 3	All Scopes	Scope 3				Scope 3	All Scopes
						CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG	CO_2	CH_4	N_2O	Total Direct GHG	Total Indirect GHG	Grand Total GHG
Method of travel		Passenger km travelled (pkm)	x	km uplift factor [12]	x	kg CO_2 per pkm [13]	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	kg CO_2e per pkm	Total kg CO_2	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e	Total kg CO_2e
Flight type [14]	*Cabin class* [11]																
Domestic[14]	**Average**		x	109%	x	0.16313	0.00010	0.00161	0.16484	0.03034	0.19518						
Short-haul international[14]	**Average**		x	109%	x	0.09589	0.00001	0.00094	0.09684	0.01783	0.11467						
	Economy class		x	109%	x	0.09138	0.00001	0.00090	0.09229	0.01699	0.10928						
	Business class		x	109%	x	0.13707	0.00001	0.00135	0.13843	0.02549	0.16392						
Long-haul international[14]	**Average**		x	109%	x	0.11037	0.00001	0.00109	0.11146	0.02053	0.13199						
	Economy class		x	109%	x	0.08057	0.00000	0.00079	0.08137	0.01498	0.09635						
	Premium economy class		x	109%	x	0.12891	0.00001	0.00127	0.13019	0.02397	0.15416						
	Business class		x	109%	x	0.23365	0.00001	0.00230	0.23596	0.04345	0.27941						
	First class		x	109%	x	0.32227	0.00002	0.00317	0.32546	0.05994	0.38540						
Total												0	0	0	0	0	0

Source: Developed by AEA (2011) using the methodology developed in discussion with the Department for Transport and the airline industry, 2009.
EMEP/EEA air pollutant emission inventory guidebook 2009 (EEA, 2009)
Civil Aviation Authority (2010)

Notes: These emissions factors are intended to be an aggregate representation of the typical emissions per passenger km from illustrative types of aircraft for the 3 types of air services. Actual emissions will vary significantly according to the type of aircraft in use, the load, cabin class, specific conditions of the flight route, etc.

[10] The emission factors refer to aviation's direct carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions only. There is currently uncertainty over the other non-CO_2 climate change effects of aviation (including water vapour, contrails, NOx etc) which may indicatively be accounted for by applying a multiplier. The appropriate factor to apply is subject to uncertainty but was estimated by the IPCC in 1999 to be in the range 2-4, with current best scientific evidence suggesting a factor of 1.9. This factor is derived from Table 1 of Aviation radiative forcing in 2000: and update on IPCC (1999), Sausen R. et al (2005):
http://elib.dlr.de/19906/1/s13.pdf
If used, this factor would be applied to the emissions factor for CO_2 set out here.

[11] The indicative emissions factors by passenger seating class have been produced to allow passengers to build an understanding of how emissions per passenger km are affected by load factors and seat configurations. This is in response to feedback on the previous version of the Act on CO_2 calculator.
Emission factors by passenger seating class were developed on the basis of detailed analysis of the seating configurations of 24 aircraft model variants from 16 major airlines providing services within/to/from the UK. Indicative emission factors were calculated via the relative area on the aircraft occupied by different seating classes compared to an economy class equivalent per passenger. Figures are only indicative averages and will vary considerably between different specific airline and aircraft configurations.

These indicative factors will be updated as further evidence comes to light on how these factors could more accurately be estimated. There are several ways in which these factors could be estimated, which will be kept under review.

[12] The 9% uplift factor comes from the IPCC Aviation and the global Atmosphere 8.2.2.3 , which states that 9-10% should be added to take into account non-direct routes (i.e. not along the straight line great circle distances between destinations) and delays/circling:
http://www.ipcc.ch/ipccreports/sres/aviation/121.htm#8223
Airline industry representatives have indicated that the percentage uplift for short-haul flights will be higher and for long-haul flights will be lower, however specific data is not currently available to provide separate factors. This is under investigation for future versions of these guidelines.

[13] The emissions factors are based on typical aircraft fuel burn over illustrative trip distances listed in the EMEP/EEA air pollutant emission inventory guidebook 2009 (EEA, 2009) – available at the EEA website at: http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009 . This information is combined with data from the Civil Aviation Authority (CAA) on average aircraft seating capacity, loading factors, and annual passenger-km and aircraft-km for 2007 (most recent full-year data available). The provisional evidence to date suggests an uplift in the region of 10-12% to climb/cruise/descent factors derived in the EEA publication is appropriate in order to ensure consistency with estimated UK aviation emissions as reported in line with the UN Framework on Climate Change, covering UK domestic flights and departing international flights. This uplift has already been included in these emissions factors.

These emissions are based on bunker fuel consumption and are closely related to fuel on departing flights. This uplift is therefore based on comparisons of national aviation fuel consumption from this reported inventory, with detailed bottom up calculations in DfT modelling along with the similar NAEI approach, which both use detailed UK activity data (by aircraft and route) from CAA, and the CORINAIR fuel consumption approach. Therefore for this version of the Defra CO_2 emission factors an uplift of 10% is applied to the emissions from the Cruise, Climb and Decent of the aircraft based on provisional evidence. The CORINAIR uplift is in addition to the assumption that Great Circle Distances are increased by 9% to allow for sub-optimal routing and stacking at airports during periods of heavy congestion. It should be noted that work will continue to determine a more robust reconciliation and this will be accounted for in future versions of these factors.

[14] The long haul estimate is based on a flight length from the EMEP/EEA Guidebook of 6482 km, short haul 1108km and domestic 463km. Actual flight distances do however vary significantly, as demonstrated in the examples in the following tables. Domestic flights are between UK airports, short haul international flights are typically to Europe (up to 3700km distance), and long haul international flights are typically to non-European destinations (or all other international flights over 3700km distance).

Appendix III: International Student Air Travel

Table 2.4 Summary of Enrolments by Country of Domicile by Level of Study, split by Government supported and Independently funded Courses

			10/11											
			Government Supported				Independently Funded							
		Distance (miles)	Undergraduate	Postgraduate Taught	Postgraduate Research	Total	Undergraduate	Postgraduate Taught	Postgraduate Research	Total	Grand Total	Total Kms	Total C (tonnes)	
Africa	Botswana	5271	1	1	1	**3**	0	3	1	**4**	**7**	**118,767**	**11**	
	Burkina-Faso (Upper Volta)	2653	0	0	0	**0**	0	1	0	**1**	**1**	**8,540**	**1**	
	Cameroon	3213	1	0	0	**1**	0	2	1	**3**	**4**	**41,369**	**4**	
	Congo, Democratic Republic of	3725	0	0	0	**0**	0	2	0	**2**	**2**	**23,981**	**2**	
	Cote d'Ivoire	3006	0	0	0	**0**	0	1	0	**1**	**1**	**9,676**	**1**	
	Cote d'Ivoire (Ivory Coast)	3006	0	0	0	**0**	0	2	0	**2**	**2**	**19,352**	**2**	
	Ethiopia	3739	0	0	18	**18**	0	2	0	**2**	**20**	**240,708**	**21**	
	Ghana	2996	5	3	0	**8**	0	18	0	**18**	**26**	**250,738**	**22**	
	Guinea	2891	0	0	0	**0**	0	1	0	**1**	**1**	**9,306**	**1**	
	Kenya	4132	44	2	5	**51**	0	33	1	**34**	**85**	**1,130,535**	**100**	
	Madagascar	5695	0	0	0	**0**	0	1	0	**1**	**1**	**18,332**	**2**	
	Malawi	4928	1	0	0	**1**	0	5	0	**5**	**6**	**95,176**	**8**	
	Mauritania	2259	0	0	0	**0**	0	1	0	**1**	**1**	**7,271**	**1**	
	Mauritius	6054	37	3	2	**42**	0	4	0	**4**	**46**	**896,407**	**80**	
	Mozambique	5256	1	0	1	**2**	0	1	0	**1**	**3**	**50,755**	**5**	
	Namibia	5167	0	1	0	**1**	0	0	0	**0**	**1**	**16,632**	**1**	
	Nigeria	2897	48	22	11	**81**	0	191	1	**192**	**273**	**2,545,751**	**226**	
	Rwanda	4093	0	0	0	**0**	0	1	0	**1**	**1**	**13,175**	**1**	
	Seychelles	5073	1	0	0	**1**	0	0	0	**0**	**1**	**16,329**	**1**	
	South Africa	5736	2	1	2	**5**	0	26	1	**27**	**32**	**590,832**	**52**	
	Swaziland	5708	1	0	0	**1**	0	0	0	**0**	**1**	**18,373**	**2**	
	Tanzania	4479	8	2	3	**13**	0	10	0	**10**	**23**	**331,599**	**29**	
	Uganda	3956	7	1	0	**8**	0	15	0	**15**	**23**	**292,879**	**26**	
	Zambia	4930	1	0	0	**1**	0	4	0	**4**	**5**	**79,345**	**7**	
	Zimbabwe	5254	5	1	2	**8**	0	4	0	**4**	**12**	**202,944**	**18**	**623**
	Total		**163**	**37**	**45**	**245**	**0**	**328**	**5**	**333**				
Associated States of Russia	Armenia	2294	0	1	0	**1**	0	0	0	**0**	**1**	**7,384**	**1**	
	Azerbaijan	2382	6	3	0	**9**	0	11	0	**11**	**20**	**153,347**	**14**	
	Belarus	1204	2	0	2	**4**	0	3	0	**3**	**7**	**27,129**	**2**	
	Georgia	2151	0	0	0	**0**	0	2	0	**2**	**2**	**13,848**	**1**	
	Kazakhstan, Republic of	2962	32	13	2	**47**	0	35	0	**35**	**82**	**781,814**	**69**	
	Moldova (Moldavia)	1358	3	0	0	**3**	0	0	0	**0**	**3**	**13,114**	**1**	
	Turkmenistan	2938	1	0	0	**1**	0	0	0	**0**	**1**	**9,457**	**1**	
	Ukraine	1437	10	1	0	**11**	0	7	0	**7**	**18**	**83,260**	**7**	
	Uzbekistan	3067	1	0	0	**1**	0	0	0	**0**	**1**	**9,872**	**1**	**97**
	Total		**55**	**18**	**4**	**77**	**0**	**58**	**0**	**58**				
Caribbean	Bahamas	4319	0	0	0	**0**	0	2	0	**2**	**2**	**27,805**	**2**	
	Barbados	4193	1	2	1	**4**	0	1	0	**1**	**5**	**67,484**	**6**	
	Belize	5226	1	0	0	**1**	0	0	0	**0**	**1**	**16,822**	**1**	
	Bermuda	3442	3	0	0	**3**	0	2	0	**2**	**5**	**55,397**	**5**	
	British Virgin Islands	4128	1	1	1	**3**	0	0	0	**0**	**3**	**39,863**	**4**	
	Guyana	4622	0	0	0	**0**	0	5	0	**5**	**5**	**74,388**	**7**	
	Jamaica	4691	0	2	0	**2**	0	1	0	**1**	**3**	**45,299**	**4**	
	Martinique	4173	0	0	1	**1**	0	0	0	**0**	**1**	**13,432**	**1**	
	Montserrat	4112	0	1	0	**1**	0	0	0	**0**	**1**	**13,236**	**1**	
	St Kitts and Nevis	4105	0	0	1	**1**	0	0	0	**0**	**1**	**13,214**	**1**	
	Trinidad and Tobago	4416	4	1	2	**7**	0	7	0	**7**	**14**	**199,004**	**18**	
	Turks & Caicos Islands (for Home/EU fee payers onl	4260	1	0	0	**1**	0	0	0	**0**	**1**	**13,712**	**1**	
	Turks and Caicos Islands	4260	1	0	0	**1**	0	1	0	**1**	**2**	**27,425**	**2**	**54**
	Total		**12**	**7**	**6**	**25**	**0**	**19**	**0**	**19**				
East Asia	China, P. R.	5082	1	0	0	**1**	0	1	0	**1**	**2**	**32,717**	**3**	
	China, People's Republic of	5082	451	172	80	**703**	52	479	3	**534**	**1,237**	**20,235,277**	**1,795**	
	Hong Kong	6007	425	32	7	**464**	0	144	2	**146**	**610**	**11,794,845**	**1,046**	
	Japan	5965	17	3	6	**26**	0	19	2	**21**	**47**	**902,429**	**80**	
	Korea, Republic of (South Korea)	5577	37	7	16	**60**	0	34	4	**38**	**98**	**1,759,266**	**156**	
	Macao	5989	8	2	0	**10**	0	3	0	**3**	**13**	**250,612**	**22**	
	Mongolia	4395	0	0	1	**1**	0	1	0	**1**	**2**	**28,294**	**3**	
	Taiwan	6175	9	13	14	**36**	0	56	0	**56**	**92**	**1,828,646**	**162**	**3,267**
	Total		**948**	**229**	**124**	**1,301**	**52**	**737**	**11**	**800**				
EU & Non-EU & Norway	Albania	1211	2	0	0	**2**	0	3	0	**3**	**5**	**19,490**	**2**	
	Austria	683	24	2	2	**28**	0	19	0	**19**	**47**	**103,329**	**10**	
	Belgium	199	71	4	7	**82**	0	21	1	**22**	**104**	**66,618**	**7**	
	Bosnia and Herzegovina	999	0	0	1	**1**	0	1	0	**1**	**2**	**6,431**	**1**	
	Bulgaria	1324	75	5	0	**80**	0	19	0	**19**	**99**	**421,918**	**42**	
	Bulgaria (for Overeseas feepayers only)	1324	0	0	0	**0**	0	2	0	**2**	**2**	**8,524**	**1**	
	Croatia	852	4	3	0	**7**	0	5	0	**5**	**12**	**32,910**	**3**	
	Cyprus	2008	39	0	8	**47**	0	4	0	**4**	**51**	**329,639**	**33**	
	Cyprus (European Union)	2008	21	20	8	**49**	0	11	1	**12**	**61**	**394,274**	**40**	
	Cyprus (Non-European Union)	2008	0	1	2	**3**	0	2	0	**2**	**5**	**32,318**	**3**	
	Czech Republic	710	11	2	3	**16**	0	10	0	**10**	**26**	**59,421**	**6**	
	Denmark	530	4	1	2	**7**	0	22	0	**22**	**29**	**49,474**	**5**	
	Estonia	1149	5	0	0	**5**	0	2	0	**2**	**7**	**25,889**	**3**	
	Finland	1291	18	1	2	**21**	0	10	0	**10**	**31**	**128,823**	**13**	
	France	394	125	23	10	**158**	0	42	1	**43**	**201**	**254,916**	**26**	
	Germany,	411	0	0	0	**0**	0	7	0	**7**	**7**	**9,261**	**1**	
	Germany, Federal Republic of	411	113	28	39	**180**	0	119	0	**119**	**299**	**395,565**	**40**	
	Gibraltar	1083	4	1	0	**5**	0	0	0	**0**	**5**	**17,430**	**2**	
	Greece	1384	27	34	30	**91**	0	67	0	**67**	**158**	**703,879**	**71**	
	Hungary	972	8	4	5	**17**	0	8	0	**8**	**25**	**78,219**	**8**	
	Iceland	1126	1	1	0	**2**	0	0	0	**0**	**2**	**7,249**	**1**	
	Ireland, Republic of	337	17	16	10	**43**	0	77	1	**78**	**121**	**131,256**	**13**	
	Italy	862	34	13	43	**90**	0	43	1	**44**	**134**	**371,806**	**37**	
	Kosovo	1181	1	0	0	**1**	0	0	0	**0**	**1**	**3,801**	**0**	
	Latvia	1092	21	2	0	**23**	0	1	0	**1**	**24**	**84,360**	**8**	
	Lithuania	1039	76	1	1	**78**	0	5	0	**5**	**83**	**277,587**	**28**	
	Luxembourg	314	22	3	1	**26**	0	1	0	**1**	**27**	**27,290**	**3**	
	Macedonia, The Former Yugoslav Republic of	1246	0	0	0	**0**	0	1	0	**1**	**1**	**4,011**	**0**	
	Malta	1302	3	3	8	**14**	0	5	0	**5**	**19**	**79,629**	**8**	
	Monaco	648	2	0	0	**2**	0	0	0	**0**	**2**	**4,172**	**0**	
	Netherlands	274	22	4	4	**30**	0	48	0	**48**	**78**	**68,794**	**7**	
	Norway	828	19	2	3	**24**	0	16	0	**16**	**40**	**106,609**	**11**	
	Poland	876	55	18	19	**92**	0	25	0	**25**	**117**	**329,909**	**33**	
	Portugal	903	15	8	10	**33**	0	17	0	**17**	**50**	**145,332**	**15**	
	Romania	1216	21	3	2	**26**	0	18	0	**18**	**44**	**172,223**	**17**	
	Romania (for Overeseas fee payers only)	1216	1	0	0	**1**	0	3	0	**3**	**4**	**15,657**	**2**	
	Serbia	1119	3	1	2	**6**	0	3	0	**3**	**9**	**32,417**	**3**	
	Serbia and Montenegro	1081	0	0	0	**0**	0	2	0	**2**	**2**	**6,959**	**1**	
	Slovakia	905	8	0	1	**9**	0	16	0	**16**	**25**	**72,827**	**7**	
	Slovenia	799	2	0	0	**2**	0	7	0	**7**	**9**	**23,147**	**2**	
	Spain	810	27	5	8	**40**	0	47	0	**47**	**87**	**226,834**	**23**	
	Sweden	931	55	2	7	**64**	0	30	0	**30**	**94**	**281,697**	**28**	
	Switzerland	491	44	3	0	**47**	0	44	0	**44**	**91**	**143,823**	**14**	**579**
	Total		**1,000**	**214**	**238**	**1,452**	**0**	**783**	**5**	**788**				
Europe - UK	Channel Islands		4	0	0	**4**	0	2	0	**2**	**6**			
	England		9,275	1,656	788	**11,719**	23	2,539	58	**2,620**	**14,339**			
	Guernsey		17	0	0	**17**	0	2	0	**2**	**19**			
	Isle of Man (The)		10	1	1	**12**	0	0	0	**0**	**12**			
	Jersey		17	0	0	**17**	0	1	0	**1**	**18**			
	Northern Ireland		40	14	5	**59**	0	34	0	**34**	**93**			
	Scotland		39	16	20	**75**	0	81	0	**81**	**156**			
	Wales		238	30	23	**291**	2	56	0	**58**	**349**			
	Total		**9,640**	**1,717**	**837**	**12,194**	**25**	**2,715**	**58**	**2,798**				
Latin America	Argentina	7087	0	4	5	**9**	0	5	1	**6**	**15**	**342,183**	**30**	
	Brazil	5331	2	0	3	**5**	0	7	0	**7**	**12**	**205,918**	**18**	
	Chile	7049	0	1	7	**8**	0	4	0	**4**	**12**	**272,279**	**24**	
	Colombia	5212	1	5	5	**11**	0	14	0	**14**	**25**	**419,420**	**37**	
	Ecuador	5771	0	1	0	**1**	0	1	0	**1**	**2**	**37,152**	**3**	
	El Salvador	5413	0	0	1	**1**	0	1	0	**1**	**2**	**34,848**	**3**	
	Falkland Islands	7886	0	0	0	**0**	0	1	0	**1**	**1**	**25,384**	**2**	
	Mexico	5467	0	1	10	**11**	0	8	0	**8**	**19**	**334,355**	**30**	
	Panama	5286	1	0	0	**1**	0	0	0	**0**	**1**	**17,015**	**2**	
	Peru	6145	2	0	1	**3**	0	1	0	**1**	**4**	**79,120**	**7**	
	Uruguay	6720	1	0	0	**1**	0	0	0	**0**	**1**	**21,631**	**2**	
	Venezuela	4743	1	1	1	**3**	0	5	0	**5**	**8**	**122,137**	**11**	**170**
	Total		**8**	**13**	**33**	**54**	**0**	**47**	**1**	**48**				
Mid East / North Africa	Afghanistan	3460	0	0	0	**0**	0	1	0	**1**	**1**	**11,137**	**1**	
	Bahrain	3179	5	0	0	**5**	0	5	0	**5**	**10**	**102,328**	**9**	
	Egypt	2317	1	1	4	**6**	0	19	0	**19**	**25**	**186,454**	**17**	
	Iran	2989	4	8	14	**26**	0	15	0	**15**	**41**	**394,471**	**35**	
	Iraq	2559	0	1	0	**1**	0	0	0	**0**	**1**	**8,237**	**1**	
	Israel	2253	5	1	1	**7**	0	2	0	**2**	**9**	**65,269**	**6**	
	Jordan	2328	3	1	0	**4**	0	2	1	**3**	**7**	**52,455**	**5**	
	Kuwait	2890	2	0	0	**2**	0	6	0	**6**	**8**	**74,421**	**7**	
	Lebanon	2180	1	0	2	**3**	0	8	0	**8**	**11**	**77,189**	**7**	
	Libya	2046	0	2	6	**8**	0	8	0	**8**	**16**	**105,373**	**9**	
	Morocco	1364	4	0	0	**4**	0	1	0	**1**	**5**	**21,953**	**2**	
	Oman	3708	3	0	1	**4**	0	2	0	**2**	**6**	**71,614**	**6**	
	Qatar	3234	2	1	0	**3**	0	11	0	**11**	**14**	**145,738**	**13**	
	Saudi Arabia	3001	2	4	12	**18**	0	28	1	**29**	**47**	**454,013**	**40**	
	Sudan	3088	0	1	0	**1**	0	6	1	**7**	**8**	**79,519**	**7**	
	Syrian Arab Republic	2213	0	9	7	**16**	0	10	1	**11**	**27**	**192,331**	**17**	
	Tunisia	1296	0	0	0	**0**	0	3	0	**3**	**3**	**12,515**	**1**	
	United Arab Emirates	3426	25	6	0	**31**	0	54	0	**54**	**85**	**937,370**	**83**	
	Yemen, Republic of	3663	1	0	0	**1**	0	0	0	**0**	**1**	**11,791**	**1**	**266**
	Total		**58**	**35**	**47**	**140**	**0**	**181**	**4**	**185**				
North America	Canada	3414	30	3	15	**48**	0	45	1	**46**	**94**	**1,032,990**	**92**	
	United States	4489	0	0	0	**0**	0	2	0	**2**	**2**	**28,899**	**3**	
	United States of America	4489	22	16	23	**61**	0	71	0	**71**	**132**	**1,907,341**	**169**	**263**
	Total		**52**	**19**	**38**	**109**	**0**	**118**	**1**	**119**				
Not European Union or Commonwealth	No information provided Overseas		1	0	0	**1**	0	3	0	**3**	**4**			
	Total	1000	**1**	**0**	**0**	**1**	**0**	**3**	**0**	**3**	**4**	**12,876**	**1**	**1**
Not Known	(Blank)		8	4	1	**13**	0	4	0	**4**				
	British Antarctic Territories	7886	0	0	0	**0**	0	1	0	**1**	**1**	**25,384**	**2**	
	Greenland (Faroe Islands)	769	0	0	0	**0**	0	1	0	**1**	**1**	**2,475**	**0**	
	Not Known	1000	5	3	0	**8**	0	11	0	**11**	**19**	**61,159**	**5**	**8**

	Total		**13**	**7**	**1**	**21**	**0**	**17**	**0**	**17**				
ROW Australia and New Zealand	Australia	9495	5	1	4	**10**	0	11	0	**11**	**21**	**641,829**	**57**	
	New Zealand	11661	4	0	0	**4**	0	6	0	**6**	**10**	**375,354**	**33**	**90**
	Total		**9**	**1**	**4**	**14**	**0**	**17**	**0**	**17**				
Russia	Russia (Russian Federation)	3578	39	10	1	**50**	0	67	0	**67**	**117**	**1,347,507**	**120**	**120**
	Total		**39**	**10**	**1**	**50**	**0**	**67**	**0**	**67**				
South Asia	Bangladesh	4964	8	3	8	**19**	0	7	0	**7**	**26**	**415,442**	**37**	
	India	4618	184	96	21	**301**	0	195	0	**195**	**496**	**7,372,935**	**654**	
	Maldive Islands	5547	2	1	0	**3**	0	0	0	**0**	**3**	**53,565**	**5**	
	Nepal	4509	1	2	3	**6**	0	1	0	**1**	**7**	**101,598**	**9**	
	Pakistan	3817	75	29	22	**126**	0	64	0	**64**	**190**	**2,334,428**	**207**	
	Sri Lanka	5475	27	1	2	**30**	0	7	0	**7**	**37**	**652,065**	**58**	**969**
	Total		**297**	**132**	**56**	**485**	**0**	**274**	**0**	**274**				
South East Asia	Brunei	7030	44	6	3	**53**	0	3	0	**3**	**56**	**1,267,209**	**112**	
	Burma (Myanmar)	5316	1	0	0	**1**	0	0	0	**0**	**1**	**17,112**	**2**	
	Cambodia	6169	0	0	1	**1**	0	1	0	**1**	**2**	**39,715**	**4**	
	Indonesia	7775	10	3	5	**18**	0	11	0	**11**	**29**	**725,777**	**64**	
	Malaysia	6537	218	3	22	**243**	98	49	0	**147**	**390**	**8,206,309**	**728**	
	Phillippines	6692	2	2	0	**4**	0	3	0	**3**	**7**	**150,785**	**13**	
	Singapore	6756	171	10	2	**183**	0	113	0	**113**	**296**	**6,437,039**	**571**	
	Thailand	5856	26	16	12	**54**	0	122	3	**125**	**179**	**3,374,107**	**299**	
	Vietnam	6044	66	4	5	**75**	0	6	1	**7**	**82**	**1,595,303**	**141**	**1,935**
	Total		**538**	**44**	**50**	**632**	**98**	**308**	**4**	**410**				
Turkey	Turkey	1907	13	22	11	**46**	0	63	1	**64**	**110**	**675,224**	**60**	**60**
	Total		**13**	**22**	**11**	**46**	**0**	**63**	**1**	**64**				
											22,833	**95,092,925**	**8,503**	**8,503**

Appendix IV: Business Air Travel

University of

New Report

Booking type: Flight
From Date: 01/08/2010
To Date: 31/07/2011
Used Date: Departure Date
Returned rows: All
Departments: Multiple
Bookers: Multiple

KEY TRAVEL

PNR	Invoice Number	Department	Flight departure date	Flight return date	Flight Origin	Flight Destination	Flight Distance	Uplift Km	Flight CO2 (KG)
YO2R7X	148862	University of Warwick - Computer Science	18/09/2010	18/09/2010	PITTSBURGH	BOSTON	796.57	868.26	84.08
Y6HW4Q	163862	University of Warwick - Health Sciences Research Institute	30/09/2010	11/10/2010	BIRMINGHAM	MELBOURNE	34992.93	38142.29	4,251.34
7ZNVJI	203783	University of Warwick - Warwick Medical School	03/02/2011	04/02/2011	BIRMINGHAM	ZURICH	1841.4	2007.13	194.37
4DEU2H	250547	University of Warwick - Sociology	22/06/2011	22/06/2011	BARCELONA	MADRID	482.73	526.18	50.95
25ZCN5	175885	University of Warwick - Computer Science	24/10/2010	31/10/2010	LONDON	PISA	2295.95	2502.59	242.35
2OHJ3N	250638	University of Warwick - Warwick Business School	14/06/2011	19/06/2011	LONDON	CORFU	4033.31	4396.31	490.01
5ZGBB2	190171	University of Warwick - Warwick Legal Training	10/12/2010	10/12/2010	BIRMINGHAM	ABERDEEN	528.74	576.33	55.81
5ZGBB2	190171	University of Warwick - Warwick Legal Training	10/12/2010	10/12/2010	BIRMINGHAM	ABERDEEN	528.74	576.33	55.81
288OAN	156009	University of Warwick - Development Technology Unit	05/09/2010	25/09/2010	BIRMINGHAM	ENTEBBE/KAMPALA	14389.92	15685.01	1,748.25
5TBLT4	8011129	University of Warwick - Centre for Caribbean Studies	02/09/2010	03/09/2010	LONDON	GEORGETOWN	7502.45	8177.67	911.48
ZVDVGN	213876	University of Warwick - Clinical Sciences Research Institute	07/06/2011	11/06/2011	BIRMINGHAM	SALZBURG	2348.87	2560.27	247.94
3YHZ7Z	198821	University of Warwick - Warwick Business School	01/03/2011	02/03/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
43MYJR	152343	University of Warwick - Warwick Medical School	06/09/2010	06/09/2010	BIRMINGHAM	GLASGOW	418.27	455.91	75.15
3PN8AX	161530	University of Warwick - Warwick Business School	13/10/2010	13/10/2010	BIRMINGHAM	BELFAST	727.04	792.47	76.74
3PN8AX	161530	University of Warwick - Warwick Business School	13/10/2010	13/10/2010	BIRMINGHAM	BELFAST	727.04	792.47	76.74
59LS5C	8013518	University of Warwick - Warwick Business School	01/12/2010	03/12/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
59LS5C	8013518	University of Warwick - Warwick Business School	01/12/2010	03/12/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
2RUAJX	254774	University of Warwick - Sociology	30/06/2011	01/07/2011	BELFAST	BIRMINGHAM	727.04	792.47	76.74
Y4IQIH	162970	University of Warwick - Warwick Medical School	15/09/2010	17/09/2010	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
4GF6HT	126627	University of Warwick - Warwick Business School	12/09/2010	12/09/2010	HAMBURG	BIRMINGHAM	794.47	865.97	83.86
3HMNS7	149666	University of Warwick - Warwick Ventures	29/08/2010	02/09/2010	LONDON	CATANIA	3876.48	4225.36	470.96
45ZK3T	249889	University of Warwick - Warwick Business School	06/07/2011	06/07/2011	LONDON	GOTHENBURG	1068.28	1164.43	112.76
245MIW	155707	University of Warwick - Library Department	08/10/2010	08/10/2010	AMSTERDAM	BIRMINGHAM	442.12	481.91	79.44
245MIW	155707	University of Warwick - Library Department	08/10/2010	08/10/2010	AMSTERDAM	BIRMINGHAM	442.12	481.91	79.44
245MIW	155707	University of Warwick - Library Department	08/10/2010	08/10/2010	AMSTERDAM	BIRMINGHAM	442.12	481.91	79.44
245MIW	155707	University of Warwick - Library Department	08/10/2010	08/10/2010	AMSTERDAM	BIRMINGHAM	442.12	481.91	79.44
245MIW	155707	University of Warwick - Library Department	08/10/2010	08/10/2010	AMSTERDAM	BIRMINGHAM	442.12	481.91	79.44
768YI9	225150	University of Warwick - Health and Social Studies	13/06/2011	16/06/2011	LONDON	BELFAST	1005.06	1095.52	106.09
8LUABK	225217	University of Warwick - Health and Social Studies	13/06/2011	16/06/2011	LONDON	BELFAST	1005.06	1095.52	106.09
6D4AID	184019	University of Warwick - Warwick Business School	07/12/2010	07/12/2010	VIENNA	LONDON	1250.37	1362.90	131.98
Z3S3OJ	197816	University of Warwick - Warwick Business School	02/03/2011	04/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
2UOCDZ	207623	University of Warwick - Politics and International Studies	07/04/2011	07/04/2011	STOCKHOLM	LONDON	1461.96	1593.54	154.32
5VO44X	231374	University of Warwick - Health Sciences Research Institute	15/06/2011	15/06/2011	BIRMINGHAM	EDINBURGH	402.86	439.12	72.38
3QP7ZO	218895	University of Warwick - Warwick Business School	15/04/2011	15/04/2011	BIRMINGHAM	EDINBURGH	402.86	439.12	72.38
4OZ26N	194433	University of Warwick - Warwick Business School	14/02/2011	18/02/2011	BIRMINGHAM	BELFAST	727.04	792.47	76.74
296EY6	166483	University of Warwick - Politics and International Studies	09/11/2010	10/11/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
296EY6	166483	University of Warwick - Politics and International Studies	09/11/2010	10/11/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
X4F5G6	162722	University of Warwick - Economics	05/11/2010	07/11/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
4ZVC9I	167438	University of Warwick - Warwick Systems Biology Centre	12/12/2010	16/12/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
2TBAYT	207747	University of Warwick - Health and Social Studies	15/03/2011	16/03/2011	BELFAST	LONDON	1122.76	1223.81	118.51
4DYYLF	199438	University of Warwick - Warwick Business School	10/04/2011	13/04/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
49LQJZ	201006	University of Warwick - Warwick Business School	10/04/2011	12/04/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
238DCL	171542	University of Warwick - Library Department	09/11/2010	12/11/2010	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
2IWXF4	155360	University of Warwick - Department of Physics	03/09/2010	03/09/2010	FRANKFURT	BIRMINGHAM	764.72	833.54	80.72
3BCKPG	218317	University of Warwick - Warwick Business School	18/04/2011	18/04/2011	LONDON	ZURICH	788.43	859.39	83.22
237V8U	170692	University of Warwick - Library Department	10/11/2010	12/11/2010	LONDON	EDINBURGH	1065.7	1161.61	112.49
5BBAVK	178636	University of Warwick - Warwick Business School	31/10/2010	02/11/2010	BIRMINGHAM	LONDON	1019.99	1111.79	107.67
YD7IPY	192873	University of Warwick - Computer Science	30/12/2010	30/12/2010	BIRMINGHAM	PUDONG INTERNATIONAL	9352.58	10194.31	1,136.26
44PTOL	253752	University of Warwick - Engineering	21/06/2011	22/06/2011	NANKING	LONDON	9102.2	9921.40	1,105.84
ZZT9SN	227104	University of Warwick - Engineering	26/05/2011	26/05/2011	SEATTLE/TACOMA	SALT LAKE CITY	1106.75	1206.36	116.82
ZZU88N	227221	University of Warwick - Engineering	26/05/2011	26/05/2011	SEATTLE/TACOMA	SALT LAKE CITY	1106.75	1206.36	116.82
ZUIBWZ	135358	University of Warwick - Health and Social Studies	07/09/2010	08/09/2010	BELFAST	LONDON	1005.06	1095.52	106.09
4GFXFE	126586	University of Warwick - Warwick Business School	29/08/2010	29/08/2010	BIRMINGHAM	FRANKFURT	764.72	833.54	80.72
485582	191499	University of Warwick - Department of Physics	17/01/2011	21/01/2011	LONDON	PISA	2295.95	2502.59	242.35
Z42M7Z	197819	University of Warwick - Warwick Business School	02/03/2011	06/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
Z42M7Z	197819	University of Warwick - Warwick Business School	02/03/2011	06/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
5VPDYE	231375	University of Warwick - Health Sciences Research Institute	15/06/2011	17/06/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
4PAKRZ	251583	University of Warwick - Warwick Medical School	19/07/2011	19/07/2011	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
4QENWI	229497	University of Warwick - Engineering	01/06/2011	01/06/2011	SALT LAKE CITY	SEATTLE/TACOMA	1106.75	1206.36	116.82
4QENWI	229497	University of Warwick - Engineering	01/06/2011	01/06/2011	SALT LAKE CITY	SEATTLE/TACOMA	1106.75	1206.36	116.82
5MYQ4P	201019	University of Warwick - Warwick Business School	10/04/2011	13/04/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
X34XRV	204829	University of Warwick - Warwick Business School	10/04/2011	13/04/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
2UCJX5	229792	University of Warwick - Warwick Medical School	22/06/2011	23/06/2011	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
3J3RZI	229795	University of Warwick - Warwick Business School	26/06/2011	29/06/2011	BIRMINGHAM	DUBLIN	643.04	700.91	67.88
YGZHH4	149265	University of Warwick - Warwick Medical School	05/09/2010	08/09/2010	LONDON	BELFAST	1005.06	1095.52	106.09
2HRSWX	124285	University of Warwick	17/09/2010	26/09/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
6ZVIIB	202532	University of Warwick - Department of Physics	09/02/2011	12/02/2011	GENEVA	BIRMINGHAM	1788.53	1949.50	188.79
4KEL7R	142283	University of Warwick - Warwick Business School	20/09/2010	24/09/2010	BIRMINGHAM	PARIS	975.06	1062.82	102.92
4XHBRA	210908	University of Warwick - Warwick Systems Biology Centre	29/03/2011	31/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
4XHBRA	210908	University of Warwick - Warwick Systems Biology Centre	29/03/2011	31/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
4XHBRA	210908	University of Warwick - Warwick Systems Biology Centre	29/03/2011	31/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
7W8BNE	213781	University of Warwick - Warwick Systems Biology Centre	29/03/2011	31/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
7W8BNE	213781	University of Warwick - Warwick Systems Biology Centre	29/03/2011	31/03/2011	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
Z7KHXP	246352	University of Warwick - Economics	11/07/2011	16/07/2011	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
X9IY2J	194714	University of Warwick - Engineering	20/01/2011	01/02/2011	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
2EKH2S	226099	University of Warwick - Computer Science	13/04/2011	28/04/2011	BIRMINGHAM	ORLANDO	17031.63	18564.48	2,069.20
2QMB3I	171755	University of Warwick - Mathematics	14/11/2010	17/11/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
YPZDYJ	155780	University of Warwick - Warwick Medical School	23/08/2010	24/08/2010	BRISTOL	GLASGOW	1023.54	1115.66	108.04
YPZDYJ	155780	University of Warwick - Warwick Medical School	23/08/2010	24/08/2010	BRISTOL	GLASGOW	1023.54	1115.66	108.04
6UBUUO	222952	University of Warwick - Health and Social Studies	17/05/2011	21/05/2011	TOULOUSE	PARIS	1143.68	1246.61	120.72
4JXL2U	191446	University of Warwick - Computer Science	12/02/2011	26/02/2011	LONDON	BUCHAREST	4223.21	4603.30	513.08
YB3K7X	153077	University of Warwick - Centre for Studies in Democratisation	21/10/2010	24/10/2010	BIRMINGHAM	FRANKFURT	1529.43	1667.08	161.44
ZPMHPL	216673	University of Warwick - Warwick Business School	06/07/2011	09/07/2011	LONDON	GOTHENBURG	2136.56	2328.85	225.53
6CNM36	211462	University of Warwick - Center for Discrete Mathematics and its Applications	01/05/2011	01/05/2011	FRANKFURT	BIRMINGHAM	764.72	833.54	80.72
4ZEGAY	143407	University of Warwick - Library Department	09/08/2010	10/08/2010	BIRMINGHAM	DUNDEE	904.42	985.82	95.47
X2T2PI	173354	University of Warwick - Economics	06/11/2010	07/11/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
YE5OHT	148293	University of Warwick - Politics and International Studies	03/10/2010	03/10/2010	GOTHENBURG	BIRMINGHAM	1061.6	1157.14	112.06
2J7VML	135364	University of Warwick - Health and Social Studies	07/09/2010	08/09/2010	STOCKHOLM	LONDON	2923.92	3187.07	308.64
3OK79O	136836	University of Warwick - Health and Social Studies	06/09/2010	08/09/2010	STOCKHOLM	LONDON	2923.92	3187.07	308.64
4MBUKO	143362	University of Warwick - Mathematics	18/09/2010	25/09/2010	BIRMINGHAM	AMSTERDAM	884.24	963.82	93.34
4CFGV9	249271	University of Warwick - Economics	06/07/2011	14/07/2011	MANCHESTER	LISBON	3405.44	3711.93	413.73
4CFEJC	249272	University of Warwick - Economics	24/06/2011	30/06/2011	MANCHESTER	LISBON	3405.44	3711.93	413.73
3Z295G	195472	University of Warwick - Warwick Medical School	01/02/2011	01/02/2011	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
Z5FM5H	149714	University of Warwick - Warwick Business School	31/08/2010	03/09/2010	LONDON	COPENHAGEN	1958.32	2134.57	206.71
X43RL3	216225	University of Warwick - Engineering	09/03/2011	11/03/2011	LONDON	AMSTERDAM	707.67	771.36	74.70
ZWW2QV	198932	University of Warwick - Sociology	10/02/2011	28/02/2011	BIRMINGHAM	PORT BLAIR ANDAMAN ISL.	17279.58	18834.74	2,099.32
Y4IQIH	129696	University of Warwick - Warwick Medical School	15/09/2010	17/09/2010	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
Y3FZE8	129700	University of Warwick - Warwick Medical School	13/09/2010	17/09/2010	BIRMINGHAM	GLASGOW	836.54	911.83	88.30
7OYPSS	185758	University of Warwick - Warwick Systems Biology Centre	18/12/2010	23/12/2010	AMSTERDAM	BIRMINGHAM		0.00	0.00
ZII5Y5	206075	University of Warwick - Politics and International Studies	09/03/2011	12/03/2011	AMSTERDAM	BIRMINGHAM	884.24	963.82	93.34
556JJL	183727	University of Warwick - Warwick Business School	16/03/2011	30/03/2011	LONDON	STOCKHOLM	2923.92	3187.07	308.64
ZGC37P	206670	University of Warwick - Comparative American Studies	26/05/2011	29/05/2011	BIRMINGHAM	SHANNON	971.08	1058.48	102.50
2HOTGB	227621	University of Warwick - Engineering	07/07/2011	07/07/2011	BUDAPEST	LONDON	1488.94	1622.94	157.17
YHO4GE	8012564	University of Warwick - Warwick Business School	24/11/2010	28/11/2010	LONDON	BARCELONA	2296.89	2503.61	242.45
YPHGKQ	195474	University of Warwick - Warwick Business School	14/01/2011	14/01/2011	DUBLIN	BIRMINGHAM	643.04	700.91	67.88
ZDXV5W	144305	University of Warwick - Computer Science	15/08/2010	20/08/2010	BIRMINGHAM	PARIS	975.06	1062.82	102.92
ZP5LC3	158905	University of Warwick - Warwick Systems Biology Centre	09/10/2010	16/10/2010	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
ZP5LC3	158905	University of Warwick - Warwick Systems Biology Centre	09/10/2010	16/10/2010	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05
ZP5LC3	158905	University of Warwick - Warwick Systems Biology Centre	09/10/2010	16/10/2010	BIRMINGHAM	EDINBURGH	805.71	878.22	85.05

The co-operative travel management

Warwick University Air Carbon Foot Print Aug 10 - Jul 11

From	To	Miles	KM	KGC02
BHX	AMS	276	444	73
AMS	BHX	276	444	73
LHR	SIN	6765	10885	1213
SIN	LHR	6765	10885	1213
BHX	DUB	200	322	53
DUB	BHX	200	322	53
LHR	JNB	5621	9044	1008
JNB	LHR	5621	9044	1008
LGW	VRN	646	1039	101
VRN	LGW	646	1039	101
EDI	LGW	357	574	56
LGW	EDI	357	574	56
LGW	VCE	696	1120	108
VCE	EDI	994	1599	155
BHX	FRA	477	767	74
FRA	YYC	4692	7549	841
YYC	FRA	4692	7549	841
FRA	BHX	477	767	74
BHX	AMS	276	444	73
AMS	ACC	3230	5197	579
ACC	AMS	3230	5197	579
AMS	BHX	276	444	73
LHR	ADD	3675	5913	659
ADD	MQX	313	504	49
MQX	ADD	313	504	49
ADD	JNB	2516	4048	451
JNB	ADD	2516	4048	451
ADD	LHR	3675	5913	659
BHX	AMS	276	444	73
AMS	JNB	5584	8985	1001
JNB	AMS	5584	8985	1001
AMS	BHX	276	444	73
LHR	DUS	313	504	49
DUS	FRA	117	188	31
FRA	ATH	1130	1818	176
ATH	LHR	1510	2430	235
LGW	VCE	696	1120	108
LHR	AMS	231	372	61
AMS	MNL	6479	10425	1162
MNL	KUL	1546	2488	241
KUL	AMS	6363	10238	1141
AMS	LHR	231	372	61
MNL	BKK	1361	2190	212
BKK	KUL	754	1213	117