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Carbon Calculation Framework

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Carbon Calculation Tool Instruction Manual For Major Projects

Version 5c

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GLOSSARY

Carbon Dioxide (CO₂)	The most important greenhouse gas. CO ₂ emissions result from the combustion of fuel, from land use changes and from some industrial processes. CO ₂ emissions are limited by the Kyoto Protocol (Carbon Trust 2007).
Carbon Dioxide Equivalent (CO₂e)	There are six main greenhouse gases which cause climate change and are limited by the Kyoto Protocol. Each gas has a different global warming potential. For simplicity of reporting, the mass of each gas emitted is commonly translated into a carbon dioxide equivalent (CO ₂ e) amount so that the total impact from all sources can be summed to one figure (Carbon Trust 2007).
Carbon Footprint	The total set of greenhouse gas emissions caused by an individual or organisation, event or product. It should be expressed as CO ₂ e.
DBFO	Parts of the motorway and trunk road network are managed under Private Finance Initiative. These contracts are known as DBFO contracts (Highways Agency 2008).
Embodied Carbon	Greenhouse gas emissions associated with the life cycle of a product. This includes all emissions (or portion of emissions) that are released as part of all processes involved in creating, modifying, transporting, storing, disposing of and/or recycling the product (BSI, 2008).
Emissions Factor	Emissions factors enable a conversion to be made from the input measure of energy to the amount of carbon dioxide emissions that will result. UK conversion factors for energy and transport are published by the Department of Environment, Food and Rural Affairs (Defra).
Greenhouse Gas (GHG) Protocol	A widely used standard for emissions reporting. The protocol covers project emissions reporting and corporate emissions reporting. The corporate emissions reporting standard provides a methodology for calculation of a carbon footprint. The protocol was developed by the World Resources Institute and the World Business Council for Sustainable Development. It is available online from www.ghgprotocol.org (Carbon Trust 2007).
ISO 14064	ISO 14064 is an international standard for corporate emissions reporting. It builds on the approach outlined in the Greenhouse Gas Protocol. See www.iso.org for more information (Carbon Trust 2007).
MAC	Managing Agent Contractor: In order to manage England's strategic network, the Agency has divided the country into fourteen areas. Each of these Areas is assigned an Area team and a contractor, known as a Managing Agent (MA) or Managing Agent Contractor (MAC). Each Area team and corresponding Managing Agent is responsible for the maintenance of the Highways Agency's roads in their area. Area teams are part of Traffic Operations Directorate.
Tonne of Carbon	1 tonne of CO ₂ emissions occupies 556m ³ of space at 25 degrees Celsius and standard pressure.

1 INTRODUCTION

The Highways Agency as a Government Agency is committed to contributing to the Government's targets for greenhouse gas (GHG) emissions reductions. In June 2007, the Highways Agency published its first Sustainable Development Action Plan (SDAP) which established the target to investigate the Highways Agency's carbon footprint from construction, maintenance and network operations.

A Carbon Calculation Tool has been developed to enable the Highways Agency to identify the emissions baseline associated with the Highways Agency's activities. The Calculation Tool provides a means of capturing the volume of carbon produced through construction, maintenance and operational activities undertaken by the Highways Agency itself, its contractors and supply chain. The Calculation Tool also provides a reporting mechanism for the ongoing calculation of carbon and GHG emissions as part of an overall Carbon Management Strategy (CMS).

This Instruction Manual has been developed to support the Calculation Tool, and provides guidance on how to both collect the requisite data needed for the Tool and how to complete the workbooks after the data has been collected. The Data Collection Strategy (Section 1.1.1) describes the type of data that will need to be collated and reported and how this should be implemented. Section 3 provides specific instructions for Data Co-ordinators to enable them to complete the workbook.

Due to the inherent variability (of availability and reliability) of both the data required to complete the Calculation Tool and of the CO₂ conversion factors themselves, it has been necessary to draw some assumptions within the calculations. These assumptions are detailed in the Highways Agency Carbon Calculation Tool – Explanatory Report (March 2008).

1.1 OVERVIEW AND DESCRIPTION

The Calculation Tool is an Excel based tool comprising four work-books. Each work-book addresses the CO₂ emissions produced by the following key operations areas:

- Highways Agency Internal & Network Operations
- Major Projects
- Managing Agent Contractors (MACs)
- Design Build Finance & Operate (DBFO) Contracts

Section 3 of this Instruction Manual provides guidance specific to Major Projects, to enable data from each individual project to be entered into the Calculation Tool.

1.1.1 Data Collection Strategy (DCS)

The Calculation Tool has been designed to enable a large and varied data set to be collected, presented and interpreted at the most appropriate level. To help implement efficient data collection a DCS has been devised. Figure 1 below illustrates the different tiers through which information will be reported back to the Highways Agency and by whom. Table 1 is the accompanying key and further describes the reporting lines within each tier.

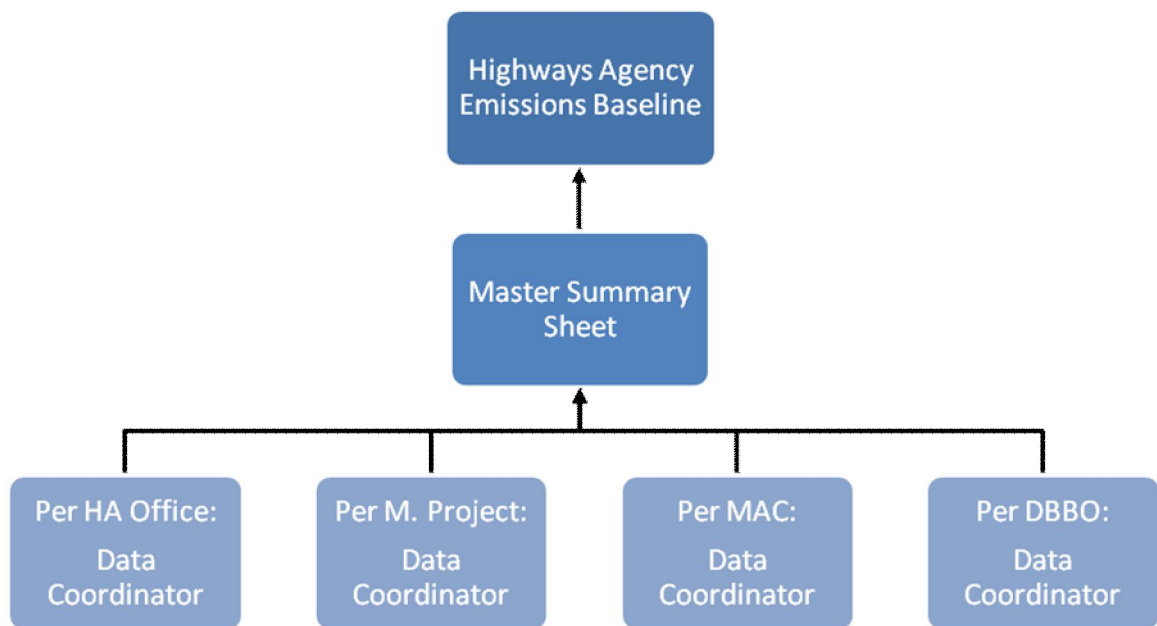


Figure 1: Highways Agency Emissions Calculation and Reporting Structure

1.1.2 Highways Agency Data Manager – Tiers 1 and 2

The Highways Agency Data Manager is responsible for co-ordinating the entire data collection process. This includes collating the completed Calculation Tool workbooks for Highways Agency Internal Offices, Highways Agency Network Consumption, Major Projects, MACs, DBFOs and Tolling Stations. As such, Tiers 1 and 2 of the DCS are the responsibility of the 'Highways Agency Data Manager', and are the highest level of reporting for the tool.

When the complete data set has been collected and entered into the workbooks, the workbooks are sent to the Highways Agency Data Manager where they are collated and interpreted. The Highways Agency Data Manager will be responsible for extracting the necessary information from the summary sheets of each workbook for the above Operational Areas, and collating this information into the Highways Agency Emissions Baseline.

1.1.3 Data Co-ordinators – Tier 3

Data Co-ordinators are responsible for overseeing primary data collection, and ensuring that ground level data collected from their Reporting Area is recorded correctly. They are also responsible for ensuring workbooks are completed and checked for accuracy. In addition, one of the key priorities for each Data Co-ordinator is to compile the comments sheet within the relevant workbook. Once completed, the workbooks should be forwarded to the Highways Agency Data Manager.

- **Highways Agency Internal Operations** – One Highways Agency Data Co-ordinator will be responsible for inputting data into, and managing the workbooks for each of the Highways Agency's offices, Regional Control Centres (RCCs) and outstations, and National Control Centre (NTCC). The internal operations will also include emissions in relation to Network Energy and Traffic Officer Operations.
- **Major Projects** - Due to the detail of the information required for Major Projects, it is recommended that a nominated Data Co-ordinator is identified for each individual Major Project.

Section 3 of this Instruction Manual provides the Data Co-ordinator with a step-by-step guide to completing each workbook and the individual spreadsheets within them.

- **MACs** - Where applicable, a Data Co-ordinator should be appointed in each main MAC Office. They will be responsible for organising collection of data within their office and also any associated out-stations, operational depots and small projects within their Reporting Area.
- **DBFOs** - Where applicable, a Data Co-ordinator should be appointed to obtain data for each individual DBFO Contract. They will be responsible for organising collection of data within their office and also any out-stations, operational depots and small projects associated with their DBFO Contract.

1.1.4 Reporting Timescale

As illustrated within Figure 2, data will be collected on a quarterly basis. An initial twelve months data is required to establish a baseline for future comparison and analysis. Interim assessment will be made at the end of each quarter. For each full twelve months of data, a full analysis of the data will be conducted and a report produced. Information will continue to be collected on a quarterly basis and reported on a rolling twelve month (annual) basis. For clarity, the adopted Quarters are indicated within the workbooks as follows:

- Quarter 1 – April, May June
- Quarter 2 – July, August, September
- Quarter 3 – October, November, December
- Quarter 4 – January, February, March

Further details of how data is collected and reported are provided within the workbook and in Section 3 of this Instruction Manual.

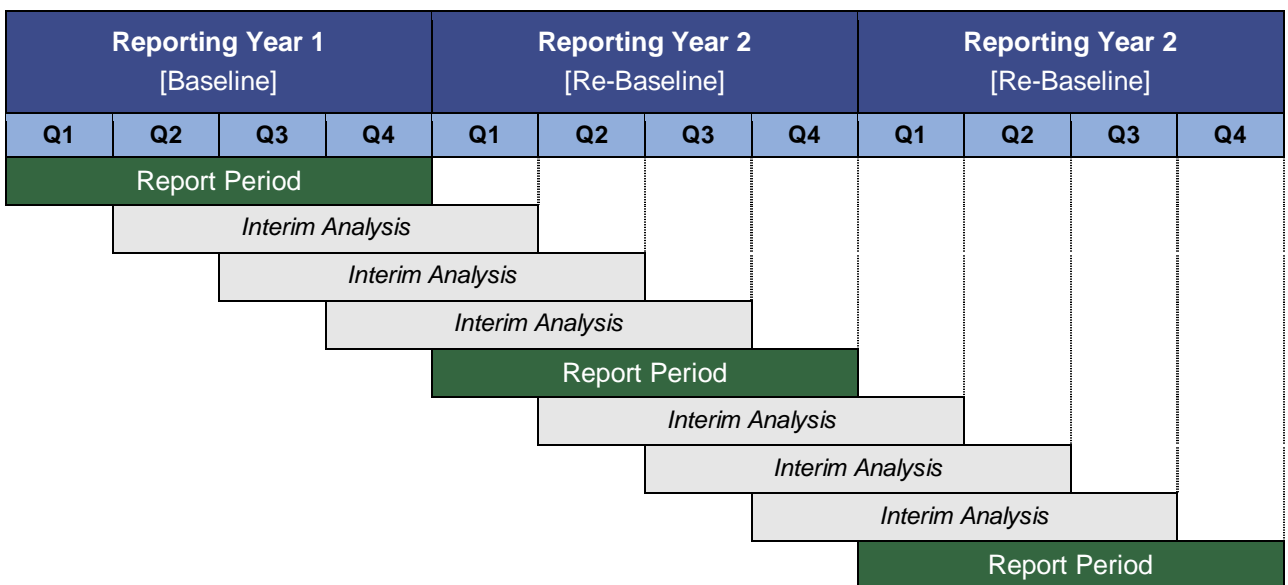


Figure 2: Rolling Data Collection and Reporting Chart

2 GETTING STARTED – WHAT YOU NEED TO KNOW

2.1 INSTRUCTIONS FOR DATA CO-ORDINATORS

Objectives - The objective of the Calculation Tool is to provide a robust, reliable means of measuring the Highways Agency's Emissions Baseline. This is to help ensure the Highways Agency meets their management targets year on year, and to enable the Highways Agency to identify areas of their business where CO₂ emissions reductions could be made. Essentially, you will be gathering raw data which will later be converted to provide an estimated volume of CO₂ emissions.

Your Responsibilities - The responsibility of the Data Co-ordinator is to research and gather the most accurate, up to date information available to complete the workbooks. You will be required to communicate with a broad range of people within your sector of the business to obtain the appropriate data.

Reporting Area – You, as the Data Co-ordinator, must ensure you know which office(s) and any associated facilities, out-stations, operational depots you are collecting data for.

Reporting Period – To keep on top of the large quantity of data you will collect, you will be required to gather information on a quarterly basis. Due to the inherent variability of data within the reporting periods, you may find that there are some sources of data collection that require little or no updating during every quarter.

Challenges and Issues - The greatest challenge you are likely to encounter is in obtaining the data itself. To maximise your efficiency, from the outset you should familiarise yourself with the type of data you will need to gather. A set of proformas has been designed to assist you with this exercise (see Appendix 1).

Time and resources during the data collection process are also likely to be a challenge. The sources of data are many and varied, and will involve speaking to a number of internal colleagues and, in some instances, sub-contractors and third party organisations. It is crucial that sufficient time and resources be allocated to the data collection process to execute this stage effectively.

Further Guidance and Help - If you require additional support or need clarification on any part of the Calculation Tool, you should contact the Highways Agency Data Manager.

2.2 GATHERING THE DATA

2.2.1 What Data is Required?

The information you will be required to gather relates specifically to the main sources of CO₂ emissions produced by the Highways Agency. In broad terms, these sources have been sorted into the following categories (an indication of the type of data required for each is also detailed below):

- 1. Energy & Utilities
- 2. Materials
- 3. Transport
- 4. Waste Removal

2.2.2 How to Obtain Required Data

You are likely to need to speak to many different members of staff across a variety of disciplines and out-stations in order to obtain all of the information required to complete the workbooks.

It may also be necessary for you to contact sub-contractors and third party suppliers directly, to acquire aspects of the data which are not available directly from your colleagues e.g. office utilities and construction materials suppliers. Further guidance on how far down your supply chain to go is provided within Section 3.2.

A set of proformas has been developed to assist you with the task of collecting and recording the requisite data, and are provided in Appendix 1. Each proforma has been divided into several sections to reflect the structure of the workbook it relates to, as indicated in Section 2.2.1 above. This will also help you to input the data into the workbooks during the next stage.

The proformas clearly identify the following:

- The data to be collected (scope).
- Units of measurement (e.g. km / miles, kg / tonnes, kWh).
- Time scale over which data should be collected (e.g. quarterly, annually).

Due to the variability of the emissions sources, the data itself will be collected in several different units e.g. kilowatt hours (kWh), kilometres (km), miles, tonnes, cubic metres (m³). Whilst the electronic workbooks themselves will later convert many of these into a consistent unit of measurement (e.g. miles to kilometres), it is **ESSENTIAL** that you accurately record the unit of measurement in which you have collected the raw data. It will be very time-consuming to return and rectify any mistakes made at this stage later on. To assist you with this process, the proformas ask you to select which unit of measurement you are entering your data in.

2.3 COMPLETING THE CALCULATION TOOL WORKBOOKS

2.3.1 Navigating the Workbooks

As illustrated in Figure 3, the Major projects workbook is divided into numerous spreadsheets, which are set out as follows:

- Preface
- 1. Energy & Utilities
- 2. Materials
- 3. Transport
- 4. Waste Removal
- 5. Summary
- 6. Comments Sheet
- 7. Emission Factors

Simply click on the tab to open the relevant spreadsheet you wish to enter data for.

Although you do not need to complete each part of the workbook in numerical order, you should work through them systematically to ensure all parts are complete.

You must also remember to **SAVE** your data.

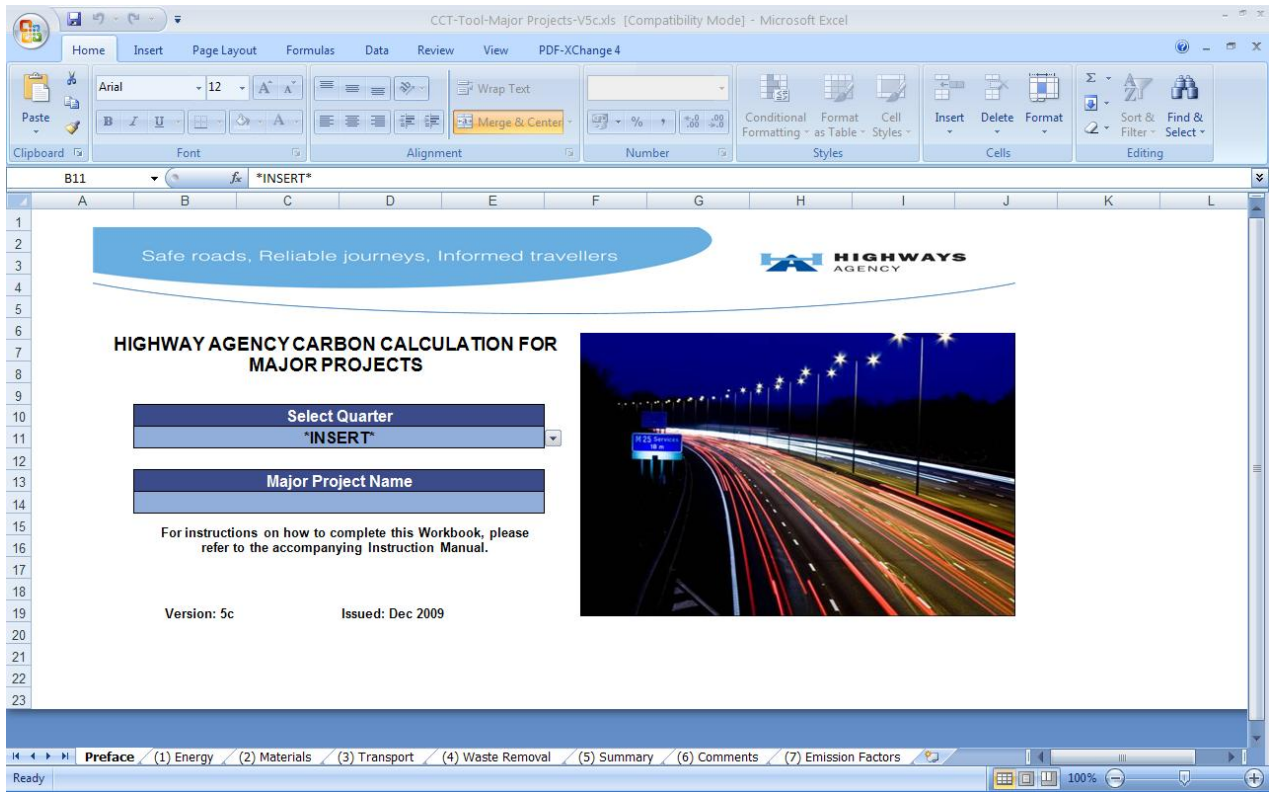


Figure 3: Workbook Preface

Data Entry

When you first open the workbook, you will be presented with a Preface Page. This simply tells you what version of the Calculation Tool you are using, and the opportunity to identify your Reporting Area and return quarter.

Cell Colour Key

The workbook’s cells have been coloured to clearly indicate the different functions of cells within the workbooks, as indicated in Table 2.

	Header
	Data / Automatic Calculation
	DATA ENTRY

Table 2: Workbook Cell Colour Key

For ease of use, the only cells which require you to manually enter data into them are coloured white.

Once you have entered your data, you will notice that there are several sections of the spreadsheets which will automatically update themselves. These cells are coloured blue, and do not require you to enter any further details.

After you have successfully entered your data, the workbooks will calculate the CO₂ emissions produced from the various emissions sources. The total volume of CO₂ emissions are presented in blue cells, highlighted in bold and the end of each section.

Drop-Down Menus

Throughout the workbooks, you will be asked to make choices about the type of data you are entering. These choices will be presented to you as a series of drop-down menus within the spreadsheets, from which you must choose the most applicable option.

To activate the drop-down menu, click on the cell. A list of options will then appear from which you should select the most relevant option.

Conversion Calculators

Several sections throughout the workbooks require your data to be converted to a specified unit of measurement. As such, you will be expected to undertake simple conversion calculations (e.g. miles to kilometres). To help you with this, 'conversion calculators' have been built into the spreadsheets in the relevant sections.

Comments Sheet

Tab 6 (Comments) of the Major Projects Workbook provides a space within the workbook for you to record any additional information, data or comments. A number of prompt questions are included, and it is important that you provide supporting information alongside your data return to assist the analysis.

2.4 WHAT HAPPENS NEXT?

2.4.1 Summary Sheets and Feedback to Highways Agency

After relevant data has been gathered, it should be entered into the workbooks. Full guidance for this process is given in Section 3. As each section of the workbook is completed, the volumes of CO₂ for that section are automatically fed into the summary sheet at the back of the workbook. The summary sheet generates a graphical representation of the volume of CO₂ generated by each emissions source in your Reporting Area, for the reporting period.

Whilst completing the workbook, you should check that the data is accurate and, when satisfied, forward each of the finalised workbooks to the Highways Agency Data Manager. It will then become the Data Manager's responsibility to extract the appropriate information from each of the individual summary sheets (of which there will be many) and collate these in the Highways Agency's Emissions Baseline.

2.5 KEY POINTS TO REMEMBER!

- Ensure you know which offices and sub-stations are included in your Reporting Area.
- Forewarn colleagues in your Reporting Area who you are likely to need information from.
- You will need to collect and compile your data on a quarterly basis.
- Ensure you are using the correct unit of measurement.
- Each workbook contains a set of simple step-by-step instructions.
- Wherever you see *INSERT*, click on the cell and a drop down menu will appear for you to select an option from.
- The **only** cells which require you to **enter data** into them are coloured **white**.

3 MAJOR PROJECTS – GUIDANCE FOR DATA CO-ORDINATORS

3.1 SCOPE OF REPORTING AREA

The “Major Projects” Reporting Area relates to the CO₂ emissions associated with the activities and operations carried out in association with each of the Highways Agency’s live Major Projects. Such projects typically include those of > £5million (total project spend).

A separate workbook should be completed for each live Major Project.

You should include CO₂ emissions at the point of purchase.

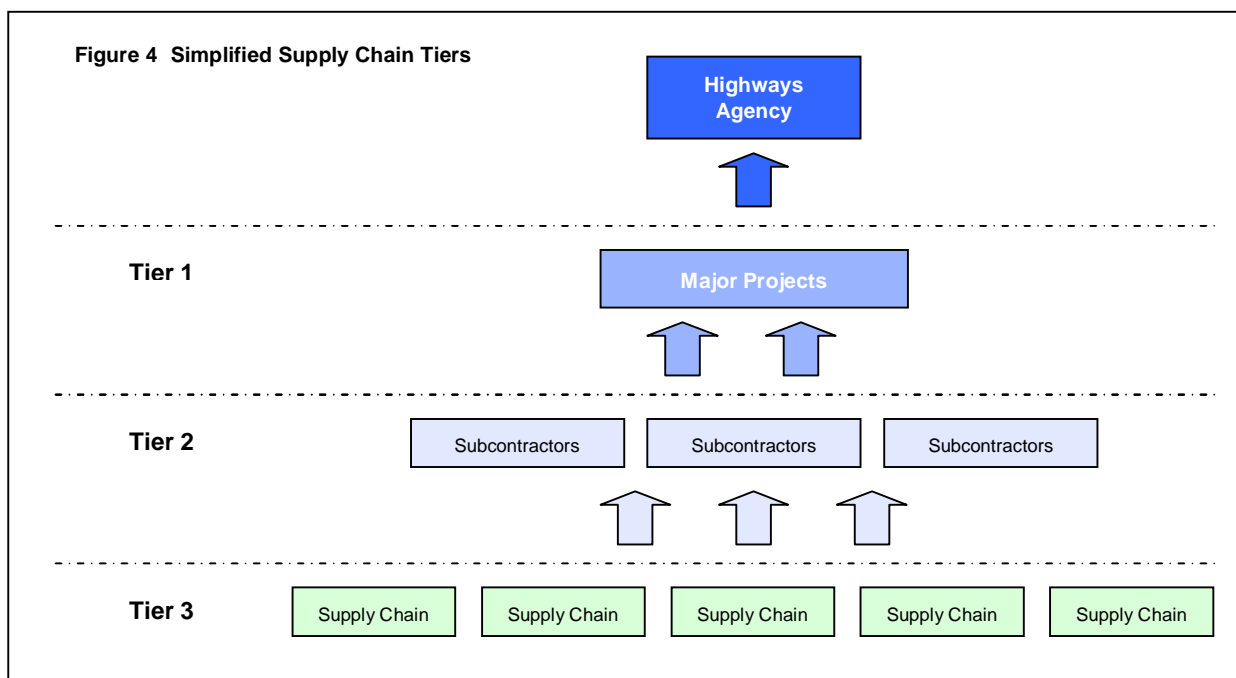
3.2 GUIDANCE ON REPORTING BOUNDARIES

The Highways Agency Major Projects include a wide range of contractors, who are involved in works and projects of varying types, scales, and durations. Major Projects include complex supply chains, undertaking significant activities on behalf of the Highways Agency. Since these activities are considered to be potentially significant in emission terms, they are to be included within the Calculation Tool. However, the Highways Agency will not be ‘responsible’ for all emissions within the supply chain, given that it does not have operational control (for example, of supply chain purchasing decisions).

The need to establish consistent emission reporting boundaries is therefore recognised, in order to incorporate emission sources in a consistent manner. These boundaries may be developed further as data collection within the supply chain progresses.

As illustrated within Figure 4, various supply chain tiers can be identified and the following applies:

- Those emissions arising from the Highways Agency and Tier 1 Major Projects fall within the scope of the Carbon Calculation Tool.
- **Only certain emissions from Tier 2** fall within the scope (as detailed below)
- **No emissions from Tier 3** fall within the scope.



Upon this basis, Figure 5 identifies the various emission categories and sources from within the Calculation Tool, and identifies the key boundaries to be reported on. Emissions are divided into those which are ‘direct’ to Major Projects, and those which are ‘indirect’, as summarised below:

Direct

- Major Project Utilities (i.e. gas / water)
- Major Project Fuel Use e.g. site plant, mobile plant
- Major Project Business Transport

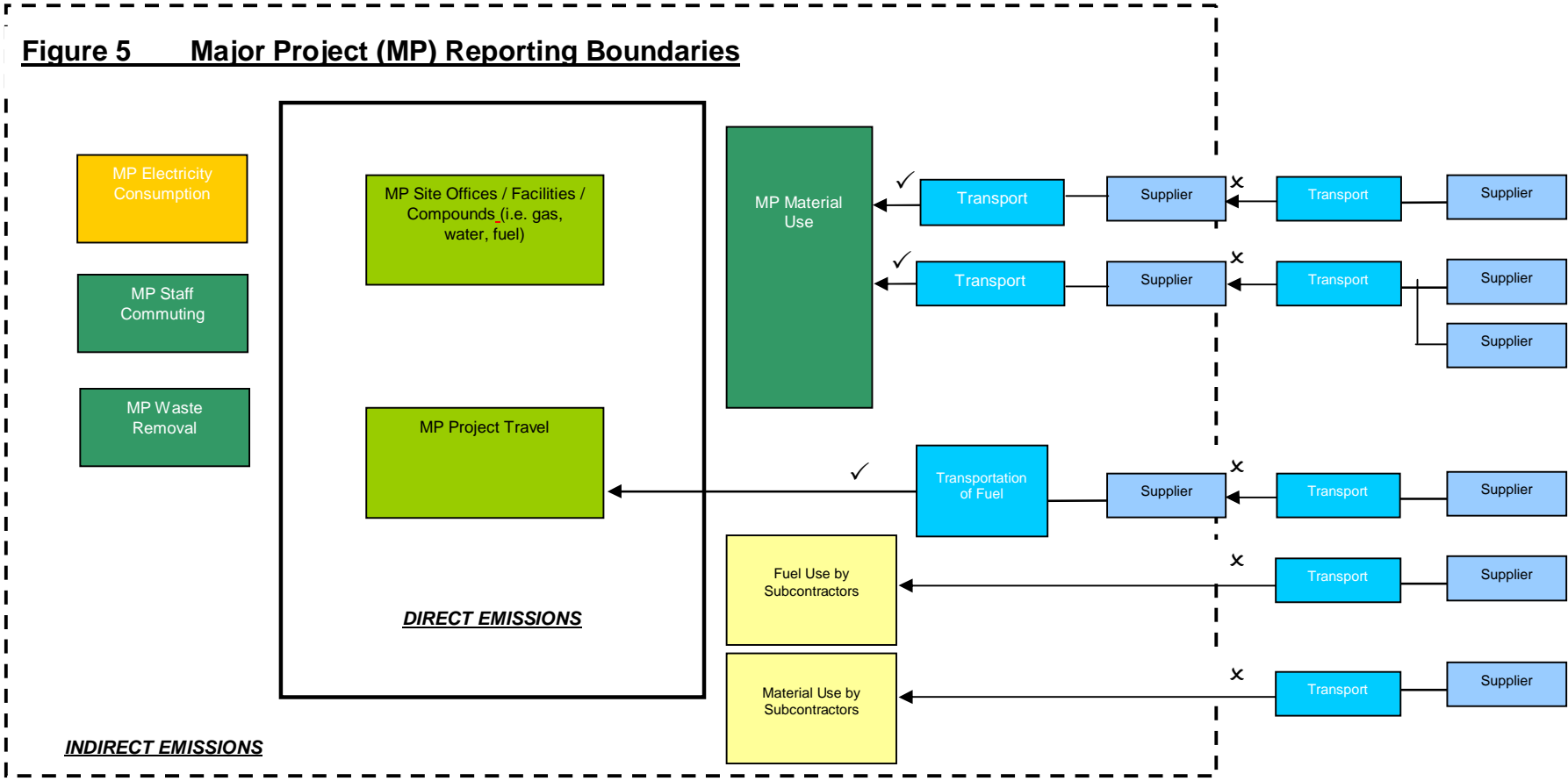
Indirect

- Electricity
- Other Transport (e.g. taxi's, hire cars, staff commuting)
- Waste Removal
- Major Project Material Consumption and Transport
- Tier 2 Subcontractor Material Consumption (where significant)
- Tier 2 Fuel Consumption

A distinction is to be made between fuel and material usage by Major Projects themselves, and the fuel and material usage by Major Project subcontractors. Within the context of the Calculation Tool, the following applies:

- Fuel and material consumption directly by Major Projects are within the scope of the Calculation Tool, in terms of the embodied carbon (which is based upon a 'cradle-to-gate' approach – i.e. covers all carbon emissions up to point of dispatch from the manufacturers' gate) and also in relation to transportation to site. This is illustrated within Figure 5 – the Carbon Calculation Tool scope does not include for transport further down the supply chain.
- Fuel and material consumption by Major Project subcontractors is included within the scope of the Calculation Tool only in terms of the embodied carbon of materials / fuel. Since the Highways Agency has no control of the transportation element, transport does not fall within the defined scope and should not be reported as part of the Highways Agency's Carbon Calculation.
- There is a question of 'significance' in terms of the Tier 2 Subcontractor materials and fuel consumption, in that only those sources considered to be of potential significance to overall emissions should be considered. Initial tests might be in terms of financial spend or volume consumption – as an initial estimate of significance. It is the responsibility of the Data Co-ordinator to determine the relevant significance.

Figure 5 Major Project (MP) Reporting Boundaries



- MP Direct Emissions
- MP Electricity Indirect*
- MP Indirect Emissions

* Although consumption occurs onsite, electricity emissions are classified as indirect within emission reporting schemes, given that emissions are released at the point of production (i.e. generation plants).

3.3 OPENING THE WORK BOOK

Once you have successfully gathered all of the information requested on the proformas (as provided in Appendix 1) for your Major Project, you should follow the instructions below to help you complete the Calculation Tool.

The emissions sources have been organised into the following main categories:

- 1. Energy
- 2. Materials
- 3. Transport
- 4. Waste Removal

The following sections of this Instruction Manual provide you with systematic, step-by-step instructions for completing each section of the work book. The instructions reflect the layout of the work book and enable you to quickly and easily find the relevant guidance for the section you require.

All data should be provided for the reporting period specified by the Highways Agency.

Upon opening your workbook, you will be presented with the 'Preface', and asked to enter your first piece of information, as illustrated below:

Section	Step	Action / Decision	Cell Ref
PREFACE			
	1	➤ Select the Reporting Period you are entering data for.	B11
	2	➤ Enter the name of the Major Project you are supplying data for.	B14

3.4 ENERGY

To select the Energy spreadsheet, click on tab '(1) Materials' at the foot of the workbook.

3.4.1 Scope

This section relates to energy which has been consumed carrying out operations and activities associated with your Major Project including, site compounds, offices and temporary traffic management measures. Fuel and energy consumption of fixed and mobile plant used during construction and development of Major Projects is also included.

It does not include:

- Energy requirements of Highways Agency offices and staff
- Energy requirements of the network itself (i.e. network lighting and communications systems);

3.4.2 Instructions for Major Projects – ENERGY

Section	Step	Action / Decision	Cell Reference
(1) ENERGY			
A		SITE OFFICES AND FIXED PLANT	
	1	➤ Enter the appropriate amount of energy / fuel consumed on your site during the reporting period. Ensure that you enter the data in the unit that has been specified in Column D.	E12 – E20
	Output	The volume of CO ₂ (in tonnes) generated by the electricity consumption of your office is shown in the cell at the end of Section A.	F21
B		MOBILE PLANT	
		Two methods have been provided to estimate CO ₂ emissions produced by mobile plant on your site. <i>Method A</i> should be used in the first instance to enter consumption fuel data. If using Method A, proceed to Step 1. If fuel consumption data is unavailable use <i>Method B</i> and proceed to Step 2. Do not use Methods A and B simultaneously.	
	1	➤ Enter the appropriate amount of energy / fuel consumed by mobile plant on your site during the reporting period. Ensure that you enter the data in the unit that has been specified in Column D.	E35 – E38
	2	➤ From the projects listed in Column C, decide which category best describes your project. In the corresponding cell in Column E, enter the number of weeks that your project has been in development during the reporting period.	E44 – E47
	Output	➤ The volume of CO ₂ (in tonnes) generated by the energy requirements of mobile plant on your site is shown in the cell at the end of Section B.	F48

3.5 MATERIALS

To select the Materials spreadsheet, click on tab '(2) Materials' at the foot of the workbook.

3.5.1 Scope

This section relates to the volume of embodied CO₂ in a selection of materials commonly used by Major Projects during construction.

This section also provides a methodology for calculating CO₂ emissions produced during the transportation of these materials from supplier to the Major Project site.

3.5.2 Instructions for Major Projects – MATERIALS

Section	Step	Action / Decision	Cell Reference
(5) MATERIALS			
A		CONSTRUCTION MATERIALS	
		This table provides a list of materials used in Major Projects. The materials are listed alphabetically and grouped by category on the left hand side of the spreadsheet. You should only enter data for materials purchased within the reporting quarter for your Major Project.	
	1	➤ Select the unit of measurement for your materials e.g. m ³ or tonnes. Click on *Insert* and select the appropriate unit from the drop-down menu.	Column D
	2	➤ Insert the volume / quantity of each material listed, that was purchased during the reporting period.	Column E
	2a (metals Only)	➤ Step 2a applies only to Steel and Aluminium used in refurbishment projects. Where appropriate, enter the estimated proportion of recycled steel and aluminium purchased during the reporting period.	Column F
	3	➤ For each material, enter transport distances in tonne-km for (i) shipping; (ii) rail; and (iii) road transport. Additional guidance to assist calculating tonne-km is included within Appendix 2.	Columns G – K, as appropriate
	3a	➤ Where tonne-km distances are not available, an average transport distance to cover all materials should be applied. It is assumed that this average value consists only of road transport.	
	Output	The volume of CO ₂ emissions embodied in materials is shown at the end of Section A.	L139
		The volume of CO ₂ produced through the transportation of materials is shown at the end of Section A.	
B		LIGHTING, ITS & VEHICLE RESTRAINT SYSTEMS	
		This section relates to the volume of CO ₂ embodied in the content of lighting and communications equipment used across the Network. In addition, the CO ₂ emissions produced through the transportation of the equipment from supplier to site are also calculated. The table provides a list of lighting and communication materials. The materials are listed alphabetically and grouped by category on the left hand side of the spreadsheet. You should only enter data for materials purchased within the reporting period for your Major Project.	
	1	Enter the number of units e.g. lighting columns, metres of cable, for the MAC / project.	Column E
	2	Enter the total distance the material has travelled from source to site.	Column G
	2a	➤ If the distance is not known, enter the estimated (average) distance the material has travelled by road to your site.	Column H

Section	Step	Action / Decision	Cell Reference
	Output	The volume of CO ₂ emissions embodied in the lighting and communications equipment is shown at the end of Section C.	I171
		The volume of CO ₂ produced through the transportation of lighting and communications materials is shown at the end of Section B.	J171 – K171

3.6 TRANSPORT

To select the Transport spreadsheet, click on tab '(3) Transport' at the foot of the workbook.

3.6.1 Scope

This section relates to the volume of CO₂ emissions produced by contractors using vehicles to undertake travel associated with a Highways Agency Major Project. This includes staff business and commuting miles travelled using both private and public transportation.

This section does not include CO₂ emissions produced by:

- Highways Agency Staff on business travel
- Haulage of materials
- Static and mobile plant

Transport Distance Conversion

A conversion tool is included with Tab (3) – Transport to convert from miles into kilometres. Enter the mileage into the blank cell, and a value will be automatically calculated. Insert this value into the appropriate transport cell.

Distance Conversion	
Enter Mileage	Kilometres
	0.00

3.6.2 Instructions for Major Projects – TRANSPORT

Section	Step	Action / Decision	Cell Ref
(3) TRANSPORT			
A		PROJECT TRAVEL	
		If you know the amount of fuel consumed by Highways Agency project related travel, by your Reporting Area during the last quarter, proceed to Method A and follow the " <i>Fuel-based Method</i> ".	
		If you do not have fuel data available, proceed to Method B and follow the " <i>Distance-based Method</i> ".	
	1	<i>Fuel-based Method</i>	
		➤ Enter the number of litres of each type of fuel consumed by your Reporting Area during the last quarter. (NB: You do not need to select the mode of transport used).	F19 – G21
	OR	<i>Distance-based Method</i>	
		This part of the table is divided into several modes of transport.	
		➤ Enter the number of km travelled by the corresponding mode of transport during the last quarter.	F23 – F46
	Output	The volume of CO ₂ emissions produced through project related travel is shown in the cell at the end of Section A.	G47

Section	Step	Action / Decision	Cell Ref
B			
EMPLOYEE COMMUTING			
	Step 1	➤ Select the mode of travel your staff uses to commute to work.	
	Step 2	Enter the total number of km travelled by commuting staff, per mode of transport, during the reporting period. Commuting distance should be calculated as a round-trip.	E59 – E65
	Output	The volume of CO ₂ emissions produced through staff commuting to and from work is at the end of Section B.	F66
C			
FUEL TRANSPORTATION			
This section only includes fuel which has been delivered to site.			
	1	➤ Enter the TOTAL volume of petrol / diesel / biodiesel delivered to site for your reporting period.	C79 – C81
	2	➤ Insert delivery distance in km where known, OR	E79 – E81
		➤ Where distance not known, estimate delivery distance from drop-down menu. For ease of use, four options are available: less than 25km, 25-50 km, 50-150km, and greater than 150km.	F79 – F81
	Output	The volume of CO ₂ (in tonnes) generated by transportation of fuel is shown at the end of Section C.	G82

3.7 WASTE REMOVAL

To select the Waste Removal spreadsheet, click on tab '(4) Waste Removal' at the foot of the workbook.

3.7.1 Scope

This section relates to the volume of CO₂ emissions produced through the transportation of removing waste. Waste materials include those generated from Major Project site compounds and offices, and waste materials from Major Project construction activities.

This section does not include:

- Embodied CO₂ in waste or disposal method.

3.7.2 Instructions for Major Projects – WASTE REMOVAL

Section	Step	Action / Decision	Cell Ref
(4) WASTE REMOVAL			
A			
SITE OFFICE WASTE REMOVAL			
		Two methods have been provided for you to estimate your volume of waste. Select Method A if you know the volume of waste collected, or Method B if the volume of waste is unknown. The methods can be used simultaneously if multiple waste storage methods are used. However, you should ensure that no waste is double-counted.	
Method A	1	➤ Enter the number of black bags, or bins, collected during your rubbish collection.	D23 – D29
	2	➤ Enter the number of rubbish collections during the reporting period.	E23 – E29
	3	➤ Enter how full your bin-bags or bins are when collected	F23 – F29
	4	➤ Enter the total distance your waste is transported from site to waste facility.	H23 – H29 I23 - I29
Method B		➤ Choose to use EITHER enter the number of staff working in your Reporting Area, OR the area of floor space of your office(s) / out-station(s).	
	1	➤ Enter the number of weeks in your reporting period.	D34 - D35

Section	Step	Action / Decision	Cell Ref
	2	➤ Where the volume of waste collected from your office is not known, insert EITHER the number of employees or occupied floor area you are reporting for.	F34 or E35
	3	➤ Enter the distance (km) your office waste is transported from site to waste facility. If the distance is not known, use the drop-down menu to estimate the distance.	H34 – H35 I34 – I35
INDICATIVE RECYCLED OFFICE WASTE REMOVAL			
	1	➤ Enter the number of units of each item listed that is recycled during an average week / month (as indicated in the spreadsheet), during the reporting period. Take care to enter the correct units.	E40-E46
	2	➤ Enter the distance, in km, the waste is transported from your Reporting Area to the recycling facility.	F40-F46 / G40-G46
	Output	The volume of CO ₂ emissions generated through transporting office and recycled office waste is shown at the end of Section A.	I49
B CONSTRUCTION WASTE REMOVAL (BY EURO CODE CLASSIFICATION)			
		Note: Use this section to enter construction waste volumes for materials listed by Euro Code Classification. For any construction materials not listed, use Steps 3 and 4.	
	1	➤ Enter the volume (in tonnes) of each type of waste material (listed in Columns A and B) removed from your site, during the reporting period.	E64-E79
	2	➤ Enter the distance, in km, the waste is transported from your Reporting Area to the point of disposal (e.g. landfill).	F64-F79 / G64-G79
	Output	The volume of CO ₂ emissions generated through transporting construction waste collected is shown at the end of Section B.	H80
		Note: Use this section to enter construction waste volumes for materials listed not listed in Section C above.	
	3	➤ Enter the volume (in m ³) of each type of waste material (listed in Column B) removed from your site, during the reporting period.	C84-C86
	4	➤ Enter the distance, in km, the waste is transported from site to the waste facility.	D84-D86 / E84-E86
		The total volume of CO ₂ emissions generated by transportation of construction waste is shown at the end of section B.	F87

3.8 SUMMARY

3.8.1 Scope

To select the Summary spreadsheet, click on tab '(6) Summary' of the workbook.

As each section of the workbook is completed, the volumes of CO₂ for that section automatically feed into the summary sheet at the back of the workbook. The summary sheet generates a graphical representation of the volume of CO₂ generated by each emissions source in your Reporting Area, for the reporting period.

3.9 COMMENTS

To select the Comments spreadsheet, click on tab '(6) Comments' at the foot of the workbook.

3.9.1 Scope

This section has been provided to collate qualitative and supporting information in relation the data entered within the preceding sections. It is important that this section is given due consideration when completing the Calculation Tool. There are also a number of prompt questions to be completed.

This section provides the opportunity to detail any emission reduction activities which have been investigated or implemented.

Section	Step	Action / Decision	Cell Ref
(6) COMMENTS			
CHECKLIST			
	1	➤ Select 'Yes' or 'No' in answer to the question. If you do answer no, go back to Sheet 1 and select the Reporting Period.	L3
	2	➤ Select 'Yes' or 'No' in answer to the question. If you do answer no, go back to Sheet 1 and enter the DBFO Contract.	L5
	3	➤ Select 'Yes' or 'No' in answer to the question.	J8 – J11
	4	➤ Provide details of any operational areas for which data has not been included and an explanation why.	B14
	5	➤ Provide details of any specific materials for which data has not been included and an explanation why.	B17
	6	➤ Provide details of any materials which have been combined and included within material categories	B20
	7	➤ Detail how you have calculated your material transportation distances.	B23
	8	Provide details of any emission reduction activities which have been investigated or implemented. This might highlight any activities which you feel are not represented through your data return. e.g. Do you have hybrid car fleet? Have you implemented staff travel plans? Do you reduce idling time of plant? Do you adopt teleconferencing for meetings?	B26
	9	Provide details of any other emission reduction activity you have employed related to your Major Project, which has not already been represented within your data return e.g. what measures have you used to reduce energy consumption on site? How have you reduced waste on site? Have you reused materials from another site?	B29

3.10 COMPLETION OF WORKBOOK

Upon completion of the workbook, the Data Co-ordinator should check for accuracy and, when satisfied with the data, forward the finalised workbook to the Highways Agency Data Manager.

4 REFERENCES

BSI (2008) PAS 2050 – Specification for the measurement of the embodied greenhouse gas emissions in products and services. British Standards Institute Working Draft.

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Hammond, G., and Jones, C. (2006) Inventory of Carbon & Energy (ICE) Version 1.5a Beta, University of Bath and 2008 update.

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DEFRA (2007) Guidelines to Defra's GHG Conversion Factors for Company Reporting

DEFRA (2008a) <http://www.defra.gov.uk/environment/statistics/globalatmos/kf/gakf05.htm>

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APPENDIX 1: MAJOR PROJECTS PROFORMA

HIGHWAYS AGENCY MAJOR PROJECTS

DATA COLLECTION PROFORMA

You will need to collect the following information for your Reporting Area, for the reporting period. The reporting period will be quarterly unless otherwise stated.

Enter the name of your Reporting Area:	
Enter the dates of your Reporting Period:	

SECTION 1: ENERGY

What You Need To Know:		Unit of Measurement	Enter Data
The amount of fuel / energy consumption used by for your site offices and fixed site plant (e.g. generators), from the following energy sources:			
1	Electricity	kWh	
2	Gas	kWh	
3	Gas Oil	Litres	
4	Petrol	Litres	
5	Diesel	Litres	
6	Biodiesel	Litres	
7	Fuel Oil	kWh	
8	Burning Oil / Kerosene	Litres	
9	Water	Cubic metres	
The amount of fuel / energy consumption used by mobile plant (i.e. those licensed for use on the public highway), from the following energy sources:			
10	Petrol	Litres	
11	Diesel	Litres	
12	Biodiesel	Litres	
13	Electricity	kWh	
14	If you do not know the energy consumption of mobile plant on your site, you will need to find out the total cost of your major project and the number of staff permanently on site.	Project Cost (£m)	
		No. of Permanent Site Staff	

15	The duration of your Major Project.	Weeks	
The amount of fuel transported directly to site:			
16	Petrol	Litres	
17	Diesel	Litres	
18	Biodiesel	Litres	

SECTION 2: MATERIALS

What You Need To Know:		Unit of Measurement	Enter Data
		DELETE AS APPROPRIATE	
1	For all construction materials supplied to your Reporting Area / site, you will need to know the distance between the supplier and site of delivery.	km / miles	
2	<p>There are many different types of construction materials used within Major Projects. You will need to know which materials have been used, the quantity and the distance they have been transported from supplier to site.</p> <p>For a full list of the materials, you should refer to spreadsheet (2) Materials, from the Highways Agency Major Projects Workbook.</p>	Ensure that for each material listed within the spreadsheet you have recorded the material in the specified unit of measurement.	

SECTION 3: TRANSPORT

This section requires you to obtain data relating to business and commuter travel. You will need to find out the amount of money spent on fuel, and the type of fuel bought, during your reporting period. Where this data is unobtainable, you will need to find out the number of business miles driven by staff in your Reporting Area.

What You Need To Know:		Unit of Measurement	Enter Data
1	The amount of petrol used for project/business travel.	£ or Litres	
2	The amount of diesel used for project/business travel.	£ or Litres	
3	The amount of LPG used for project/business travel	£ or Litres	
The number of miles / kilometres (as applicable) driven during business travel for the following vehicle models:			
4	Small Petrol Car: <1.4 litre engine	km / miles	
5	Medium Petrol Car: 1.4 – 2litre engine	km / miles	
6	Large Petrol Car: >2 litre engine	km / miles	

7	Any other miles driven in petrol vehicle where car size is unknown.	km / miles	
8	Small Diesel Car: <1.7 litre engine	km / miles	
9	Medium Diesel Car: 1.7 – 2litre engine	km / miles	
10	Large Petrol Car: >2 litre engine	km / miles	
11	Any other miles driven in diesel vehicle where car size is unknown.	km / miles	
12	Hybrid Car: Medium engine	km / miles	
13	Hybrid Car: Large engine	km / miles	
14	LPG Car: Medium engine	km / miles	
15	LPG Car: Large engine	km / miles	
16	Any other miles driven in LPG vehicle where car size is unknown.	km / miles	
17	Any other miles driven in a car where size and fuel are unknown.	km / miles	
18	Small Motorbike: Up to 125cc	km / miles	
19	Medium Motorbike: 125 – 500cc	km / miles	
20	Large Motorbike: >500cc	km / miles	
21	Motorbike: Unknown engine size	km / miles	
22	Bus	km / miles	
23	National Rail	km / miles	
24	Underground	km / miles	
25	Tram / Light Rail	km / miles	
The number of miles / kilometres (as applicable) driven whilst COMMUTING to work, for the following vehicle models:			
46	Average Petrol Car	km / miles	
47	Average Diesel Car	km / miles	
48	Car: Unknown Fuel	km / miles	
49	Average Petrol Motorbike	km / miles	
50	Local bus	km / miles	
51	Long distance coach	km / miles	

52	Train – National Rail	km / miles	
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SECTION 4: WASTE REMOVAL

What You Need To Know:		Unit of Measurement	Enter Data
1	The number of waste collections in your reporting period.	-	
2	The distance from your Reporting Area to the waste facility	-	
3	The average number of black bin bags of rubbish thrown away on each waste collection day.	No. of Black Bags	
4	The number and size of waste containers used within your Reporting Area.	No. of 240 litre containers	
		No. of 600 litre containers	
		No. of 1100 litres containers	
		No. of 2000 litres containers	
		No. of 3000 litre containers	
5	On average, how full are your bins when collected?	% full	
6	Number of Wheelie Bins used within your Reporting Area.	No. of Wheelie Bins	
7	On average, how full are your bins when collected?	% full	
8	If you do not have accurate data regarding your waste collections, you will need to estimate the floor space of the building / facilities for which you have no data.	m ²	
9	How many staff work in the Reporting Area you do not have waste data for?	No. of Staff	
10	How much recycled office paper and cardboard do you recycle each week?	No. of black bags	
11	How many aluminium cans do you recycle each week?	No. of cans	
		No. of black bags	
12	How many printer toner cartridges do you recycle during the reporting period?	No. of cartridges	

What You Need To Know:		Unit of Measurement	Enter Data
13	How many tonnes of waste construction material were removed from your site during the reporting period? You will need to enter these materials by Euro Code Classification as denoted in Section 4B of the Workbook. If this is not possible, an estimate should be made of the volume (m ³) of inert and hazardous construction waste removed from site.	Tonnes	
		m ³	

APPENDIX 2: MATERIAL TRANSPORT DISTANCE CALCULATION

Material Transport Distance Calculations

Within the current version of the Calculation Tool, under Materials Tab (2) there are two ways in which material transportation distances can be included: (i) based upon actual known distances; or (ii) based upon an average distance applied to all materials. The input field for each method is indicated below.

(i) Actual transport distances
under Step 3

(ii) Average transport
distances under Step 3a

(2) MATERIALS

A - Construction Materials

This spreadsheet identifies the embodied CO₂ content of materials used during construction of Major Projects. In addition, the CO₂ emissions produced through the transportation of the materials from source to site are also calculated.

Instructions

Step 1 - Use the drop down menu to select the unit of measurement in which you will enter the volume or weight of construction material.
 Step 2 - Insert quantity (in unit specified) of relevant materials, purchased during reporting period.
 Step 2a - For Metals only, insert the proportion (%) of metals derived from recycled sources.
 Step 3 - Insert relevant total transport tonne-km for each material.
 Step 3a - Where tonne-km data is not available, insert average transport distance for all material entered under Step 2. *Note: This only covers road transport.*

Category	Type of Material	Step 1	Step 2	Step 3			Step 3a	Embodied (tCO ₂)	Transport (tCO ₂)	Estimated Road Transport (tCO ₂)
		Unit	Total Material Purchased	Tonnage	Total Shipping Tonne km	Total Rail Tonne km	Total Road Tonne km			
Cements	Cement: general	*INSERT*	676.66	0	6767.68			0.00	0.07	0.00
	Cement: general - 25% fly ash	*INSERT*		0				0.00	0.00	0.00
	Cement: general - 50% fly ash	*INSERT*		0				0.00	0.00	0.00
	Cement: general - 25% blast furnace slag	*INSERT*		0				0.00	0.00	0.00
	Cement: general - 50% blast furnace slag	*INSERT*		0				0.00	0.00	0.00
	Fibre Cement	*INSERT*		0				0.00	0.00	0.00
	Portland Cement (dry kiln)	*INSERT*		0				0.00	0.00	0.00
	Portland Ash Cement	*INSERT*		0				0.00	0.00	0.00
	Soil-Cement	Tonnes		0				0.00	0.00	0.00

Embodied (tCO ₂)	0.00
Shipping (tCO ₂)	0.07
Rail (tCO ₂)	0.00
Road (tCO ₂)	0.00
Average Road (tCO ₂)	0.00

(i) Known Transport Distances

Where transport distances are known, data is input into the Calculation Tool in the form of tonne-kilometres (tkm). One tonne kilometre is the equivalent to one tonne of material being transported for 1km. Therefore, if you have 25 tonnes of aggregate being transported by road at a distance of 25km, the total tkm value would be calculated as follows:

➤ 25 tonnes x 25 kilometres = **625 tkm**

Using this method you can also account for multiple transport distances and deliveries. For example, if you had 25 tonnes of aggregate being transported by road at a distance of 25km, and a further 15 tonnes from a different supplier at 15km, the total tkm value would be calculated as follows:

- 25 tonnes x 25 kilometres = 625 tkm
- 15 tonnes x 15 kilometres = 225 tkm
- 625 + 225 = **850 tkm**

There is also the option to include materials travelling by rail and ship, or multiple transport modes. For example, this might be significant for road salt supplies which have been transported from Scandinavia via ship, and then by road freight to the point of delivery. Table 1 works through an example of how such data might be collated from two suppliers of aggregate and inserted into the Calculation Tool.

Please note that material volumes and tonne-kilometres is the only aspect that you should provide data for. You do not need to account for any additional factors such as vehicle loading, as this is already accounted for within the applied emission factors and is an accepted assumption as part of the Calculation Tool.

(ii) Unknown Transport Distances

Where the above data is not known or currently available, it is possible to provide an estimated average transport distance to all materials. Please note that this is the least preferred method due to data accuracy and it is not possible to account for different material transport distances within each material type. An average transport distance (in km) should be inserted into the workbook under Step 3a, as indicated above. This will only account for road based transport.

As an example, for the transport of 50 tonnes of aggregate, inserting a value of 50km will assume that each tonne of material has travelled 50km. The total tkm assumed within the calculations will therefore be 50t x 50km = 2,500 tkm.

Table 1 Worked Example of Tonne-Kilometre Data

Category	Material Type	Description	Tonnage	Supplier	Supplier Location	Shipping Distance (km)	Shipping t/km	Rail Travel (km)	Rail t/km	Road Travel (km)	Road t/km
Quarry Sourced	Aggregate	Type 1 Sub-base	1000	Aggregate Ltd	Norway	750	750,000	0	0	75	0
		Type 1 Sub-base	800	Agg Ltd	Glasgow, Scotland	0	0	350	280,000	50	40,000
	Total		1,800				750,000		280,000		115,000

The screenshot shows a Microsoft Excel spreadsheet titled 'CCT-Tool-MAC-V5.xls'. The main data table is as follows:

Category	Type of Material	Unit	Step 1	Step 2	Step 3	Step 3a	Embodied (tCO ₂)	Transport Emissions (tCO ₂)	Estimated Road Transport (tCO ₂)		
			Total Material Purchased	Quantity (Tonnes)	Total Shipping Tonne-km	Total Rail Tonne-km	Total Road Tonne-km	Average Transport Distance (km)			
Quarry Sourced Material	Quarried aggregate	Tonnes	1800	1800	750000	280000	115000		14.40	29.31	0.00
	Recycled aggregate	*INSERT*		0					0.00	0.00	0.00
	Asphalt	*INSERT*		0					0.00	0.00	0.00
	Bitumen	*INSERT*		0					0.00	0.00	0.00
	Standard Brick	*INSERT*		0					0.00	0.00	0.00
	Facing bricks	*INSERT*		0					0.00	0.00	0.00
	Clay	*INSERT*		0					0.00	0.00	0.00
	Vitrified clay pipe DN 100-200	Length (m)		0					0.00	0.00	0.00
	Vitrified clay pipe DN 200-300	Length (m)		0					0.00	0.00	0.00
	Sand	*INSERT*		0					0.00	0.00	0.00
Soil	*INSERT*		0					0.00	0.00	0.00	

Overlaid on the spreadsheet is a summary table with the following data:

Shipping (tCO ₂)	0.00
Rail (tCO ₂)	0.00
Road (tCO ₂)	0.00
Average Road (tCO ₂)	0.00

Arrows in the image point from the summary table to the corresponding columns in the main spreadsheet: Shipping (tCO₂) to Total Shipping, Rail (tCO₂) to Total Rail, Road (tCO₂) to Total Road, and Average Road (tCO₂) to Average Transport Distance.