Automotive Supply Chain Best Practice Recommendation

Guidelines for Reporting Freight Greenhouse Gas Emissions

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CONTRIBUTORS

These Guidelines have been written by a working party created under the auspices of Odette International and including the following individuals:

Blechschmidt, Manja	Audi AG, Germany
Buchanan, John	Ford Motor Company Ltd - Project Leader
Canvin, John	Odette International
Carlson, Raul	Viktoria Swedish ICT, Sweden
Dagher, Elie	Renault SAS, France
Dinçarslan, Özlem	TOFAŞ, Turkey
Li, Yiyang	Renault SAS, France
Lindgren, Sten	Odette Sweden
Morbin, Robert	SMMT, UK
Özkan, İbrahim	TOFAŞ, Turkey
Robert, Frederic	Renault SAS, France
Soderlind, Andreas	Volvo Group, Sweden
Tomingas, Michael	Volvo Group, Sweden
Turner, Jeff	Odette International
Walker, Robert	SMMT, UK

The team is very grateful to a number of other individuals for their contributions and comments during the pre-publication review stages of this document.

EXECUTIVE SUMMARY

Freight Greenhouse Gas (GHG) reporting is becoming an increasingly important topic for the industry and cannot be ignored.

New standards are being published and there are rising demands for data both from external customers and public bodies as well as to meet the internal GHG accounting objectives of companies.

These Guidelines have been published by Odette specifically for the automotive sector. They are directed at helping all those involved to understand the basic principles and to adopt a consistent approach that will support both recent and future standards and legislative requirements.

Rather than introducing new methodologies, these Guidelines make recommendations based on use of the most appropriate existing initiatives. These are initiatives being adopted by industry as a whole and so these Guidelines may be helpful to those engaged in other sectors besides automotive.

Companies may have different objectives for GHG reporting and so, as explained in these Guidelines, may need to use different calculation methods. The over-riding principle however must be that methods used should be clearly explained and transparent and that they should be based on publicly recognised approaches.

6 Steps to Success:

1) Identify your reporting objectives
2) Understand the sources of your emissions
3) Select your calculation method
4) Gather required data as accurately as you can
5) Present results in an appropriate report including methodology used and all assumptions made
6) Use publicly recognised methods and emissions factors as referenced in these Guidelines wherever possible

HIGH LEVEL SUMMARY OF THE GUIDELINES

The Guidelines begin with a general introduction (Section 1) and then follow with some background information to explain why GHG reporting is becoming an increasingly important issue (Section 2).

There then follows the core sections of the Guidelines which can be used as a step by step approach to best reporting practice, summarised below. (The methods used are based on several existing standards for Greenhouse Gas Reporting, referenced in Section 4).

Final sections of these guidelines cover strategies for reducing emissions (Section 9) and a discussion on future trends in GHG reporting (Section 10).

KEY STEPS TO FREIGHT GREENHOUSE GAS REPORTING

1) **Identify your reporting objectives** Refer Section 3

This may be to answer requests from external sources or for your own internal needs

- Sections 3.2-3.4 explain different aspects to consider, depending on your objectives

  (Section 3.3.1 introduces the French Decree)

2) **Understand the sources of your emissions** Refer Section 5
- Breakdown your operations into systems/ sub-systems
- If your freight emissions are to be part of wider company reporting then the Greenhouse Gas Protocol framework can be used as explained in Section 5.3
- Align your approach with your objectives- Section 5.4

3) **Select your calculation method** Refer Section 6
- Generate a best estimate of fuel used and then calculate the resulting emissions as explained in Section 6.1
- As a default, Odette recommend following the CEN methodology as described in Section 6.2. This section also discusses assumptions required and methods of allocating emissions for shared transport

4) **Gather required data** Refer Section 7

Accuracy of results will depend on quality of data available

- Section 7.1 defines the different accuracy levels that may be used
- Section 7.2 discusses ways of collecting the necessary data
- Section 7.3 explains where to get appropriate emissions factors to use for the calculations

5) **Present results in an appropriate report** Refer Section 8

Makes sure all necessary explanations and references are submitted with your report

- Section 8.2 identifies aspects to include within an internal report
- Section 8.3 identifies how to specify reporting requirements between different parties
- Section 8.4 looks at reporting requirements for the French Decree
- Section 8.5 explores how in the future EDI might be used for sharing of emissions data

6) **Use publicly recognised methods** Refer Section 11

- Use the methods and data sources referenced in these guidelines wherever possible

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1. INTRODUCTION

This section considers the objectives of these Guidelines and the benefits that may be gained by using a standardised approach to freight greenhouse gas reporting.

1.1 PURPOSE

This publication is intended to improve understanding of the relevance of freight greenhouse gas (GHG) emissions to the automotive industry and to provide clear guidance on the steps needed to produce high quality emissions reports*.

Freight transport has a number of environmental impacts besides GHG emissions, such as resource use, noise, traffic congestion, land usage and emission of other pollutants such as NO_X, SO_X and particulates. These Guidelines are focussed on GHG emissions. Nevertheless, it should be noted that actions to reduce GHG emissions by making freight more efficient usually have positive benefits in reducing other environmental impacts as well.

This document is designed to provide help in using established methods of calculation and sources of emission data that are in general use in the freight industry, rather than introducing a new process specific for the automotive industry.

* The term "Greenhouse Gas" refers to Carbon Dioxide and other climate change gases recognised as contributing to global warming- see Section 2.3 for fuller details

1.2 OBJECTIVES FOR REPORTING

There are various and increasing demands for information on freight GHG emissions, including:

External demands:

- Legal obligations
- Customer requests
- Corporate social responsibility surveys
- Industry benchmarking

Internal demands:

- Identifying opportunities for cutting carbon and improving efficiencies
- Assessing the carbon impact of logistics decisions and investments
- Measuring changes in carbon emissions through time
- Comparison/ evaluation of transport suppliers

Transport emissions are to be part of a mandatory government emissions reporting scheme in France from 1st October 2013 and other governments are likely to introduce similar measures.

In order to support the ambitious carbon reduction targets that governments have set for 2020 and beyond, individual companies operating within the automotive sector will need to implement carbon reduction strategies over the next few years. Many industry sectors and companies have already begun the early stages of this process, analysing their GHG emissions and exploring options for reducing them.

GHG reporting requirements are also becoming more frequent in the business environment due to:

- Voluntary initiatives related to brand image and/or ISO 14000 environmental management systems
- Legal and/or commercial requirements for procurement of transport services or products

In a commercial relationship, reporting requirements, if they are applied, have often been given in many different ways since there are various definitions and calculation methods available. Reporting, if carried out, is often not an integrated part of normal business processes. As a result, there is a growing demand for the kind of harmonisation offered in these Guidelines from a business point of view.

A more standardised, and from an administrative point of view, a more efficient procedure for handling freight GHG reporting is necessary for the continuous improvement of automotive industry freight transport.

1.3 DEVELOPMENT OF STANDARDS

Efforts have been made internationally to standardise the measurement and reporting of GHG emissions in order to make life simpler and to ensure comparability of results. While there is no single agreed standard, the two main standards developed by the World Business Council on Sustainable Development / World Resources Institute (2004) (the Greenhouse Gas Protocol) and International Standards Organisation (ISO 14064) are broadly similar.

Both set out Guidelines for the carbon auditing of individual businesses and provide advice on the scoping of the calculation, data collection methods and the allocation of emissions. Neither, however, provides detailed guidance on how to measure and acquire the data needed to calculate the carbon emissions from specific activities, such as transport. ISO published a standard for structuring the handling of quantitative environmental information in 2012, and a separate initiative by CEN, the European Committee for Standardisation, for calculation of freight GHG emissions was published in January 2013. If the European Commission issues any Directives relating to GHG reporting of transport it is likely that the latter will be the reference document.

In the meantime, various data and forms of advice are available on calculations and emissions reporting of transport operations from government departments/other agencies, such as DEFRA in the UK, ADEME in France, NTM in Sweden or UBA in Germany and national standards bodies, such as the British Standards Institution and the French AFNOR.

In the absence of agreed data and measurement standards, however, there is a danger that individual sectors will adopt standards and procedures that produce inconsistent results. These Odette Guidelines consider different ways in which data for calculations of carbon emissions from freight transport might be measured and acquired. Using those as a basis, they recommend best practices for carbon foot-printing for automotive transport operations.

1.4 SCOPE OF THE GUIDELINES

These Guidelines focus on freight operations, including transport of raw materials, finished parts and complete vehicles. The advice is applicable to all modes of freight transport- road, rail, river, canal, sea and air. While the general principles are also relevant to reporting emissions from other elements of the logistics processes, such as warehousing and packaging, these are not covered explicitly.

1.4.1 WHO IS THE AUDIENCE?

This Guideline is aimed at all professionals involved in transportation within the European Automotive Industry. It includes:

- Vehicle manufacturers
- Suppliers, logistics service providers and freight transport operators
- Other participants who have an interest in transportation: governments, city councils, legal institutions etc….
- Those who specify and purchase transport services and receive the GHG emissions information.

1.4.2 GUIDELINE OBJECTIVES

- To provide clear overall guidance on automotive freight emissions reporting to any interested parties
- To address in more detail the difficulties to be encountered in gathering and allocating data and calculating and reporting emissions within what can be complex supply chains
- To assist the customers of freight transport operators in specifying reporting requirements and to help them in verifying the results
- To encourage a standardised approach, leading to a more level playing field in the reporting and comparison of emissions within the automotive freight sector
- To advance the collaboration between shippers and carriers in working to reduce overall levels of emissions and improve the environmental footprint of the automotive logistics sector

1.4.3 WHAT IS INVOLVED?

Calculating and reporting the GHG emissions from freight transport operations need not be difficult, and can have multiple business benefits. Fundamentally, measuring the GHG emissions from transport is based on measuring or estimating fuel use for the transport work, and as such is aligned with good logistics and fuel management practices – and all the cost savings this can bring.

Key requirements are:

- Identification of the operations that produce freight-related emissions
- Adoption of an appropriate calculation methodology and set of related assumptions, including selection of an appropriate set of emissions factors
- Gathering of data to quantify the level of activity
- Use of a reporting format that clearly explains the source and quality of the data used and gives recipients an unambiguous and authoritative response to their enquiries

1.5 AUDITING

It is anticipated that as the subject of emissions reporting grows in significance, freight GHG reporting will increasingly be of interest to external auditors.

It is therefore of key importance that the integrity of emissions reporting can be demonstrated through using approaches such as those outlined in these Guidelines.

1.6 GENERAL RECOMMENDATION

It is recommended to adopt GHG reporting for freight activities as a routine practice within all automotive related companies by applying the basic principles and approach within this document.

The benefits will be:

- Use of recognised methods that can be used to answer information requests from customers, government bodies and contribute to the whole company carbon footprint
- Alignment to new French legislation and European CEN standard
- Ability to support Corporate Sociability/Sustainability surveys without duplication of effort
- Alignment with other industry sectors.

2. BACKGROUND TO GREENHOUSE GAS REPORTING

This section provides an overview of the nature of Greenhouse Gases, their relationship to climate change and the significance of transport emissions.

2.1 CLIMATE CHANGE IS A REALITY

Our planet has undergone climate change throughout its history as a result of natural factors like changes in the Earth's path around the sun, volcanic activity and fluctuations in weather systems. However, there is an overwhelming scientific consensus that climate change is now happening at a rate we should be concerned about and that it is being accelerated as a result of human activity.

Humans are having an increasing influence through burning fossil fuels, cutting down forests and changing farming practices. "Climate change is one of the greatest challenges of our time", according to the United Nations Framework Convention on Climate Change (UNFCCC), Copenhagen Protocol, 2009). 2000–09 was the warmest decade on record, and 2010 matched 2005 and 1998 as the equal warmest year.

2.2 THE SCIENCE OF THE GREENHOUSE EFFECT

As the sun's energy warms up the Earth, our planet radiates some of this heat back out into space. Certain gases in the upper atmosphere act like the glass in a greenhouse, allowing the sun's energy in but preventing heat from escaping.

Some gases with a greenhouse effect, such as water vapour - the most abundant - are naturally present in the atmosphere; without them, the Earth's average temperature would be an unbearably cold -18^{o}C instead of the +15^{o}C it is today.

However, human activities are releasing immense additional amounts of greenhouse gases into the atmosphere, enhancing the greenhouse effect and warming the climate.

2.3 WHICH GASES SHOULD BE CONSIDERED?

A variety of gases are considered by scientists to contribute to the greenhouse effect. The Intergovernmental Panel on Climate Change (IPCC) agreed on a list at the Kyoto Climate Conference of 6 Greenhouse Gases of principal concern.

It is this set of Greenhouse Gases that is generally considered in GHG reporting activities and which is included in these Guidelines. Each of these gases has a different relative contribution to the Greenhouse Effect, which is quantified in terms of a figure, the 'global warming potential' (gwp) that compares the impact with that of CO_2.

These 6 principal Greenhouse Gases, along with their global warming potentials, are:

- Carbon Dioxide (CO_2) gwp= 1
- Methane (CH_4) gwp= 56
- Nitrous Oxide (N_2O) gwp= 280
- Hydrofluorocarbons (HFCs) gwp= 460-9100
- Perfluorocarbons (PFCs) gwp= 4400-6200
- Sulphur Hexafluoride (SF_6) gwp= 16300

Note: the gwps cited here are the values recognised by the UNFCCC on their website 1/7/2013 and are based on a 20 year horizon.

2.4 THE SIGNIFICANCE OF CO_2

Of these greenhouse gases, the one most commonly produced by human activities is carbon dioxide (CO_2). It is responsible for 63% of man-made global warming. The principal cause is the combustion of fossil fuels - coal, oil and gas.

Over the past couple of centuries, our societies have burnt increasing amounts of these fossil fuels to power machines, generate electricity, heat buildings and transport people and goods. There is now almost 40% more CO_2 in the atmosphere than there was before the industrial revolution; the highest level seen in at least the last 800,000 years.

Besides CO_2, vehicle emissions also contain some methane. The majority of fuel currently used in freight transport is diesel and the quantity of methane produced is small. However, due to methane's much higher relative global warming potential, its effect still needs to be considered. In particular, methane should be considered when comparing the use of alternative fuels, as for example, natural gas/ biogas exhaust contains a much higher percentage of methane than does that of petrol and diesel.

Small quantities of other Greenhouse Gases can escape from air conditioning systems ('fugitive emissions'). This can be significant where refrigerated transport is used, however as this form of transport is generally not used within the automotive industry it is not of major concern here.

The impact of GHG gases is handled by using a 'CO_2 equivalent' factor. This is explained in more detail in Section 5.6.

2.5 ROAD TRANSPORT AND FREIGHT'S CONTRIBUTION

The transport sector consumes more energy than any other in the European Union (EU), even more than the power generation sector (see Figure 1). While greenhouse gas emissions in other sectors decreased 15% between 1990 and 2007, emissions from transport (road, sea, air) increased 36% during the same period. This increase has happened despite improved vehicle efficiency because the amount of personal and freight transport has increased.

As we can see in Figure 1, nearly one third of final energy consumption by sector in 2010 was from transport activities. There are also industry and household activities who take great part in the energy consumption, which represent separately about a quarter of the total.

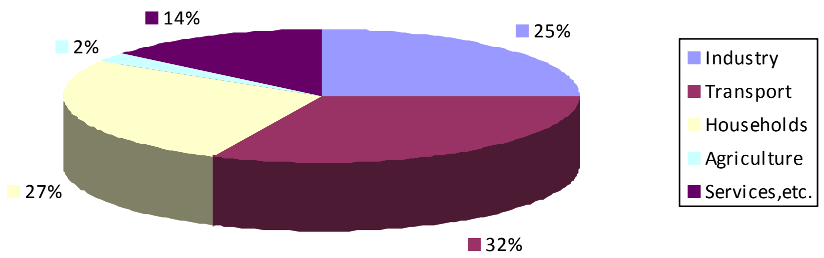

Figure N°1: Final energy consumption by sector 2010

Source: Eurostat, April 2012 cited in DG Energy Statistical Pocketbook 2012

http://ec.europa.eu/energy/observatory/statistics/statistics_en.htm

Note: The percentage for transport in Figure 1 includes contributions from passenger cars as well as light and heavy goods vehicles.

As we can see in Figure 2 below, more than two thirds of transport-related greenhouse gas emissions are from road transport. However, there are also significant emissions from the aviation and maritime sectors and these sectors are experiencing the fastest growth in emissions, meaning that policies to reduce greenhouse gas emissions are required for a range of transport modes.

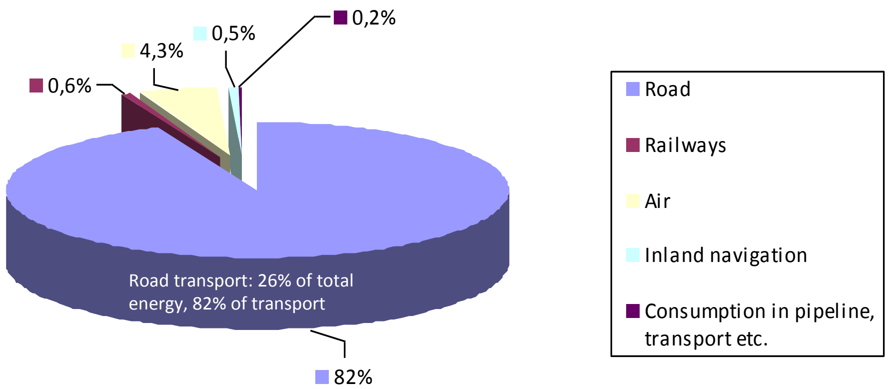

Figure N°2: Final energy consumption by mode of transport 2010 (% of Mtoe*total)

Source: Eurostat, April 2012 cited in DG Energy Statistical Pocketbook 2012
http://ec.europa.eu/energy/observatory/statistics/statistics_en.htm

Heavy-duty vehicles (HDV) represent about a quarter of EU road transport CO_2 emissions, 6% of the total EU emissions and more than both international aviation and shipping. In spite of continuing improvements in fuel consumption efficiency in recent years, total HDV emissions are still rising, mainly due to increasing road freight traffic.

2.6 ENERGY STAKES

Greenhouse Gas emissions are closely linked to energy consumption, particularly with freight transport where most freight is still moved using diesel powered trucks.

Fuel costs form a large proportion of transportation costs (typically 25-30%) so most businesses are working already to make their energy use more efficient. This economic driver to reducing energy use will only increase as fuel costs continue to rise.

Fortunately in the context of Greenhouse Gas Reporting, actions to reduce energy usage will generally reduce GHG emissions as well.

2.7 POLICY ACTION TO LIMIT CLIMATE CHANGE

The UNFCCC (United Nations Framework Convention on Climate Change) aims to stabilise GHG concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system and recognises the scientific view that the increase in global temperature should be limited to 2 degrees Celsius compared to pre-industrial levels if the worst effects of climate change are to be avoided.

Many regions have established vehicle fuel efficiency targets, as shown in the graph below. In North America the first regulation related to fuel usage came in 1975, known as Corporate Average Fuel Economy (CAFE). The purpose of CAFE is to reduce energy consumption by increasing the fuel economy of cars and light trucks. The US has recently set standards to increase the CAFE ambitions rapidly over the next several years.

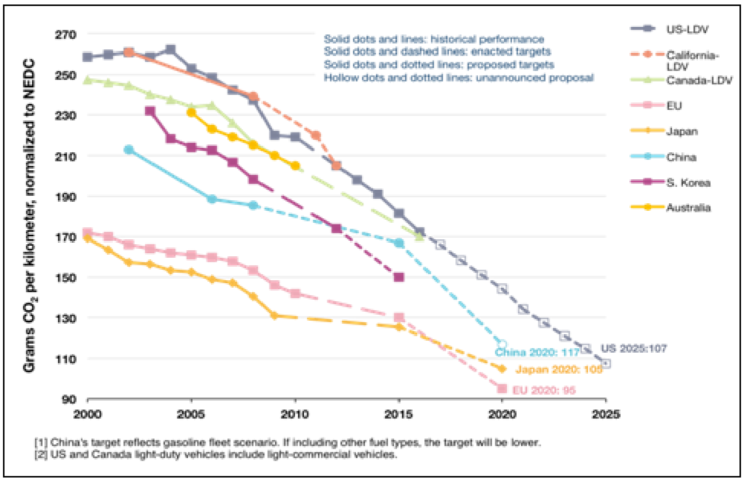

Figure N°3: Evolution of light duty vehicle CO_2 standards in different countries (ICCT)

In Europe, similar corporate average fuel economy requirements exist, following the European Commission's comprehensive 2007 **strategy** to reduce CO_2 emissions from various sectors of the economy and the 2011 **Transport White Paper**, which aims for a 60% cut in transport GHG emissions by 2050. An important strand of the strategy is the mandatory target for new cars and vans sold in the EU. For instance, average CO_2 emissions from new cars will be reduced by 25% between 2006 -15 and a further 27% by 2020 in line with EC Regulation No 443/2009. As the automotive industry works towards meeting these targets, average emissions are falling each year.

The Commission's **HDV strategy (Heavy Duty Vehicles)** is expected in late 2013 and, in preparation, it is developing a methodology for measuring the CO_2 emissions of heavy duty vehicles, taking into account not only the engine, but the whole system – engine, truck, driving resistance, aerodynamics etc.

2.8 FUTURE RISKS

Climate change means we are likely to experience more flooding, heat-waves, droughts, other extreme weather events and faster coastal erosion.

Climate change and the actions being taken to mitigate the effects will impact in some way on almost every business, but the main risks to logistics operations are likely to be:

- Increased supply chain disruptions and costs of emergency actions
- Increased fuel costs due to combination of shortages of supply and increased taxation
- Increased operating costs- traffic tolls, more expensive vehicle technologies

If unprepared, your business could have additional economic impacts due to:

- Power supply interruptions, internet failures or fuel shortages
- Operational inefficiencies from environmental influences such as high working temperatures, floods preventing movement of employees and raw material shortages
- Higher insurance premiums
- Failure to adopt new opportunities from a decarbonising economy

  Negative competitive advantage vs. companies seen to be more environmentally friendly

3. RESPONSIBILITIES & OBJECTIVES FOR REPORTING

This section describes the roles and responsibilities of the different stakeholders in the supply chain and considers the different objectives organisations have for reporting Greenhouse Gas emissions.

3.1 OVERVIEW OF ROLES IN THE SUPPLY CHAIN

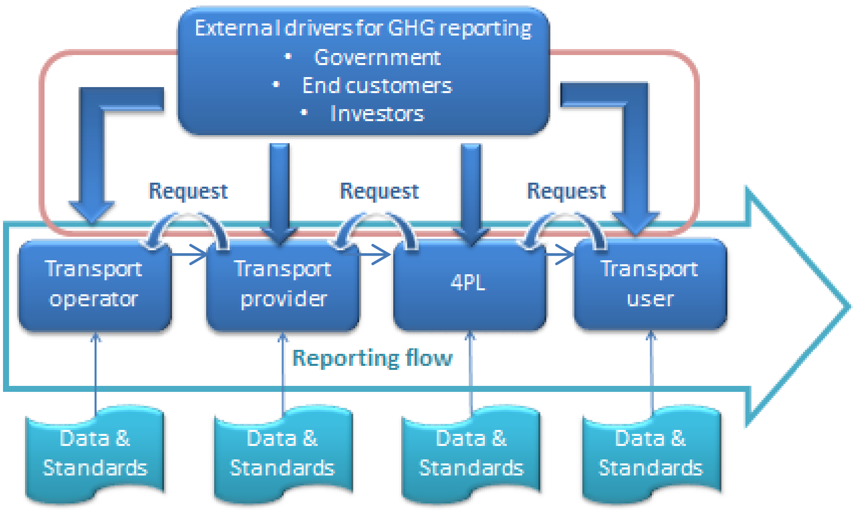

Figure N°4: Overview of roles in supply chain from a GHG reporting perspective

As depicted in the above diagram, there are a range of different stakeholders involved in the use of freight transport:

- The **transport service user**, who orders the transport, or who benefits from it being carried out. This can be either the supplier or the customer, depending on contract delivery terms
- The **3rd or 4th party logistics provider** who may procure and manage the transportation and other logistics needed, such as warehousing & packing. These companies can also take on the role as transport service providers.
- The **transport service provider**, or forwarder, who offers transport services to the market
- The **transport operator**, or haulier, or carrier, who actually carries out the transport

Any of these stakeholders might receive requests for emissions information from outside parties, which will drive the need for requests for supporting data between the different elements of the supply chain.

Examples of external parties are:

- Government bodies (both local and regional)- making requests for data provision
- End customers- the final recipients and users of the products
- Investors and other financial stakeholders- environmental performance is of increasing interest to investors.

The nature of any requests for data, depend on the objectives for reporting.

3.2 OBJECTIVES FOR REPORTING

As identified in the introduction, demands for Greenhouse Gas reporting can be generated from a range of sources.

They may be divided into those that are driven by specific requests from outside parties and those that are identified to support an organisation's own internal strategic objectives.

External demands

- Legal obligations
- Customer requests
- Corporate social responsibility surveys
- Industry benchmarking

Internal demands

- Identifying opportunities for cutting carbon and improving efficiencies
- Assessing the carbon impact of logistics decisions and investments
- Measuring changes in carbon emissions through time
- Comparison/ evaluation of transport suppliers

3.3 EXTERNAL DEMANDS

3.3.1 LEGAL OBLIGATIONS (INCLUDING THE FRENCH DECREE)

At the time of writing, the first piece of European legislation concerning freight GHG reporting is coming in to effect in France. Known as the "French Decree", it requires transport service providers to inform service users of the carbon dioxide emissions produced while conducting any contracted transport operations.

The "French Decree" covers all transport, both passenger and freight, that starts and/or ends on French territory. The CO_2 emissions from this transport need to be reported by the **transport service provider** to the party that is contracting the transport. This requirement comes into effect on 1st October 2013. The French Decree imposes mandatory reporting, but leaves some flexibility, initially at least, to use other guidance for calculation than the methods described within the decree. (See Section 11.2.2 for further details.)

Similar legislation may be adopted elsewhere in Europe, with France being the forerunner. For this reason, these Odette Guidelines are written to ensure alignment with the French Decree. Fuller details of the methodology required by the French Decree and how reports should be compiled are included in later sections of these Guidelines.

3.3.2 CUSTOMER REQUESTS

Customer requests to Manufacturers

Increasingly customers are asking questions about the environmental footprint of products that they buy. A typical example might be a fleet customer who is wishing to demonstrate that they have a sustainable approach to sourcing.

Questions may be specific about the emissions released from shipping vehicles from point of manufacture to point of sale. Or more general information might be requested about the total emissions generated in production and distribution of a car.

As with many other products and services, the concept of life-cycle assessment is receiving attention. For a car, the life-cycle would include its manufacture, use and final recycling.

To fulfil these requests, it will be necessary to provide suitably accurate assessments of the freight emissions involved.

ISO 14040/4 standards give great detail as to how life cycle assessments should be made. When looking at supply chain emissions it will be necessary to include sub-suppliers to the reporting company as well as all transport and logistics activities in between.

Some products are beginning to be labelled with information on emissions - ISO 14025 provides guidance on this. Currently the complexities of automotive supply chains make this a daunting task, but it may become the norm in the future.

The GHG Protocol can help to allocate the emissions between companies in the supply chain, i.e. to define where the responsibility ends for one company and begins for another.

To meet customer requests for life-cycle assessment data, it is recommended to ask suppliers to provide their supply chain GHG emissions, if they are not already being received from the transport company. Suppliers should use these Guidelines and report emissions from the transport involved when providing their own lifecycle assessments.

A complete life-cycle assessment of a product would include all transport legs e.g. all transport from resource extraction, through refining and manufacturing of the components and materials, up to the vehicle assembly plant and then the delivery of vehicles to the dealerships and on to the final customer.

Customer requests to Carriers and other Logistics Services Providers

Requests may be received for emissions data for a range of reasons. It might be to provide input towards the shipper's objectives to identify their overall freight emissions. It might be to help them identify the life-cycle emissions of a particular product. Alternatively, it might be specific to just one or two transport legs, to allow comparison of the environmental impacts of different freight options.

Whichever it is, it is important to understand the requester's reporting methodology so that the calculation methods chosen and assumptions made are aligned to those of the requester.

3.3.3 CORPORATE SOCIAL RESPONSIBILITY REPORTING

Corporate Social Responsibility (CSR), or Social Responsibility (SR) as it is described in ISO 26000, is the subject that addresses the environmental and social responsibility aspects of a company's operations. It has increasing prominence in board rooms. The reporting of activities and performance of organizations within this field is referred to as sustainability reporting. There are various Guidelines for this reporting, such as the Global Reporting Initiative (GRI) and the Greenhouse Gas Protocol (GHG Protocol). The GRI is a multi-stakeholder institution providing global standards in overall sustainability reporting. It focuses not just on the current status, but on the need to demonstrate improvement.

The Green House Gas Protocol, as its name suggests, is focussed specifically on reporting of emissions. It is the most widely used international standard for governments and business leaders to understand, quantify, and manage greenhouse gas emissions. It is jointly published by the WRI (World Resource Institute) and the WBCSD (World Business Council for Sustainable Development).

In order to assess and compare different companies' activities, a number of external parties provide assessments. These may be referred to by investor bodies, so many automotive companies now complete these annually.

Examples are:

- Carbon Disclosure Project
- Dow Jones sustainability index
- Oekom index

More details of these are to be found in Section 10.2.

It is important that the process for generating any data provided to these surveys is valid and that records are maintained. Use of the recommended reporting methods in these Odette Guidelines would satisfy this.

Most surveys are annual in nature. Efforts taken to provide a well-structured submission initially will reduce the amount of work required to prepare subsequent submissions.

3.3.4 INDUSTRY BENCHMARKING

It is to be expected that as companies look to improve the accuracy of reporting and to reduce their GHG emissions, there will be increasing interest in carrying out benchmarking studies. It is anticipated that these Odette Guidelines, promoting a common approach to reporting, will make these kinds of studies easier to complete.

3.4 INTERNAL DEMANDS

Compared with typically very specific external data demands, there is much greater freedom in the way organisations can choose to report emissions to satisfy their own internal objectives. Internal reporting requirements are usually focussed on specific parts of the organisation or activities undertaken, such as business regions, plants, or particular transport networks.

4 examples of internal reporting objectives are:

1. Identifying the total GHG emitted when transporting goods to different operating locations and investigating how the emissions are improving year on year.
2. Comparing the environmental performance of different transport service providers.
3. Investigating the environmental impacts as well as the cost impacts when studying alternative scenarios for entering new markets or citing new supplier sources or production locations.
4. Looking at the environmental improvements possible from new technologies or changes of freight mode (such as between road and rail).

It is strongly recommended that organisations should apply the same methodologies and rigour to internal reporting as they would to satisfy external demands. In this way data developed to answer an internal objective can be available to answer future external requests and hence avoid duplication of effort and auditing issues.

Data acquisition routines, measurement systems and internal databases should be standardised wherever possible.

4. STANDARDS FOR GHG REPORTING

This section gives an overview of various existing standards covering the subject of Greenhouse Gas emissions reporting and identifies those that are of particular relevance to the automotive sector. References are also made to basic information sources for GHG emissions standard values.

There are a range of standards and initiatives already written to support different aspects of GHG reporting. These Odette Guidelines are based on those initiatives that are in most common use in industry and offer most practical help.

They include general industry standards and those specifically targeted at the transport sector.

4.1 GENERAL STANDARDS ON GHG MEASUREMENT AND REPORTING

GHG emissions can be looked at from two major perspectives:

- **Organisational emissions.** The GHG emissions generated directly and indirectly by the operations controlled by an organisation
- **Product life-cycle emissions.** The total GHG emissions resulting both directly and indirectly from the manufacture and use of a company's specific products and services including raw material production, transport and waste management

Organisational emissions
This perspective may loosely be compared with the economic term 'corporate turnover'. It applies the perspective that an organisation is responsible both for the emissions that occur within the boundaries of their direct control and also, indirectly, for any emissions from any material and services from other organisations that the business needs to operate and produce.

The **Greenhouse Gas Protocol**, jointly developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is the most widely used framework for organisational GHG emissions reporting. These Odette Guidelines have been developed to ensure that a company's freight emissions can easily be incorporated into any wider GHG Protocol based reports.

The relevant ISO standard for organisational GHG reporting, **ISO 14064**, is also generally based around the Greenhouse Gas Protocol.

Product life-cycle emissions
This second perspective may be compared with the economic term 'product allocated production cost'. This type of responsibility stresses that the real cause for GHG emissions throughout the industrial society is not driven by production or transport processes themselves, but by the demand for the products and their use. Standards and methods relating to this approach have been formulated with a product and service life cycle perspective. This is often referred to as generating a 'carbon footprint'.

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The international standard **ISO 14040** addresses the principles of the LCA (Life Cycle Assessment), while the ISO **14067** based on **ISO14040**, focuses on the carbon footprint in an LCA approach.
Use of the methodologies within these Odette Guidelines would give results that could readily be incorporated within this kind of carbon foot-printing initiatives.

4.2 STANDARDS TO SUPPORT GHG DATA ACQUISITION

Recognising a lack of guidance for the acquisition of environmental data for reporting purposes, ISO published **ISO 14033**: “Environmental management - Quantitative environmental information - Guidelines and examples”. In the present context, this standard provides help in acquiring the quantitative information needed to perform GHG emissions calculations.

The approach of these Odette Guidelines is based on this ISO standard, since it provides a very helpful sequential approach for completing the steps between measuring data and final reporting.

4.3 THE CEN STANDARD

The CEN Standard EN 16258:2012 (hereafter abbreviated to ‘the CEN standard’) was made available by the European Committee for Standardisation in November 2012. It has since been adopted and published by the National Standards organisations in individual European countries in appropriate different languages.

Its stated aim is to provide a ‘Methodology for calculation and declaration of energy consumption and GHG emissions of transport services’’.

It is of particular relevance to these Guidelines as it is the only standard specifically published for a European-wide audience and to be adopted by European legislative bodies. Its methodologies are being used by the French Decree.

The intent of the Odette Guidelines is to be fully aligned to the approach of the CEN Standard. This is seen as desirable to ensure that the Odette recommendations remain aligned to the way European legislative requirements are likely to evolve in the near future.

4.4 ADDITIONAL INFORMATION SOURCES AND REPORTING GUIDANCE

There are a wide variety of further sources of help to support the calculation of freight GHG emissions. General guidance includes that provided by **ADEME** (Methodical Guide to the French Decree) and **UK DEFRA** (Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations).

Many publications include useful data sets, although in many cases they are limited in scope, either by mode (e.g. only road), or region (based around conditions in specific countries). It may be unclear as to the provenance of the data provided. It is important to use data sets that are publically recognised and appropriate to the circumstances they are to be used in.

The Odette guidelines that follow provide a methodical approach to analysing transport emissions and indicate where and when different standards and methodologies should be applied. Further details of those felt by Odette to be particularly relevant are included in Sections 11.3 & 11.4.

5. SYSTEMS APPROACH TO ANALYSING EMISSIONS

A systems approach is recommended to carry out the analysis. This will ensure quality and reliability in the results achieved.

5.1 THE NEED FOR A SYSTEMS APPROACH

To meet the different objectives and to break down the reporting in a structured way, Odette recommends the use of the approach within ISO standard 14033.

ISO 14033 acknowledges that the task of reporting quantitative environmental data, such as GHG emissions, is both complicated and difficult. ISO 14033 brings a structure to the task by identifying five distinctive and logical steps to divide the task into manageable sub-tasks.

These steps can be put in the form of questions:

1. For which transport system(s) will you report GHG emissions?
2. How should you break down your total transport system into more manageable sub-systems in order to be able to identify the necessary data to report GHG emissions? (e.g. specific routes, modes or geographic areas)
3. Which emissions will you consider within your total emissions calculations? (e.g. CO_2, CH_4, N_20)
4. Which data will you need to collect from your transport sub-system in order to calculate the emissions for step 3 above? (e.g. distance, fuel consumption or geographic route)
5. From which data sources will you acquire the different data needed for the calculations? (e.g. GPS data, mapping software, vehicle performance specifications, carrier invoices, on-line environmental databases)

Applying this approach in relation to the objectives of your reporting will help you define the systems boundaries and identify the data required. To answer the first question, it is important to understand what the main sources of emission are.

5.2 SOURCES OF LOGISTICS EMISSIONS WITHIN THE AUTOMOTIVE INDUSTRY

Within typical automotive operations there are a number of different sources of emissions. These might include:

- ***Freight from parts suppliers to OEM assembly plant (Inbound Freight)***
- Warehousing (heating/ fork lift operation)
- Packaging (emissions during manufacture of packaging)

- ***Return transport of empty packaging to suppliers***
- ***Transport of finished vehicles to dealerships (Outbound Freight)***
- ***Shipment of service parts, spares etc***
- Transport of waste materials
- Office accommodation of logistics operatives (heat, light etc.)

When considering overall emissions due to logistics, all these might be included.

However by far the biggest logistics emissions for most automotive operations are the transport operations (highlighted in bold in above list) - the inbound freight of parts and packaging, and the outbound freight of finished vehicles and spare parts; these are the chief subject of these guidelines.

(Some information about how to approach the other elements can be found within the Greenhouse Gas Protocol and is touched on in Section 5.4 and in Appendix 1.)

5.3 SYSTEMS BREAKDOWN OF TYPICAL TRANSPORT OPERATIONS

A very simple transport system is one by road from a given pick-up point to a given delivery point. Several different systems can be described to constitute that road transport, all with different scopes.

One narrow system scope is to include the start and end point of the transport and to measure the shortest distance between them, estimating that an average truck moved the goods along this distance while combusting fuel and emitting Greenhouse Gases.

An example with a less narrow system scope may include, in addition, the production of the fuel needed for the truck, as well as the transport distances necessary to move the truck to the pick-up point and the distance to reposition the truck into a new pick-up position.

An even larger system scope may include also the infrastructure necessary for the handling of the goods throughout the distance travelled, such as goods terminals, the maintenance of the truck and even the emissions of the truck driver travelling to and from work.

More complexity arises from systems with more than one movement, such as a set of journeys moving goods many times during a year, including perhaps multiple modes such as rail and sea in addition to road. These systems may also be expanded by considering fuels and energy production, infrastructure etc. It is also needed to consider that transport could be sub-contracted to one or even several levels of providers.

The extreme case might be all transport for all goods moved for an entire organisation during a year, considering the different systems scopes described earlier.

The choice of system scope depends on the application or objective. A general rule is that the system scope should be chosen to give a comprehensive and unbiased view of the transport system. In short, this means that at least all relevant transport legs should be considered, and the production of fuel and other energy should be followed from cradle to grave.

When reporting according to a particular methodology, such as for the Greenhouse Gas Protocol, the system scope is clearly defined in the specifications.

5.4 USE OF THE GREENHOUSE GAS PROTOCOL TO CATEGORISE EMISSIONS

The GHG Protocol considers emissions as falling into one of three different scopes, as illustrated in Figure No. 5 below.

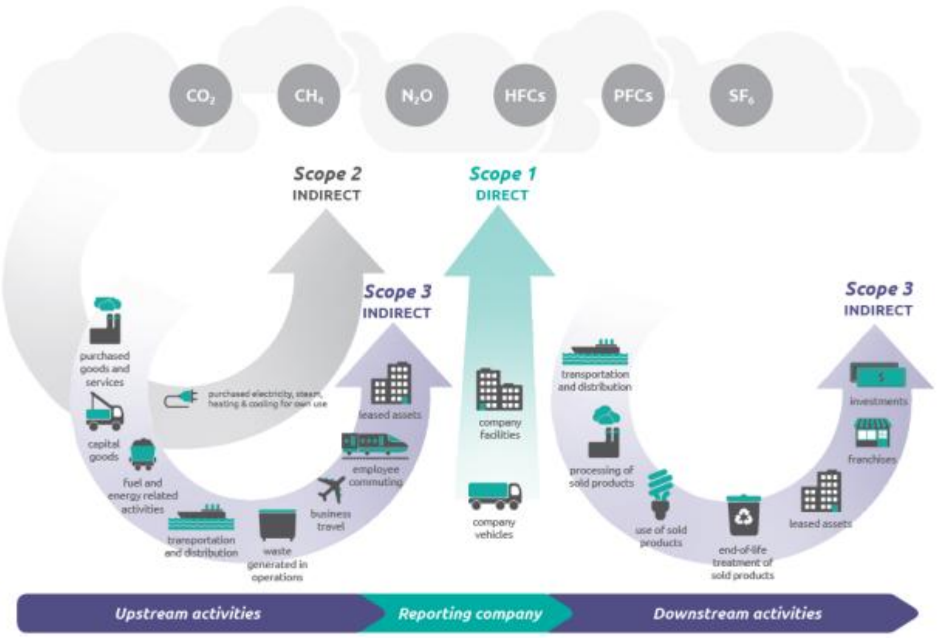

Figure N°5: The three scopes of emissions defined by the Greenhouse Gas Protocol

The three scopes can be explained as follows:

- Scope 1 covers emissions from activities and processes under the direct control of the organisation that performs the reporting, described as direct emissions.
- Scope 2 covers indirect emissions resulting from the generation of energy used by an organisation's directly controlled activities and processes.
- Scope 3 covers all other indirect emissions from activities and processes that are contracted by an organisation, or resulting from its activities, but directly controlled by others.

The same emissions may be reported as one company's direct (Scope 1) emissions while also being a part of someone else's indirect (Scope 3) emissions. In the common situation where a manufacturer contracts most of their freight transport to other parties, the carrier who provides the freight would report the freight emissions from their equipment within their own Scope 1 emissions report while also providing the data to the manufacturer to include within their Scope 3 emissions assessment.

Further explanation of use of the framework of the GHG Protocol can be found in Appendix 1.

5.5 BREAKING DOWN THE SYSTEM INTO SMALLER SUB-SYSTEMS

The quality of GHG emissions calculations is dependent on how the basic data is gathered. To help identify what data is needed, the total transport system can be broken down into more manageable sub-systems, or system components.

Such sub-systems might include individual transport routes, different transport modes and different categories of goods. What is important is to consider how much data already exists, or at least may be readily gathered following an acceptable amount of work.

The CEN standard uses the term 'leg' to describe each section of a route where a cargo is carried by a particular vehicle.

In the following sections, examples are given on ways of defining sub-systems for reporting for the different types of objectives previously described in this section.

Legal obligations

Legislation for mandatory reporting should clearly define the systems to be reported on. The French Decree requires inclusion of all transport legs starting or finishing within France.

The reporter must break down all transport into sub-flows into:

- All transport legs that are solely within France.
- All transport that starts outside France, but then passes through a harbour or a border station and then travel within France.

Additionally the decree explains how to treat other aspects, such as necessary empty trailer moves before/ after material is picked up/ delivered.

More detail of the reporting requirements within the French decree is contained within Section 8.4.1.

Customer requests

Customer requests for emissions data may take a variety of forms. One example is where a customer buying a vehicle (often a fleet customer) might ask for a full analysis of the emissions involved in vehicle production as part of a life-cycle analysis. Here, all transport legs between suppliers and end customers may need to be identified, i.e. all transport from the beginning to the end.

The Figures 6 and 7 below illustrate an example of the level of complexity in automotive transport chains. The first figure shows how 4 tiers of transport suppliers link together the material flows from the raw material supplier processes to the end customer, component manufacturers and final assembly at Original Equipment Manufacturers (OEMs) and on to the Sales operations (including e.g. aftermarket and repairs).

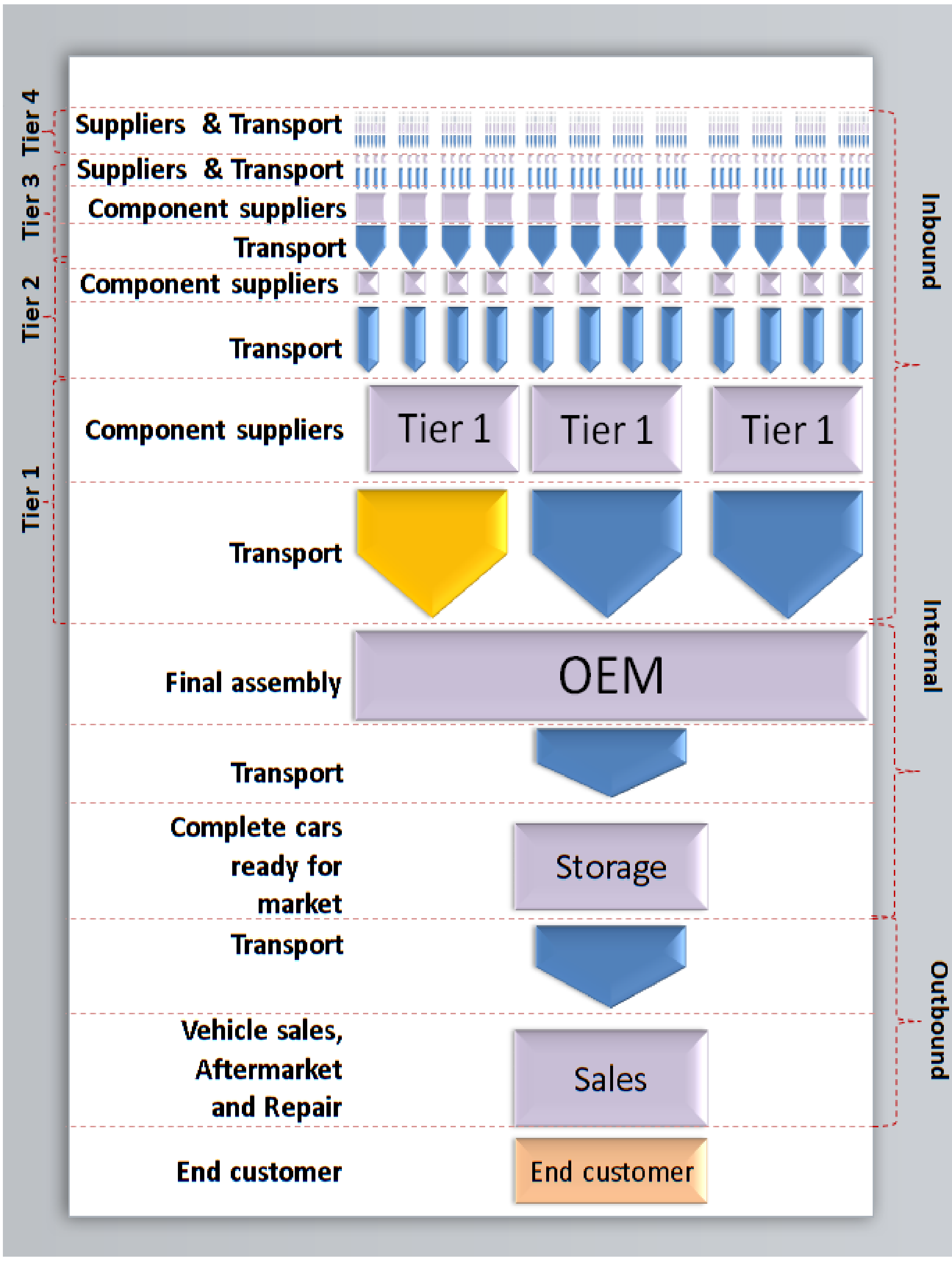

Figure N°6 Example of freight transport in the life cycle of a car

Note: The blue and the yellow arrows represent transport legs. The yellow arrow is colour coded to show the link with the next figure, Figure 8.

Figure 7 shows how each transport element from Figure 6 may involve a variety of different companies, each performing different roles.

- The transport is ordered by the transport user who in this case is the OEM.
- The OEM may contract a Logistics Services Provider (4PL) who in turn contracts Transport Operator Haulier 1, Transport Forwarder 1, and Transport Forwarder 2 to execute the transport.

- Further tiers of Transport Forwarders may sub-contract different parts of the freight.
- It is finally the Transport Operators who actually own the vehicle fleets and actually perform the transportation and directly emits the Greenhouse Gases.

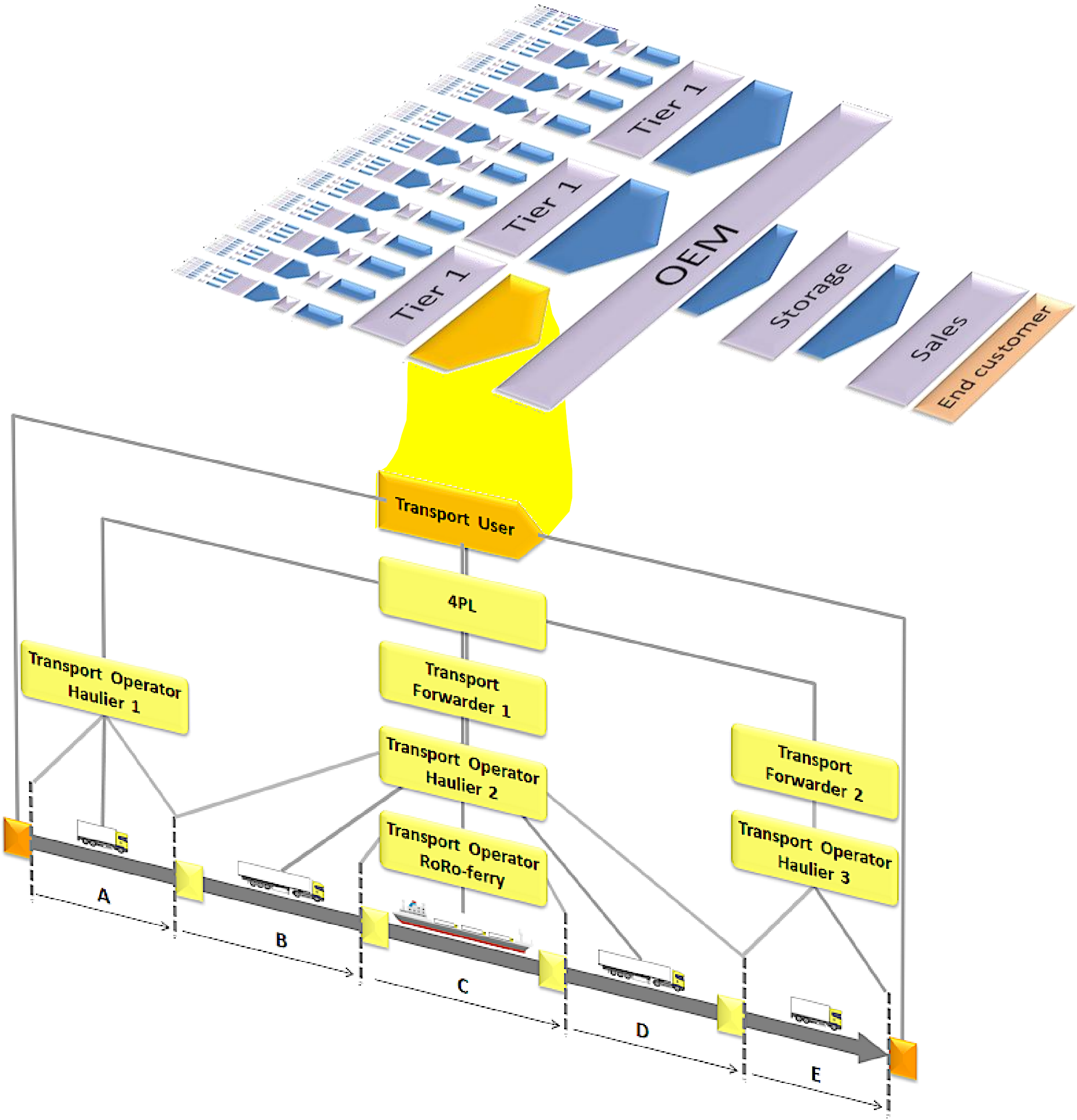

Figure N°7: Example of transport chains with transport legs and parties involved

When performing a detailed analysis taking all transport into consideration, this complex picture can be modelled by breaking down the simplified transport legs represented by the arrows in Figure 7 into individual system components that eventually will represent the actual transport routes, modes and distances within the different transport legs.

Decisions will need to be made as to how best to obtain emissions date from each element. Due to the practical difficulties in acquiring data from transport operators in distant tiers or buried down in complex contract structures, it may be necessary to use average or derived data rather than real and detailed data in some instances.

Corporate Social Responsibility Surveys

Most external CSR surveys will clearly explain the kind of information they require though the form of the answer may be quite open as the same questions are asked of many different types of businesses. The main themes are generally:

- Is there are environmental strategy in place?
- Are steps taken to monitor the business's environmental impacts?
- Are the results quantified and made publicly available?
- Are actions taken to create year on year improvements?

The questionnaire will generally contain different sections to cover each of a company's areas of activity, one of which will comprise questions on supply chain, including freight and logistics. The Greenhouse Gas protocol is generally used to provide an overall framework. If companies use the approaches advocated within these Guidelines, then completion of CSR surveys should be relatively straightforward.

More information on specific CSR surveys is contained in Section 10.2.

Internal reporting objectives

For internal reporting, it is a matter of considering the question being asked and then mapping out the operational elements that will contribute to the answer. For example, when comparing transport emissions for different supply chain legs or locations, the system needs to be broken down so that the relations between transport legs and location can be clearly identified and analysed.

It is sensible to look at how your operations are structured already and choose boundaries for different reporting systems to align with this. It may be appropriate to divide systems up according to characteristics. A long transport routing might be divided into different modes-road, sea and rail. North American truck and train specifications & usage differ considerably from those used in Europe so it makes sense to consider them separately.

If considering the emissions of an entire network, it can be done by requesting emission data or data to calculate emissions from all transport service providers that are used globally for all goods transport to the reporting company. It would then be important to ensure either all transport providers use the same methodology or else ask for base data, such as distance travelled and load carried, so that a common calculation method can be applied (see Section 6).

If data is required to support comparison of different scenarios, it generally means dividing the whole problem of improving a transport situation into the specifics for which decisions can be taken. For example, when comparing transport set-ups for various location scenarios the system needs to be broken down so that the relations between transport and location can be clearly identified and analysed.

When breaking the system down, it is important to clearly identify who will be responsible for reporting on each element and to ensure that the methodology to be used for each is defined and unambiguous.

5.6 WHICH GAS EMISSIONS TO CONSIDER WITHIN THE CALCULATIONS?

Which gases to consider?

When Greenhouse Gas emissions were first becoming a subject of interest, the main focus was on CO_2 reporting. This was not surprising as it forms the bulk of the gas volume produced by fuel combustion and was linked to global warming when climate change was first being investigated.

As explained in section 2.3, there are other gases considered to contribute to the greenhouse effect. Although emissions of these may be low in volume they have greater global warming potential per unit mass than does CO_2. The method used to quantify the total global warming potential of a mixture of emissions is to identify a CO_2 equivalent (CO_2e) value of the mix- i.e. the mass of pure CO_2 that would give the same global warming effect as the mix in a given time span.

Increasingly, CO_2e is being reported and this approach is recommended by Odette. The French Decree as initially published requires reporting of CO_2 , but at the time of writing the authors of the French Decree have stated that they are moving towards using CO_2e factors, which is the approach used by the CEN Standard. Fortunately for most fuels, the difference can be treated as a percentage uplift, making it relatively easy to convert from one to the other.

How to account for emissions from fuel used

As the majority of emissions are generated from the combustion of fuel it is important to use a recognised method for quantifying the emissions generated from use of a standard unit of energy.

The basic approach for transport would be to look at how much CO_2 is produced by burning each litre of diesel that has been used from the vehicle's fuel tank. This result, known as '**Tank to Wheel**' emissions (**TTW**) is easy to define and explain.

However this approach does not consider the environmental impacts of production of the fuel. Besides the emissions produced by fuel combustion during the 'use phase', emissions are also generated during the 'upstream phase' in the extraction, refining and transport of the fuel before it is pumped into the vehicle. These total emissions results are known as '**Well to Wheel**' emissions (**WTW**).

From a sustainability perspective, it is important to use this broader perspective to be able to compare the overall emissions impact of the use of different types and sources of fuel. This kind of analysis (fuel cycle analysis) helps particularly with understanding the benefits of using alternative fuel sources, such as sugar cane, where the CO_2 from combustion is compensated by the fact that the sugar cane has absorbed CO_2 from the atmosphere while it was being farmed. For electrical power, aspects to be considered include losses during transmission as well as the production of batteries.

Examples where the WTW approach is relevant are:

- Understanding benefits of using 'green fuels' such as biodiesel
- Comparison of electric and diesel rail transport
- Recognition of the different emissions from different types of electricity generation (coal/ gas/ nuclear/ hydro etc.)

Increasingly, published data sets of fuel emissions factors provide WTW figures as well as TTW factors. The WTW approach is used by the French Decree, the CEN standard and other standards such as the ISO 14040 product & life cycle standards.

Note the French Decree uses the phrase **Upstream Phase** to describe Well to Tank emissions and **Operating Phase** to cover Tank to Wheel emissions.

The figure below explains diagrammatically the relationship between TTW and WTW emissions.

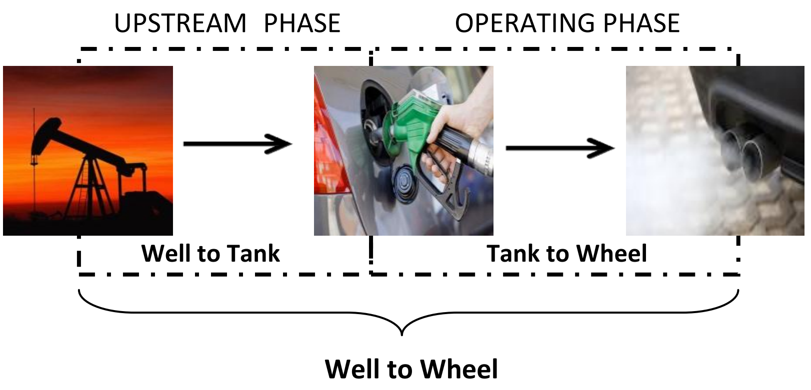

Figure N°8: The Well to Wheel approach to fuel life cycle analysis

5.7 CONCLUSIONS & RECOMMENDATIONS

Odette acknowledges the GHG Protocol as a tool for defining high-level system boundaries for corporate external reporting. The GHG protocol is well known and used by major players in the field of sustainability reports, such as government bodies and standards institutions.

For freight GHG reporting, however, additional detail is required. It is recommended to apply the methodical approach here, which follow the methodology of ISO 14033 and which are aligned to the CEN Standard and the French Decree.

The reporting objectives will generally dictate the way that transport systems should be broken down to allow the necessary data to be collected.

It is strongly recommended that the same systems break down should be used for internal reporting as selected for external reporting so that duplication of effort can be avoided.

After defining the system, sub-systems and the emissions to be accounted for, the next 2 steps in the ISO 14033 can be taken: data acquisition & calculation. These are covered in the sections that follow (6 & 7).

6. CALCULATION METHODOLOGY

This section explains the basic principles of emissions calculation. It refers to various available calculation methodologies, focussing particularly on the European CEN standard. The necessary steps in emissions calculation are explained and ways of simplifying the calculation burden for large quantities of data are discussed. Methods and strategies for acquiring the different data needed for the calculations are provided in Section 7.

GHG or CO_2 emissions cannot be directly measured easily as this requires special equipment that can sample a vehicle's exhaust gases. Hence GHG emissions values are usually derived by calculation using data from other parameters that can be measured. In this section we describe how such calculations are made.

6.1 PRINCIPLE OF CALCULATION

Calculation is needed to convert data about fuel consumption and other physical entities (such as distance travelled, loads carried) into GHG emissions data. There may also be a requirement for calculation to allocate total amounts of GHG emissions from a shared transportation, such as between the different cargos carried or between different customers served.

The principle of emissions calculation is the conversion of fuel consumption into GHG emissions using emission factors relative to the fuel consumed. Hence, the calculation formula is:

$$G = F \times g$$

G is the GHG emissions, *F* the fuel consumption, and *g* an appropriate emission factor.

Each calculation of GHG emissions (or energy consumption) of a transport service should be carried out by using the steps described in the next section (6.2).

Choice of emissions factor

The results will depend on various considerations including transport modes, vehicle specifications and choices of systems boundaries. Different emissions factors will be required in different situations. The selection of the most appropriate emissions factor is covered in Section 7.3.

CO_2 or CO_2-equivalent?

As discussed in section 5.6 most new standards, including the CEN standard, require emissions data to include all relevant GHG emissions and not just CO_2 emissions. Therefore it is recommended that CO_2e emissions factors should be used where possible.

6.2 CALCULATION METHODOLOGY ACCORDING TO THE CEN STANDARD

As explained in Section 4.3, the CEN Standard EN 16258:2012 sets out methodology and requirements for calculating and reporting GHG emissions in transport services.

It is likely to be taken as a foundation for other European initiatives and so for this reason its calculation terminology and stepped approach is followed in these Guidelines.

CEN advocates the following steps:

Step 1: Describe the different legs of the transport service
Step 2: Calculate the energy consumption and GHG emissions of each leg
Step 3: Summing of all legs to determine total corresponding value of energy consumption and GHG emissions

Note the CEN standard looks at energy consumption as well as GHG emissions. As can be seen below, the calculation methodology is basically the same for both of them.

Different values are calculated according to the set of fuel emissions factors used, whether Tank To Wheel, or the increasingly common Well To Wheel approach (See section 4.4.4).

CEN defines the following nomenclature for the different results that might be calculated:

- E_t Energy usage based on Tank To Wheel approach
- E_w Energy usage based on Well To Wheel approach
- G_t GHG emissions based on Tank To Wheel approach
- G_w GHG emissions based on Well To Wheel approach

6.2.1 STEP 1: DESCRIBE THE LEGS

In order to carry out detailed calculations it is necessary to break the transport service down into individual legs. Each section of a route that utilises a different vehicle is considered a different leg. So for example, an automotive component that is collected from a supplier by truck and then shipped by train until finally being delivered by truck to the vehicle assembly plant will have utilised 3 transport legs.

The minimum information needed to define a leg would be the start and finish points, the mode of transport and a description of the load carried.

6.2.2 STEP 2: DEFINE THE VOS AND PERFORM THE CALCULATIONS

The next step is to describe how the transportation is carried out so that any data is used in the correct manner. The way that vehicles operate to execute a transport leg is referred to in the CEN Standard as the *Vehicle Operation System,* or VOS.

The VOS definition should include the type of vehicles operating the transport leg, the period of time of activity of these vehicles and assumptions about how they are operated. For example, are parts being collected from suppliers via multiple trips and then consolidated, or are they being collected on a single collection route (‘milk-run collection’)?

The CEN Standard states that the VOS should include all repositioning/ empty trips that are related to the vehicle operations. This means if this approach is used, any distances that the transport vehicle has had to move without any goods in order to provide the transport service should be included in the total transport distance. Note that empty trip distances can be hard to measure and assign. The French Decree adopts the pragmatic approach that the transport service provider shall determine the procedure for integrating repositioning legs, empty legs, and emissions while stopped with the engine running.

The CEN Standard excludes some transport related elements from the VOS including loading & unloading of freight, and processes at the administrative level such as office work. More information can be found in the section 4.3 “Processes not included” of the CEN Standard.

Once the VOS is defined, the characteristics needed for calculation can be listed out for each leg. These might include: fuel consumption, distance, weight of load, load factor and empty distance. The appropriate emissions factors can then be selected according to the available data and the calculation can be completed, as shown in Section 6.2.5.

6.2.3 ALLOCATION

The term ‘allocate’ here refers to the activity of sharing the responsibility for the total energy use and emissions amongst those products, actions, services or customers that have the responsibility for them.

Where transport is performing an exclusive service to a specific customer, there is no need to allocate - all fuel and energy use and emissions are related to that specific service and customer. But for Vehicle Operation Systems performing more than one different service, perhaps also for more than one customer, it is important to allocate emissions in a fair way to the service and customers involved.

This is not an exact science and there are a number of different parameters that might be chosen on which to base the allocation process, such as weight of goods carried, volume of goods as well as the distance travelled for each individual transport service and user of the transport service.

(a) Allocation based on cargo

If a VOS involves transport of more than one cargo, the fuel, energy and emissions can be allocated using a relevant cargo allocation ratio. Commonly this might be agreed to be done on the basis of either weight or volume of goods carried.

(b) Allocation to different transport service users

If different transport service users use precisely the same VOS over the same distance, such as rail freight carrying a variety of loads to the same destination, then allocation to the different transport service users can be done on a weight or volume basis as per the cargo example above.

However, if a VOS involves different user's freight being picked up at and delivery to different locations, then it is necessary to further investigate how to allocate the responsibilities for distances, empty vehicles etc. to the different transport users. This may often be complicated, and there are additional considerations such as relative distances covered and the number of collection/ drop-off points relating to each user. Further details on allocation can be found in the CEN standard, which has several examples of how these rules can be applied in different scenarios.

6.2.4 STEP 3: SUMMING OF ALL LEGS

The final step is to total the GHG emissions (and any energy consumption data) for the whole transport system by summing the individual values for all individual legs.

At this stage it is good practice if possible to give an indication of the precision of the results by giving some kind of tolerance bands. For example, if estimates of distances travelled are assumed to have a precision of +/- 10% then the accuracy of the final emissions data will be no better than this.

Many companies use spreadsheet software for tabulating and summing up all of the data (See Section 6.4).

6.2.5 CALCULATION EXAMPLE

The figure below gives an example of the emissions calculation according to the French Decree. (Note the French Decree uses the methodology of the CEN Standard for calculation processes.)

ODETTE

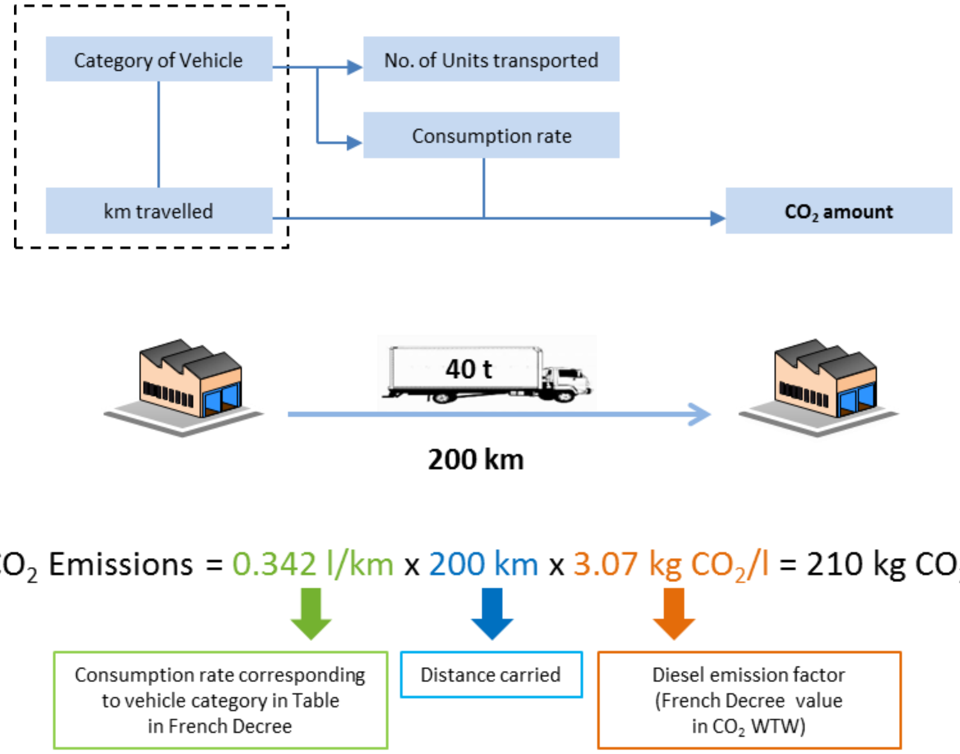

Figure N°9: Example of emissions calculation (Level 1)

To calculate the amount of GHG emissions, we multiply the data for the distance travelled by each truck, by the diesel emissions factor, and by the diesel consumption rate corresponding to each truck category. For example, if a 40 tonne diesel articulated truck, driving 200 km, consumed 61 litres of fuel, the GHG emissions can be calculated as follows: (the diesel emission factors used in the calculation are the French Decree values: 3.07kgCO_2/L in WTW and 2.49kgCO_2/L in TTW.)

(1) <u>For Well to Wheel calculations</u>

$G_w = g_w \times C_t = 3.07 \times 61 = 187.27$ kg CO_2

(2) <u>For Tank to Wheel calculations</u>

$G_t = g_t \times C_t = 2.49 \times 61 = 151.89$ kg CO_2

Key:

- Ct: Number of litres of diesel
- Gw: Well To Wheel (WTW) GHG emissions
- Gt: Tank To Wheel (TTW) GHG emissions
- gw: WTW Diesel emission factor
- gt: TTW Diesel emission factor

ODETTE

Note that the accuracy of the calculated result depends on the accuracy of the data and precision of the emissions factors used for the calculation. In this case there is no specific fuel consumption data available so a default value is used from the French Decree table making the accuracy 'Level 1' (See Section 7.1 for more on accuracy levels).

For examples of calculations in line with the French Decree for other modes (railway and air transportation) see Appendix 2.

6.3 METHODS TO USE WHEN COMPARING DIFFERENT SCENARIOS

6.3.1 COMPARISON OF TOTAL EMISSIONS

When comparing different scenarios, the most obvious approach is to consider the total emissions impact of each by simply summing the individual emissions from each leg, as in Step 3 above.

This would help answer needs such as:

- Comparing different routes
- Comparing freight emissions from shipments from different supplier locations
- Estimating emissions connected with entering a new market or changing production sites

Sometimes the results can seem counter-intuitive. Proper evaluation of emissions of multi-modal routings can reveal that the road leg from start point to port may produce more emissions than a subsequent 10,000 km ocean leg.

6.3.2 CALCULATION OF RELATIVE EMISSIONS IMPACT

In many cases there is a need to compare the relative environmental impact of different transport methods. Questions to be answered might include how to:

- Compare the effectiveness of different transport modes
- Compare the efficiency of different service providers
- Compare the benefits of different types of trailer and equipment improvements etc

In these cases it is necessary to have a standard metric that can be comparable. This is known as normalisation. There are various ways of normalising emissions data. The most common is to use the parameter gram CO_2e per tonne km. This gives an average of how much CO_2 emissions a transport service provider emits per transported tonne and per transported km. The benefits of using this value is that it takes both the distance and transported weight into consideration, as well as how energy efficient the vehicles are that are used for the transport.

$$CO_2e/\text{tonne km} = \frac{(\text{Fuel consumption x Emission values for that fuel})}{\text{Transported tonnes x distance travelled in km}}$$

This figure might be worked out for a specific type of transport equipment or for a whole transport fleet or as an average for an operator in a particular network. The average value can be calculated per operator and for each mode that the operator is offering. Also these values can be different depending on country and region.

For transport of finished vehicles, there is an obvious benefit to considering emissions per vehicle transported, as this would allow easy comparison of the different impacts of trailer units with different carrying capacities. A typical metric might then be:

$$CO_2e/\text{vehicle km} = \frac{\text{(Fuel consumption x Emission values for that fuel)}}{\text{Vehicles carried x distance travelled in km}}$$

6.4 AUTOMATING THE CALCULATION PROCESS

If a lot of data is to be processed, there are various options to make things easier.

A wide range of database services offer on-line CO_2 calculators to help estimate emissions from transport operations. These may be useful for one-off or quick estimates, however, care should be taken before using them before adopting them for large scale use:

- It can be unclear as to calculation methods and assumptions being used
- Dependency on the particular emissions factor that has been selected by the site. It may be difficult to obtain repeatable results over time if the data base service emissions factors and or calculation processes are changed

If you wish to use an on-line calculator, it is recommended to use one from a reputable authority such as one of the organisations referred to in these guidelines.

If you want to create a systems solution tailored to your own requirements, a common starting point is to develop a spreadsheet, using standard office software on a desktop computer. This will allow you easily to add appropriate emissions factors into the calculations and to import large amounts of operational data on which the calculations can be performed.

An important advantage with spreadsheets is that they are easily updatable as newer and more refined emissions factors are published or if additional data becomes available to make the calculations more comprehensive.

Once experience has been gained using simplified spreadsheets then decisions can be made as to whether more sophisticated software solutions should be developed/ procured.

	Input				Calculation	Output	
	A	B	C	D	E (A x B)	F (C x E)	G (F/D)
Month	Total Operator Kilometres	Fuel Consumption: litres / kilometre	Emissions factor kgs CO_2e/ litre	Total vehicles shipped	Total litres of fuel	Total CO_2e emissions (kg)	CO_2e emissions per vehicle shipped (kg)
Jan-13	3,500,000	0.40	2.67	80,000	1,400,000	3,740,000	46.8
Feb-13	3,200,000	0.41	2.67	90,000	1,310,000	3.500,000	38.9
Mar-13	4,000,000	0.40	2.67	110,000	1,600,000	4,270.000	38.8
Total	**10,700,000**			**280,000**	**4,310,000**	**11,510,000**	**41.1**

CEN Accuracy Level 2 - fuel consumption data provided by carrier as fleet average
Emissions factor from CEN 16258:2012 (Tank to Wheel)

Total CO_2e emissions Jan-Mar 2013= 11,510 tonnes

Figure N°10: Example of spreadsheet to support emissions calculations from shipments of finished vehicles by road

7. DATA ACQUISITION

This section gives methods and strategies for acquiring the different data required for GHG calculations and describes how the choice of data affects the accuracy of the calculation results. Help is provided in selecting emissions factors from the different sources available.

7.1 ACCURACY LEVELS

The quality of calculations will be affected by the level of accuracy of the acquired data and the applied emissions factors. The accuracy of the data depends on data availability, recording accuracy and resources available for processing the data.

The best data that a transport service user can obtain to determine fuel consumption would be the exact consumption by the equipment used for the specific transport legs being reported on: to use CEN terminology, the specific measured values.

However, given that this exact data may not be available, the concept of accuracy levels is used to define alternative approaches that allow calculations to be made based on averaged or estimated data. As these other approaches will involve various assumptions being made there will thus be a lowering in the level of accuracy of the results obtained.

Using higher levels of accuracy not only produces better quality results, but also allows a greater ability to quantify improvements made by making changes to equipment used, load utilisation, driving styles etc.

7.1.1 ACCURACY LEVELS WITHIN THE CEN STANDARD

CEN has defined 4 accuracy levels, as described below.

Default Values (= Level 1 in French decree)

Generic emissions factors are used that are average fuel consumptions or GHG emissions for a particular mode and type of transport. They should be obtained from a published source and not determined by the transport service operator.

Note that while useful in providing quick and repeatable results, this approach does not allow differentiation of performance between different operators use of the same equipment. The accuracy of the results is dependent of the granularity of the generic factors.

Transport Operator Fleet Values (= Level 2 in French decree)

Here the Transport Operator uses fuel consumption figures based on their own average fuel usage across their whole fleet. This is a figure that the operator should be able to readily provide and it means that the results given are constant whichever particular vehicle or equipment is used for the transport being reported on.

Transport Operator Specific Values (= Level 3 in French decree)

Here the Transport Operator analyses the fuel consumption of different elements of their operations and uses an average fuel consumption for the most relevant type of equipment and usage for the transport being reported on. The operator might consider breaking down their operations by logistics organisation, type of route, type of means of transport, vehicle type, client or any other appropriate complete breakdown.

Specific Measured Values (= Level 4 in French decree)

This is the most accurate approach where the Transport Operator uses exact values of fuel usage measured on the specific Vehicle Operation System (VOS) for the transport being reported on.

In summary:

Level 1:	Emissions = distance travelled x emissions factor (using default values)
Levels 2 & 3:	Emissions= average fuel/ km x distance travelled x emissions factor (For 2, average fuel/km is across whole fleet, for 3 it is more specific)
Level 4:	Emissions = exact quantity of fuel used x emissions factor

See Section 7.3 for more on emissions factor selection.

7.1.2 ACCURACY LEVELS ACCORDING TO THE FRENCH DECREE

The levels of accuracy for emissions reporting defined in the French Decree (and its Guidelines) follow the CEN Standard. (For this reason the French numeration is used as a reference in order to standardise reporting in the above section.)

The French Decree stresses the principle that you should aim to use the best accuracy level that you are able to. If a lack of detailed data forces you to use the lowest level of accuracy (level 1) then you are encouraged to use the default values for average vehicle fuel consumption published by the French environment organisation ADEME. These values consider an average fuel efficiency for each type of vehicle, taking into account empty running. If justified, then alternative default values may be used.

All transport companies can use those values until July 2016. After that date, only those with less than 50 employees, and those who do not obtain their subcontractors' values on time and are not necessarily correct, can continue using them. All others are expected to have started measuring their own fuel economy.

7.1.3 ACCURACY LEVELS CONSIDERED BY DEFRA/ GHG PROTOCOL

The UK Department of Environment, Food and Rural Affairs (DEFRA), in its freight CO_2 reporting guidance, follows the Greenhouse Gas Protocol in considering ways of tackling situations where detailed data on transport equipment and/ or routes travelled is not available.

DEFRA defines four levels of estimation that encompass a wider range of scenarios vs the 4 levels of the CEN standard.

Based on the quality/ availability of data available, DEFRA provide the following classifications:

Primary data

Data obtained by directly measuring the transport being reported on e.g. by use of vehicle data loggers of individual fuel receipts. This approach requires availability of measured fuel usage data and is equivalent to Level 4 of the French Decree.

Secondary data

Generic, or average data, relevant to the transport being reported on. This approach requires sufficient operational data to be available to apply average or default factors and corresponds to Levels 1-3 of the French Decree.

Extrapolated data

Data calculated by estimating a trend from existing data, to fill a gap or project forward. This approach allows emissions data from a known sample of transport operations to be used to estimate emissions from a larger sample.

Examples of how this approach may be used:

1. If detailed study is carried out for 3 months of operations, an estimate of a year's worth of emissions could be made by pro-rating. (Note that some adjustment may need to be made for level of activity: in this example a year's emissions may be less than 4x the emissions of the first quarter due to seasonal fluctuations).
2. If data is known for specific networks or customers, then estimates could be made for other transport by pro-rating by activity level. For example, if the annual inbound freight CO_2e for a 300,000/yr car assembly plant in Germany has been calculated as 36,000 tonnes then the annual figure for a nearby 200,000/yr assembly plant could be estimated at 24,000 tonnes CO_2e. (A better approximation could be made by taking account of any differences between average supplier-to-plant distances or in combined component weights of different car models).

Proxy data

This involves the use of something similar where no direct data is available, (i.e. in its proxy).

An example of this would be to derive an emissions estimate from transport cost when full details of the transport system are not known. GHG emissions come from fuel usage, which in turn forms a significant proportion of the total freight cost (typically 25-30%). This fuel cost burden is likely to be directly discussed during transport cost negotiations, so whoever is buying the transport services will likely know approximate %. An order of magnitude on freight emissions can be generated by requesting the transportation buyer to confirm total freight cost and give a best guess of fuel cost %.

Emissions = Fuel cost / (fuel price/ litre) X emissions factor

While not that accurate, this approach is nevertheless very useful to gain an understanding of relative emissions levels between different networks, regions and customers and to allow prioritisation for more detailed reporting and for emissions reduction actions (See Section 9.1).

Note that any use of extrapolated or proxy data should be accompanied by a justification explaining why the approach being used is valid. Ideally, some indication of accuracy levels should be provided based on the assumptions used. For example, if it is considered that the accuracy level of the estimate of total fuel used is +/- 20%, then the resulting CO_2 emissions data will be no more than +/- 20 % accurate.

The techniques of using extrapolated and proxy data can be very helpful in filling in any gaps encountered while producing a high level estimate of total corporate emissions, as advocated by the GHG Protocol (See also 'First steps in reporting- Section 8.3).

7.1.4 SELECTING THE CALCULATION METHOD TO SUIT DATA AVAILABILITY

The decision tree below in Figure No.11 illustrates how to select the best calculation methods to use according to the available data. It consists of five questions and the answer "YES" or "NO" will help to make the best choice. The grey blocks present the primary data and calculations and the yellow blocks indicate the final calculations for obtaining GHG emissions.

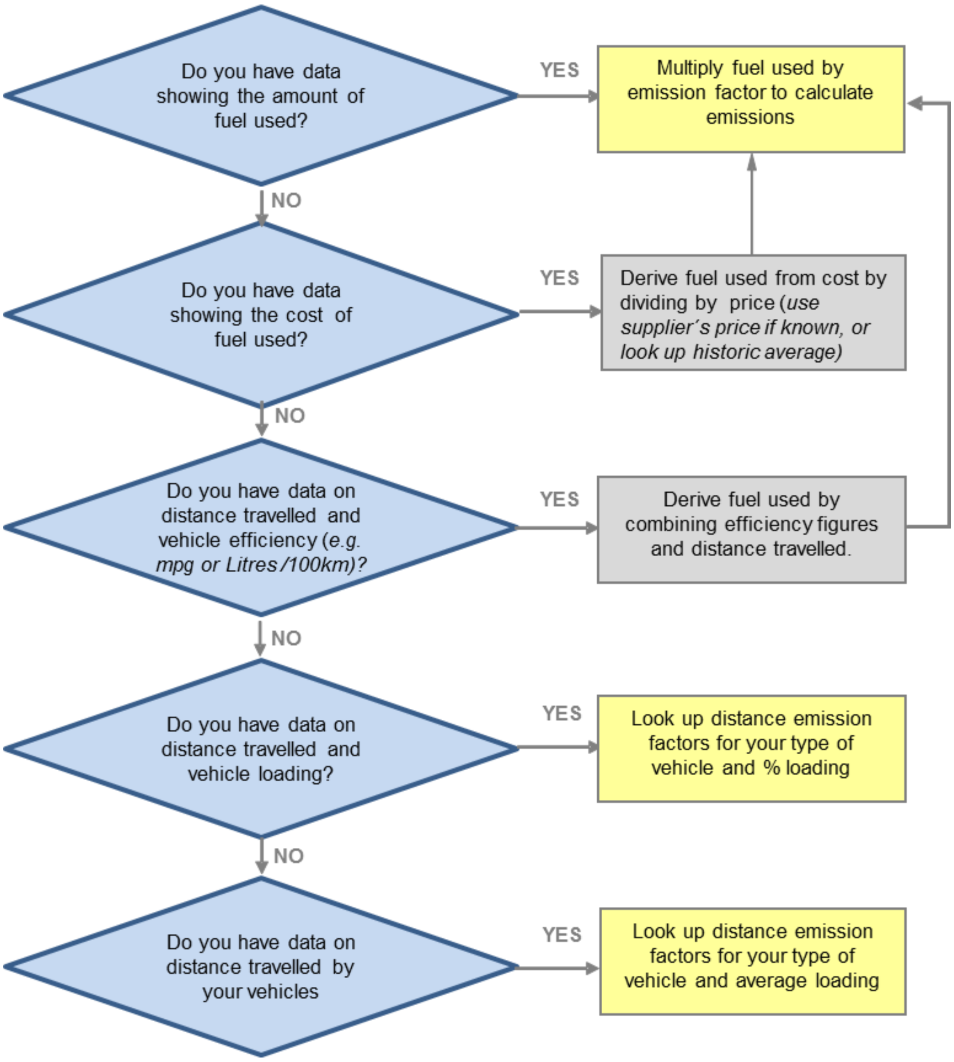

Figure N°11: DEFRA Calculation Diagram

Source: "Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations" From DEFRA UK

As there is some considerable variation between these methods it is important for the Transport Service User and Transport Operator to be aligned on which methodology they should use. (See Section 8.5.2 for more guidance on making agreements on reporting methods between parties).

7.2 COLLECTING OPERATIONAL DATA

7.2.1 SOURCES OF OPERATIONAL DATA

There are many alternative methods available for gathering data and examples of how to collect the various necessary data elements are described below. How the data is collected depends on the actual case, who is doing the calculation and for what purpose.

The ease of gathering data will depend on who is carrying out the reporting. This might commonly be:

1. The transport operator or carrier
2. The forwarder or transport service provider who is directly controlling the transport
3. The transport service user - the customer of the transport

The main data that may be needed is:

- Pick-up and delivery point location
- Transport mode or vehicle
- Amount of goods moved
- Route and distance
- Transport Load Factor (how heavily loaded is the truck)
- Fuel consumption or energy use

There are two main sources for the data: the transport management systems used for directly controlling the freight and the transport service user's planning systems used for specifying and paying for the freight. The reporter may be able to obtain additional data from other external sources such as those involved in specific transport activities.

In most cases, if data from the transport management system is used, the calculations will be made by the transport service provider and the transport service user will be given summary results about emissions (though there may be cases when the transport service user will be interested in receiving more detailed data for various reasons).

Alternatively, the transport service user may use their own systems for calculating GHG emissions.

These two alternatives are considered in the sections below.

Data from the transport system

Information about goods moved is of course vital in transport management and we can expect any forwarder to have information readily available on the key parameters- pick-up and delivery points, transport mode, amount of goods moved and in most cases, routings and distances covered.

Much of this information will normally also be available to the transport service user via freight invoices and other transport documents. When there is no direct fuel consumption data, another source of information can be the purchased fuel invoices.

The ability to provide the data will depend on the size and resources of the companies involved. There may be those who are only able to give the information after some kind of investigation while others will be able to give the data easily from their internal ERP systems. It is expected that due to the increasing needs for GHG reporting, transport service providers will develop continuously their systems in order to improve the quality of their information. Such developments could include linking their on-board Data Terminals and Fleet Management Systems (for GPS-based routing information, real fuel consumption etc.) closer to their ERP systems and to information about goods and customers.

Transport Load Factor

Information on transport load factor (how heavily loaded the vehicle is) enables use of more accurate emissions factors and also allows emissions efficiency metrics (emissions per tonne carried) to be calculated. However this data will not always be easily available from the transport system. To collect such information the forwarder must be able to identify the various goods transported and relate them to individual shipments and/or transport service users. In order to provide such data, the forwarder must also calculate how to allocate emissions to specific shipments. This is something which could be quite complex if there are several transport legs, reloading is involved and empty transport etc. is to be included.

Fuel consumption or energy use

As per the direction of the French Decree, the aim is to obtain the best available data on fuel usage to drive the calculation processes. As it is such a major element of cost, carriers generally have a good understanding of fuel efficiencies of their fleets, though they may consider this as commercially sensitive information.

Data from the transport service user system

Many transport service users in the automotive industry are quite well equipped with their own data that could be used for calculation of emissions. Collecting your own data would be an alternative for certain information needs, such as if you want to verify received data, if you want to do bench marking, or compare various options for locations, routes etc. Production planning, sourcing, logistics etc. handled by the automotive industry's internal systems contain information about:

- Amount of goods moved (through delivery schedules, packaging instructions, transport bookings….)
- Pick-up and delivery point (at least for the first and last location, maybe not always intermediate locations for complex transport chains)
- Route and distance (at least the average distance, maybe not the route)
- Transport mode or vehicle (at least transport mode for actual transport legs, normally not vehicles)
- Transport load factor may be possible to derive from other data. For finished vehicle transportation it is relatively straightforward to assign numbers of vehicles carried to equipment used.

- Fuel consumption data – this information is normally not available in the internal systems of transport service users. Whilst fuel efficiencies can be obtained from public sources (see Section 7.3.2), various other approaches could be taken to obtain more accurate factors, e.g. by talking to equipment manufacturers, asking carriers for average figures, or, if available, using data from closely monitored transport operations and then applying the results to general operations.

7.2.2 CHOICES FOR COLLECTION OF DATA

A transport service user, such as an automotive OEM, has a choice to make as to whether to request their individual service providers to provide emissions data or whether they calculate the emissions themselves, as indicated in the below chart.

	Transport Service Provider or Transport Operator	Transport Service User (e.g. OEM)
1.	Calculates full emissions	Receives full emissions data
2.	Provides operating data (distances, loads etc.)	Calculates emissions from operating data
3.	Provides basic reference data within invoices	Obtains necessary operating data from planning system and/ or invoices & calculates emissions

Table N°1: Strategies for data collection/ calculation

Each of these approaches has pros and cons.

The first approach, where an OEM is provided with emissions data by the carrier, is the method promoted by the French Decree and is likely to be the future long-term method once all transport service providers and operators are fully experienced and skilled in Greenhouse Gas reporting.

However, from an OEM's perspective, a comprehensive set of emissions data will only be possible if all carriers are able to calculate themselves. An OEM may consider that in the short-term they will only gain a full picture by obtaining the basic route and load information from the operators and then performing the calculations themselves.

7.2.3 TEMPLATES FOR GATHERING DATA

As explained in Section 6.4, spreadsheets provide a practical way of gathering and calculating emissions data. Examples of templates of GHG calculation is also provided in Appendix 3.

The exact layout used is best tailored to the particular requirements e.g. timespan, format of available data, breakdown of transport legs etc.

7.2.4 DATA FOR RAIL FREIGHT

Rail freight is frequently used within Europe for transport of both automotive component parts and finished vehicles. Its use is encouraged by governments both as a means of reducing emissions and to keep traffic off the road.

Emissions from rail freight vary considerably according to the type of locomotive power. Diesel trains produce most of their emissions by direct fuel combustion. With electric trains, the majority of emissions are upstream emissions produced during the generation of electricity. Different methods of generation produce very different levels of emissions, with nuclear and hydro-electric producing significantly less CO_2 compared with oil and gas.

Different route infrastructures and economic considerations will influence choice of power sources by the rail operators. Trains vary in size and efficiency and emissions will depend also on speeds and operating cycles. Rail use by automotive companies is generally repetitive, with the same routes being used on a regular basis. The best approach for emissions reporting is to list out all the different rail legs used, to establish the standard emissions for each and then to multiply by the number of trips taken.

Because of the wide variation of emissions produced on different routes and with different configurations of train, it is recommended not to use a generic emissions factor for all rail freight. Instead, a first step would be to approach the specific rail operators providing the transport and ask for emissions data direct. An alternative is to use the EcoTransIT tool which has been established with the input of major European rail operators and takes account of different routings, power sources and equipment configurations.

7.2.5 DATA FOR SEA FREIGHT

The main types of sea freight used within the automotive industry are:

- Container shipping - for long distance shipping of parts and, in some cases, vehicles
- Roll-on/ Roll-off ferries – for road trailers of parts and for finished vehicles
- Dedicated car transporters

Relative emissions from sea freight are low - in fact the biggest element of emissions for a door to door route can be road freight to and from the ports of exit and entry.

As with rail freight, most routes will be run on a regular basis so it is recommended to list out all the legs and then establish the standard emission for each.

Many shipping lines can provide emissions data to cover specific routes taken.

ODETTE

Where a variety of carriers or vessels may be used or if specific carrier information is not available, it is recommended to use a data set such as that provided by the Clean Cargo Working Group (CCWG) for international container freight. The CCWG database has been established through the direct input of data by shipping lines.

There are different ways of allocating ocean emissions. For practical reasons, for container shipping many look at emissions per container. The CCWG use this approach. Other shipping lines look at emissions per tonne carried. Dedicated car transporters may be able to provide data on emissions per car carried.

7.2.6 DATA FOR AIR FREIGHT

Within the automotive industry air freight tends to be used only in emergencies, or for shipment of prototype parts and vehicles. As much for cost reasons as any other, volumes flown tend to be low.

Due to the high fuel usage of aviation, GHG emissions per tonne of freight carried are very high compared to terrestrial transport modes. However due to the low volumes shipped, automotive companies may find that the total air emissions is low compared with their total freight emissions.

For detailed analysis, many airlines can provide emissions data for freight carried, normally as a factor related to weight of cargo.

7.3 SELECTING EMISSIONS FACTORS

There are two types of factors:

1. Fuel emissions factor - literally how much GHG is generated by burning a litre of fuel
2. Parameter based factor - how much GHG results from transporting units of material set distances on particular types of transport…e.g. CO_2 per tonne km for different trucks.

These two types are discussed in the next two sections, followed by a section discussing how to choose which emissions factors to use from the wide range of sources available.

Emissions factors can be obtained from the data sources listed in Section 11.3.

7.3.1 FUEL FACTORS

A fuel factor is needed to convert fuel usage into emissions. The factor is normally expressed in terms of kilograms of CO_2 or CO_2e per litre of fuel.

The Greenhouse Gases in exhaust emissions generally all come from the burning of carbon contained in the hydrocarbons within the fuel. Working out the fuel factor is not straightforward as the chemical make-up of most fuels such as petrol and diesel is variable, depending upon the quality of the crude oil and decisions made during the refining process. Different markets have different blends of fuel. Assumptions also have to be made as to how efficiently the fuel is being combusted when used, i.e. how much of the carbon actually is turned into CO_2. The result is that different authorities may quote different fuel factors for similar fuels. However the differences are slight and should not be a major concern so long as the factor being used is clearly stated.

As explained in Section 5.5 there are two other considerations:

1) Many data sets now include factors giving total 'CO_2 equivalent' (CO_2e) emissions, to take account of emissions of other Greenhouse Gases besides Carbon Dioxide.

2) In order to account for emissions created during fuel production, then 'Well to Wheel' emissions factors can be used rather than simple 'Tank to Wheel' factors.

Note that when GHG reporting began, the emphasis was on CO_2 only and on Tank to Wheel emissions, so emissions factors were published on this basis. Increasingly, however, data sets are also providing factors to support reporting on the CO_2e impact of all Greenhouse Gases and on Well to Wheel fuel emissions. (See Section 5.5 for explanation of these differences).

At the time of writing, the authors of the French Decree have stated that they are moving towards using CO_2e factors.

A useful set of CO_2e Fuel Factors that should be generally applicable in Europe is provided in the Annex of the CEN 16258 Standard.

For automotive diesel, CEN provide the following factors:

- CO_2e emissions from Tank to Wheel: **2.67 kg/ litre**
- CO_2e emissions from Well to Wheel: **3.24 kg/ litre**

7.3.2 PARAMETER-BASED EMISSION FACTORS

Emission factors are required to allow the calculation of emissions where exact fuel usage is not known. Emission factors for specific vehicles may be available from specification data sheets provided by the vehicle manufacturer.

More generally, emissions factors for different transport modes and categories of vehicles are available from a variety of authorities and web sites.

Basic databases may just give generic data for types of transport, e.g. 'Heavy Goods Vehicle'. Better databases will sub-divide transport into different types, e.g. '40 tonne truck Euro 5 emission level'.

Increasingly, databases are being updated to include data relating to different operating parameters such as trailer loading and short vs. long-haul running. This might allow categorisation such as 'road transport, 40 tonne truck, long haul, 65% utilisation level'.

While choosing the conversion factors, the user must understand whether they are relative to CO_2, GHG, TTW, WTT, etc… and should be careful not to mix many references without proper reasoning. For instance, the French diesel is not the same as the British one and it is not relevant to obtain TTW emission factors from a British database and WTT emission factors from the French one.

According to the CEN Standard, any GHG emission factors used for implementing this standard shall be:

- The values specified by the fuel supplier
- If unavailable, the values established by CEN (In Annex A of the standard)
- Values from other guidance if their relevancy can be proven.

Odette recommends companies avoid using numerous references in their calculation sheets and should, where possible, select a single source for emission factors that is appropriate for their use. It is recognised however that as full data sets are not yet readily available, it may be necessary to use different ones to cover, for example, different modes or different geographical regions. Each source used should be fully referenced within the report.

Different references give different results, but they are generally close. To illustrate this, the following example shows results emissions calculation using 4 different standards: CEN, French decree, UK Guidelines and NTM.

The examples consider an articulated 40 tonne diesel Truck travelling a distance of 100 km, 50% loaded with automotive parts.

CEN Standard

The CEN Standard does not provide values by truck type but recommends looking for them from trusted references. The French Decree provides such values for average loading. While posing the hypothesis of an articulated 40t Truck for various freight types, a first table gives us 0.338 L/km of fuel consumption (the filling rate is not important since it is an average value taking into account empty running). The truck consumed 33.8 L of HGV Diesel.

The CEN Standard recommends taking values from the fuel supplier. However, we will take values that CEN proposes: 2.67 kg CO_2e/L of diesel in TTW emissions and 3.24 kg CO_2e/L of diesel in TTW emissions.

Hence, the results would be 90kg CO_2e in TTW emissions and 110 kg CO_2e in WTW emissions.

French Decree

The truck consumed 33.8 litres of HGV diesel.

The French Decree states it is mandatory to report CO_2 emissions, but the French guidance for application gives emission factors for CO_2e emissions also for optional reporting. TTW emissions would be 2.49 kg CO_2/L diesel and WTW emissions of 3.07 kg CO_2/ L of diesel.

Hence the total emissions, according to the French decree, would be 84 kg CO_2e in TTW emissions and 104 kg CO_2e in WTW emissions.

UK DEFRA Guidelines

The DEFRA guide provides a simple to use tool where if you enter into the data sheet 100 km for a 50% filled diesel HGV >33t articulated truck. The result gives directly the GHG emissions: 94 kg CO_2e in TTW emissions and 114 kg CO_2e in WTW emissions.

NTM

NTM also provides a tool where in addition to weight, distance and truck type it is also possible to add parameters for road type, Euro emissions class, how hilly the road is etc. The result when calculating a trip of 100 km for a 34t truck carrying 20 tonnes gives the following GHG emissions: 82kg CO_2e in TTW emissions and 88 kg CO_2e in WTW emissions.

This is based on a fuel consumption of 31.8 litres for the whole trip, 2.57 kg CO_2e/L in TTW emissions and 2.77 kg CO_2e/L in WTW emissions.

This example demonstrates that there can be variation between results using different factors and so shows that caution must be taken when comparing results from different sources.

The low WTW emission value in NTM is because the NTM calculation is based on Swedish fuel data. The difference between Swedish average diesel fuel and European average fuel can be explained by Swedish refineries having higher refining energy efficiency and having lower usage of fossil fuel based electricity. This highlights the importance of comparing similar systems and basing them on comparable assumptions.

Nevertheless, the range of variation is generally small and probably within the level of variation of other aspects of the process and should not be of major concern. It is certainly clear there is no one correct result. It should not be interpreted as if one process is necessarily better than the other but instead that there are different views on the emission values and that there are quite some uncertainties in these values.

Once again, to allow meaningful statements about improvements it can be seen that whichever methodology you use you should follow it consistently.

A final point to stress is that emissions factors are regularly being updated. There is therefore great advantage in keeping the raw data used in calculations so that at a future point it is possible to recalculate prior results using new factors, thereby allowing better quality comparison of data from different years. See also comments about automating the calculation process in Section 6.4.

7.3.3 WHICH EMISSIONS FACTORS TO USE

At the time of writing, no one data source provides a fully comprehensive set of factors, though they are improving on an annual basis.

They have the same general purpose but vary in terms of:

- Coverage - are all required modes & type of freight covered?
- Regional - are factors applicable to just one country or can they be used regionally?
- Detail - how specific are they to particular vehicle types, trailer loadings, road conditions etc?

It is important to use values from recognised sources. The CEN Standard provides a list of sources; the French Decree provides values for average loading to be used though does allow use of other sources where justified.

Faced with the choices available, the following considerations may be used to help decide which factors to use:

- Is the use of a specific data set required by the reporting standard you are following or by the customer of your data?
- Is there a data set already in use by your company or customer that it would be sensible to use for consistency?
- Is there a particular data set that is linked to guidance relevant to your main country of operation? (e.g. DEFRA for UK, NTM for Sweden or ADEME for France)
- Is there a data set particularly aligned to your main mode of operation? (e.g. EcoTransIT for European rail or CCWG for ocean freight)
- Is there a data set that takes into account specific areas of interest, such as use of vehicles complying with different emissions standards? (e.g. HBEFA)

Emissions factors can be obtained from the data sources listed in Section 11.3.

8. REPORTING GUIDANCE

This section is intended to give practical guidance on contractual aspects of GHG reporting. Potential content in legal agreements (in most cases as part of transport agreements) is listed with references to reporting scope and requirements. Examples are given for GHG reporting as part of legal obligations or as part of business activities respectively. Detailed recommendations are given for how to agree administrative and technical details of the reporting.

8.1 DIFFERENT TYPES OF REPORTING

Up till now there has been considerable variety in how GHG reporting has been carried out, in terms of accuracy levels, data sources and administrative tools used. Over time we can expect a development towards more mature solutions as illustrated in Figure N°12 below. In the future, many of these communications are likely to be performed electronically by using EDI or similar methods.

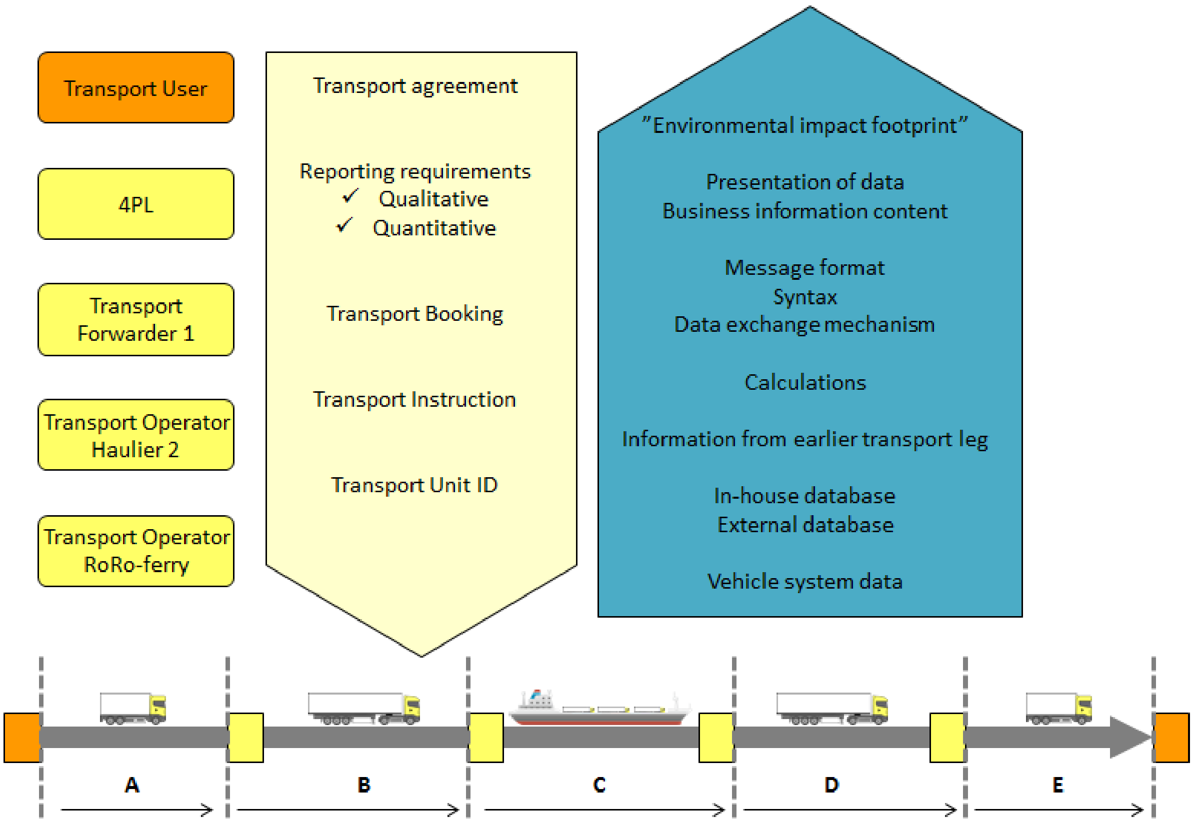

Figure N°12: Basic model for communicating and fulfilling GHG reporting demands

The model in Figure N°13 represents a high level of ambition, but could also be applied without using all of the components.

When looking in detail at this example, the following may be noted:

- The model defines the basic structure of the transport chain with transport legs and parties involved
- In this case the reporting requirements are defined by the Transport user
- Reporting requirements are forwarded step by step from one Tier to the next Tier in the transport chain, thus covering all related transport legs

Reporting is made from lower Tiers to higher Tiers according to what has been agreed and/or stipulated

8.2 REPORTING PRINCIPLES

The Greenhouse Gas Protocol provides a helpful list of key principles to follow:

RELEVANCE –
Ensure emissions reports appropriately address the questions being asked

COMPLETENESS –
Account for and report on all emissions within the chosen scope.
Identify and justify any exclusions.

CONSISTENCY –
Use consistent methodologies to enable meaningful comparisons to be made.

TRANSPARENCY –
Make clear all assumptions made and methodologies used and include references to sources to provide a clear audit trail.

ACCURACY –
Aim to provide data that is as accurate as is practical.
Where possible give an estimate of tolerance band within which results lie.

8.3 FIRST STEPS IN REPORTING

When starting reporting it is unlikely that you will be able to fully report from day 1.

It is suggested that the first step should be to lay out all the different operations you might consider to include and then develop a phased plan.

The GHG Protocol recommends that you should make at least a high level estimate of all the different elements of your operations so you can then focus your resources on reporting the most significant ones.

For logistics, because so much of CO_2 emission is related to fuel used, a high level estimate could be made simply by estimating the total fuel bills of each element of operation and then applying a simple fuel factor to convert litres of fuel into CO_2 emitted.

Total fuel bills can be estimated by considering the % that fuel costs from the overall freight costs.

If you have your own transport you should have all the fuel data available and therefore an estimate should not be needed.

8.4 INTERNAL REPORTING

Any internal analysis of Greenhouse Gas emissions should be backed up with all necessary information so that the provenance and accuracy can be readily checked at a future date.

Reasons for good reporting integrity include:

- Potential need to support company auditing
- Ability to re-use data to answer additional reporting requests
- Help simplify the task of updating data to reflect any future changes in reporting practice, such as the use of updated emissions factors

As a minimum any report should include the following:

- Clear definition of scope
- Roles & responsibilities of those people involved
- Explanation of calculation methodology & assumptions made
- Identification of data sources
- List of all assumptions
- List of emissions factors being used (and sources)
- Confirmation of any recognised standards that are being adhered to
- Validation procedures and sign offs required
- Distribution list

8.5 REPORTING BETWEEN DIFFERENT PARTIES

Where emissions data is requested from one party to another, some form of agreement will be needed as to what to report.

Sometimes reporting practices may be defined by legislation. More commonly the requestor will have more of a free hand in defining what they would like to receive.

Initially, information may be requested in an ad hoc manner, but sooner or later the provision of data is likely to become more formalised and may be incorporated within the commercial agreements between the parties. If this is the case, then care should be taken to provide a proper specification for the reports needed.

8.5.1 LEGAL REQUIREMENTS (INCLUDING THE FRENCH DECREE)

Any legislative reporting requirements will likely give very clear guidance on how reports should be presented. As an example, the French Decree is again used. It clearly defines reporting responsibilities (to the service provider) and there are clear rules regarding the scope of the operations to be assessed and the calculation processes to be used. There are also rules about submission deadlines and reporting frequency as well as what additional reference information may be required on demand.

Reporting requirements within the French Decree

The French Decree comes into force from 1st October 2013. A summary of main aspects is presented below. (For further help the French Ministry has published a Methodological Guide written by ADEME: *"CO_2 information for Transport services: Application of Article L. 1431-3 of the French transport code"*).

The French Decree stipulates:

- The service provider shall identify the different segments (segment refers to any part of the route taken or to be taken by a transport service over which the person or goods is/are carried by the same means of transport) for the transport service, assess the quantity of carbon dioxide for each segment and calculate the total of the values obtained in this way to prepare information on the quantity of carbon dioxide emitted in a transport service. (The French guidance for application gives emission factors for CO_2e emissions also for optional reporting)
- The service provider shall provide the beneficiary (*Transport Buyer*) with sincere, clear and unambiguous information, by any means considered appropriate.
- The service provider may provide the beneficiary with information explaining the calculation method and sources of energy used by any means considered appropriate".
- The basic principle of the French Decree is that Transport Service Providers are obliged to report on GHG emissions for transport services to their Transport Buyers. This should be done as agreed, or at the latest 2 months after execution of a transport service. The decree does not put any obligation on the Transport Buyer other than receiving the information. The Transport Buyer has the right to ask for complementary information explaining how calculations were made. It is common that reporting is made more frequently/faster in long term relations.
- The French Decree refers to CEN Standard EN 16258:2012 for calculation processes. However during the first period of implementation of the Decree, until 2016, transport providers are free to use other calculation processes if preferred.
- For empty transport, the service provider shall determine the procedure for integrating emissions produced while equipment is running empty, e.g. during repositioning legs, empty legs, and emissions while stopped with the engine running.
- The information provided by any sub-contractor of a service provider and prepared in accordance with the provisions of the decree and its enforcement orders shall be included in the calculation method of the service provider without modification.

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8.5.2 COMMERCIAL AGREEMENTS ON REPORTING REQUIREMENTS

Greenhouse gas reporting has already become a part of some commercial relationships between parties ordering or executing transport services. A demand for GHG reporting would normally mean that the party buying the service, the Transport Buyer, would ask the Transport Service Provider for information about emissions related to a specific transport.

The level of detail such reporting would require depends on factors such as:

- The reason behind the request, such as legal requirements, CSR aspects, business improvement
- The complexity of the actual transport chain
- The reporting capabilities of parties concerned

Basic requirements for an agreement for reporting are as presented in the chart below:

Requirements to be included	Explanation
State the scope of reporting	Provide full details of required scope: • Network/ Shipments to be covered • Time span to be covered • Activities to be included (the Vehicle Operation System) • Type of emissions data needed - e.g. CO_2 vs. CO_2e/ WTW vs. TTW
State timing requirements for reporting	If the Transport Buyer wants to state frequency/ timing when the Transport Service Provider is expected to provide report
State how information on calculation principles used should be given	If the Transport Buyer wants a standardised way of receiving information from the Transport Service Provider on calculation principles used. If the Transport Buyer wants to clarify what calculation principles should be used by the Transport Service Provider
State accuracy levels using the 4 levels defined by CEN, applied for each transport activity	Accuracy levels could be different according to different scopes. If the transport buyer wants to know the accuracy levels used by transport service provider, including sub-contractors involved, carriers should state at least the percentage of activity covered by different accuracy level.
State accepted data format(s) and data exchange method(s)	If the Transport Buyer wants to process information received in a more efficient way he should ask for specific formats and data exchange methods

Table N°2: Basic requirements for a reporting agreement

Complexity of the transport chain

GHG reporting may often become a complex issue. This is because in many transport situations:

- There are more than two parties involved. There might be one buyer of the service and another party acting in between as a transport user. There might also be several parties executing various parts of the service, for example in the case of using 4PL services.
- There are several transport modes involved and the actual goods might go through consolidation and deconsolidation during the transport.
- Each leg of a journey might be carried out by a different transport operator.
- Transport might carry material for more than one customer so allocation of emissions will be required.

For these reasons it may be necessary to engage other parties in discussions on commercial agreements to ensure that it is clear how various emissions will be allocated amongst all those involve and there will be neither omissions nor double-counting.

Technical capabilities of different players

Reporting capabilities will vary among providers of transport services due to various reasons:

- Availability of data is of vital importance. There are some providers able to use real data from the transport equipment (ship or truck…) while most of the others will rely on average or calculated data from their own sources and/or external sources. Some are not in a position to carry out GHG reporting at all.
- Reporting capability is also dependant on whether the service provider is able to link their emissions data to specific shipments.
- Technical capabilities are also important - does the service provider possess the necessary resources for GHG reporting? Most GHG reporting at present is based on ad hoc procedures on a mainly manual basis. In the future, automated IT solutions with electronic data interchange may be more readily available which might reduce the workload involved.

Where resources are limited it is recommended to prioritise:

- Focus on obvious needs due to legal and/or commercial requirements
- Focus on the transport cases with the highest impact for the transport user
- Use best available data
- Follow a strategy for continuous improvement in quality and scope of reporting

Suggested content for reporting agreements between transport user and transport provider

While GHG reporting is now becoming a part of commercial relationships, there are negligible standard procedures available for specifying GHG reporting requests. A transport buyer who wants their transport providers to provide environmental information should lay their requirements out in a specification to support negotiations and contractual agreements. These requirements could be considered as either *quantitative* and/or *qualitative*.

Quantitative requirements

This is where the transport buyer would specify a need for numerical data. The data required will depend on the requestor's own approach to gathering the data.

At one extreme, the requestor may want the transport provider to calculate the emissions themselves and simply provide the resultant quantities.

In this case, the provider should supply:

- The value of calculated emissions
- A reference to the actual transport service for which the calculations apply (in its simplest form a unique Shipment/Consignment ID)
- The calculation method & assumptions, the source of emissions factors used and the accuracy level applied.

Alternatively, the requestor may want to carry out the calculations themselves, perhaps to achieve consistent results across multiple carriers and transport modes. In this case the requestor would just want the raw data required for the calculation, such as:

- Transport mode
- Distance covered
- Load carried
- Type of fuel

If available the type of equipment used and any available fuel economy (litres/ 100 km) data might also be requested.

If reporting is required over the long term, then the most efficient approach is to establish a regular routine. Linking GHG reporting to established business procedures, such as ordering and invoicing of transport, will prove to be the easiest and most precise solution. For the moment, there are various obstacles that need to be removed to facilitate a development in this direction, such as:

- Current in-house applications, like ERP systems, do not support handling of GHG reporting
- There are no standards for exchanging GHG related information, in invoices or otherwise
- The level of business integration in general in transport management is not mature enough

Qualitative requirements

At the same time as defining reporting requirements, it may also be relevant to add other requests within the same commercial agreement. These may refer to steps that the service provider should take to ensure steps are taken to ensure that the most environmentally efficient equipment is used and that continuous improvement methods are adopted.

See Section 9.4 for more discussion on this.

8.6 ELECTRONIC EXCHANGE OF EMISSIONS DATA

It is likely that, as with other key business information, electronic data exchange will increasingly be used for emissions data communication between different parties. There are a number of data formats that could be used, or are already in use. To review the options we need to consider different information exchange scenarios, such as the following:

- Information is given by the transport service provider to the transport buyer in a dedicated report
- Information is given by the transport service provider to the transport buyer in combination with other business information, such as invoices
- Information is made available by the transport service provider for downloading by the transport buyer

The table below discusses the applicability of different exchange formats for each of these scenarios.

Information exchange scenario	Comments on data formats
Information is given by the transport service provider to the transport buyer in a dedicated report	The simplest formats to be used would be spreadsheets or statistical reports/diagrams/tables. The advantage would be simplicity; no advanced IT solution is needed. The disadvantage is that much of the input as well as usage of data will require manual intervention. A somewhat more advanced solution would be that the transport buyer will ask the transport service to give reports over a web portal. The advantage with this solution is that it allows for automation of information handling by the transport buyer. The transport service provider will still depend on keying in data manually. A more advanced solution would mean that standardised messages are exchanged automatically. This would allow for automated information handling at both parties. This solution is not available today, but could be made available in a few years provided that there are standardised messages developed by organisations such as Odette International and

Information exchange scenario	Comments on data formats
	that ERP systems at transport service providers, as well as at transport buyers are developed to incorporate support for handling of GHG reporting information. The most likely technical format for GHG reporting messages will be Web Services.
Information is given by the transport service provider to the transport buyer as part of other business information, such as invoice	This might be a good solution, at least for the basic reporting (GHG emission value plus reference to the actual transport service). This information could quite easily be added into any type of invoice, irrespective of whether it is paper based or in an electronic format. It simply requires some additional reference information in the invoice. However, this solution would be less appropriate if the aim is to give more details as listed above (Qualitative environmental data, Quantitative environmental data etc.)
Information is made available by the transport service provider for downloading by the transport buyer	In this case the transport service provider will give a link (URL address) to the transport buyer where GHG report information could be downloaded. This address could be added to the invoice. The format could be anything from simple “office program” type information to more integrated solutions (Web Services). The data content could be either just basic data or more advanced reporting (Qualitative environmental data, Quantitative environmental data…)

Table N°3: Examples of technical data formats

8.7 ENERGY USAGE REPORTING

Many bodies interested in monitoring CO_2 are also interested in energy usage, from a sustainability perspective. In addition, many financial departments may focus more on energy due to it being a more direct cost driver than are GHG emissions. An example is the CEN organisation, which has included the requirement for energy reporting within their transport GHG reporting Standard. The good news is that for freight transport, similar processes can be used to calculate both, as they are both directly linked to fuel usage. All that is generally needed is to obtain an appropriate factor to convert fuel usage to energy consumption (in mega joules, MJ).

Many sources of Greenhouse Gas emissions also provide energy factors.

For automotive diesel, CEN 16258 provides the following factors:

- Energy usage from Tank to Wheel: 35.9 MJ/ litre
- Energy usage from Well to Wheel: 42.7 MJ/ litre

9. STRATEGIES FOR REDUCING EMISSIONS

An overview of how GHG reporting can help in achieving reductions in emissions

All initiatives in GHG reporting have a central purpose- to encourage people to reduce their overall emissions. While these Guidelines are not aimed at providing detailed information on methods to reduce emissions, the following sections outline some steps that will help make any emissions reductions easier to achieve.

9.1 ESTABLISHING A BASELINE

To track progress it is essential to have a baseline. Typically, for GHG reporting, this might be done by calculating all transport GHG emissions for a particular year. Emissions in future years can be compared to the emissions in this baseline year in order to review changes.

The exercise of establishing baseline data has added benefits.

- It will help you understand the process issues and resources required to carry out reporting.
- Analysing the results will enable you to understand relative emission levels of different elements of your operations and thereby allow you to prioritise improvement actions for maximum impact.

Key steps to take to develop a set of baseline results are:

1. Agree scope and time period to be covered by a baseline report and publicise within the organisation
2. Document processes to be used and ensure all involved are trained in advance
3. Consider carrying out trial reporting prior to the actual baseline report to prove out data gathering processes
4. Retain all data used for the report so that adjustments can be made to suit any future changes in calculation methods

9.2 USE OF METRICS

Analysing total GHG emissions in total may not be the most effective way of managing performance.

Total emissions are directly related to the scale of operations, so an expanding business may have year on year major increases in emissions.

The answer is to normalise the data by measuring emissions relative to business intensity.

The choice of metrics would depend on the nature of the business and the perspective being taken.

- For general transport a useful metric for comparing equipment efficiency is 'emissions per kilometre per ton of freight carried'. This approach allows comparison of carriers and equipment whatever the goods being carried. (See 6.3.2 for more on this approach).
- For a carrier specialising in car transport, an appropriate metric would be 'emissions per kilometre per car carried'.
- For a component supplier interested in the footprint of their product, a useful metric might be 'emissions per part produced'.
- Within the automotive sector, an obvious measure for OEMs to consider would be 'emissions per car produced/sold'.

An automotive OEM might consider two perspectives. For inbound freight they could look to improve their supply chain emissions by minimising total inbound transport emissions per car produced. For outbound transport, they could look to improve the emissions from their distribution network by minimising outbound freight emissions per car sold.

9.3 OPPORTUNITIES FOR IMPROVEMENT

There are a wide range of elements within the supply chain that impact freight emissions. It is not the intention of these guidelines to investigate these in detail, however the chart below illustrates the key parameters that can be looked at to generate improvements.

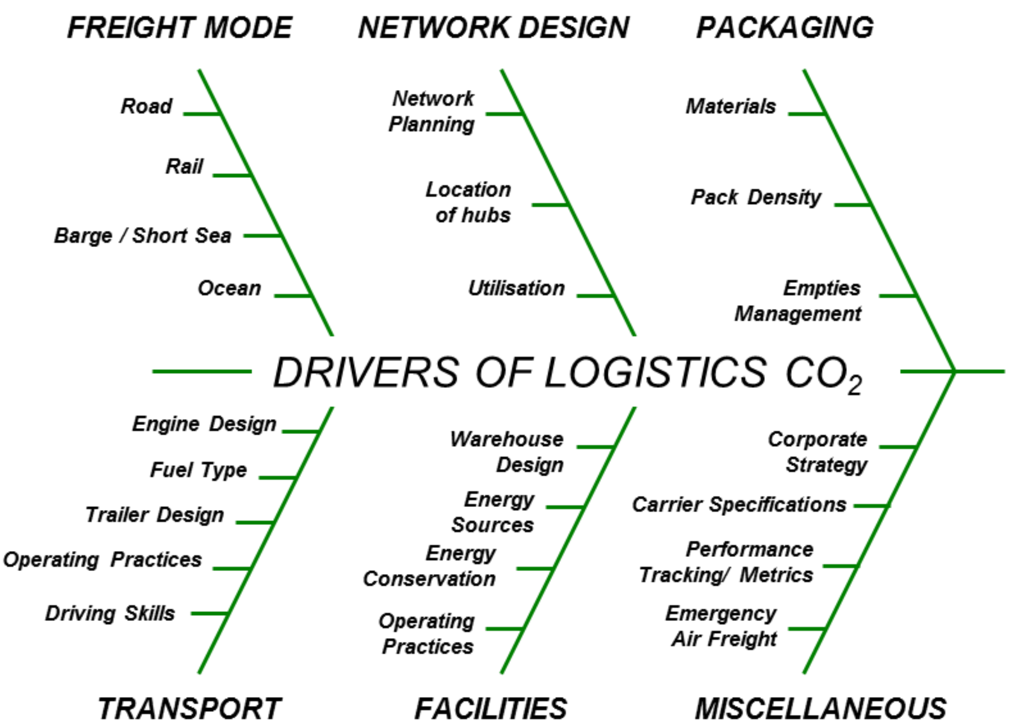

Figure N°13: Keys parameters for improvements

It is recommended that companies use CO_2 reporting techniques to support the analysis of the business benefits of any changes to these parameters.

9.4 ENGAGEMENT OF CARRIERS IN REDUCING EMISSIONS

OEMs are increasingly requesting specific commitments as part of service level specifications.

Examples of requirements that may be included are:

- The service provider should have in place an environmental policy with continuous improvement objectives
- The transport service provider should only use trucks powered by engines above a certain Euro emissions class.
- The transport buyer requires all drivers to have undertaken training in eco-driving.
- The transport buyer requires that Transport Services used should have undergone a certain certification, for example, *Green Freight Europe*, *Clean Shipping Index or ADEME charter Objective* CO_2.

9.5 BENEFITS OF A STRATEGIC APPROACH

Companies should adopt strategic plans to reduce their freight emissions. Having the support of senior management in setting emissions targets will help drive improvements; having a structured approach will help ensure that momentum is maintained.

This approach should align with the need for an Environmental Management System required for compliance with ISO 14001. It will also help in responding to the expectations of Corporate Sustainability surveys (as covered in Section 3.3.3).

It should always be remembered that as emissions are so intimately related to fuel usage, most emissions reduction actions will also achieve financial savings in terms of reduced fuel bills - a win-win situation in which all stakeholders can benefit.

10. FUTURE TRENDS

This section gives an overview of trends related to governmental actions and forthcoming legislation for reporting or taxation purposes. It also links GHG reporting to general developments in demands for sustainability reports.

10.1 GOVERNMENT ACTIONS

10.1.1 CO_2 REDUCTION COMMITMENTS

As discussed in section 2.7, governments have made commitments on significant reductions in CO_2 emissions. Across all sectors, the European Union has committed to reducing its 1990 level of CO_2 emissions by 20% by 2020 and is looking to reduce by much higher percentages by 2050.

As previously mentioned, the EU 2050 target for transport emissions reduction is 60% vs. 1990 levels. Much work has been going on to identify how best this can be achieved. The 2011 White Paper on transport highlights goals in three areas:

- Developing and deploying new and sustainable fuels and propulsion systems
- Optimising the performance of multimodal logistics chains and making greater use of more energy-efficient modes
- Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives

Of particular relevance to freight is the goal that "thirty per cent of road freight over 300km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green corridors. To meet this goal will also require appropriate infrastructure to be developed." [1]

10.1.2 FREIGHT CO_2 REPORTING

Recognising a need to understand the CO_2 emissions of the freight sector, the EU has co-funded the COFRET (Carbon Footprint of Freight Transport) project. The objective is to identify and test a harmonized methodology for freight CO_2 reporting. The project has not yet concluded, but it is reviewing the impact of the CEN standard and many of the other initiatives covered within these Odette Guidelines and would be expected to draw on the common themes covered.

No doubt the new French Decree making freight CO_2 reporting mandatory is being looked on with interest by other National Governments.

Within the UK, the Freight Transport Association is running a voluntary scheme to capture freight emissions data with the objective of being able to monitor any improvements being made.

[1] http://ec.europa.eu/transport/themes/strategies/2011_white_paper_en.htm

10.1.3 CARBON TAXATION

Various different approaches in direct and indirect taxation are gradually being introduced in an effort to curb emissions. In many cases the actions are being targeted on reducing energy use as energy usage is often easier to quantify and regulate and the effect can be the same.

Examples include:

- Tax levies on fuel prices
- Reduced road tax for lower-emitting vehicles
- Incentives for use of bio-fuels
- Vehicle tax incentives for alternative propulsion systems (electric/ hybrid)
- Road usage charging

The EU follows the principle of 'Polluter Pays', as enshrined in the European Treaty, so it is expected that where possible, taxation regimes will be targeted to make the biggest demands on those operators that are generating the most emissions.

10.1.4 CARBON TRADING

Emission trading is a tool of the environment policy. It is an approach to control emissions, by providing economic incentives.[2]The idea is that a country that is able to generate savings in emissions can transfer that saving, at a price, to others who are finding it more difficult

There are different trading systems:

- The bilateral trade between countries
- The trade between companies
- The trade for private households

In Europe, the European Union Emission Trading System (EU ETS) is the basis of the European Union's policy to combat climate change and is a key tool for reducing industrial greenhouse gas emissions cost-effectively. Being the first and largest international scheme for the trading of GHG emission allowances, the EU ETS covers some 11,000 power stations and industrial plants in 30 countries.

2 http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php

The EU ETS was launched in 2005 and works on the "cap and trade" principle. This means there is a limit on the total amount of certain greenhouse gases that can be emitted by the factories, power plants and other installations in the system. Within this limit, companies receive emission allowances that they can sell to or buy from one another as needed. The limit on the total number of allowances available ensures that they have a value. At the end of each year each company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs, or else sell them to another company that is short of allowances.

The number of allowances is reduced over time so that total emissions fall. In 2020 emissions will be 21% lower than in 2005.

At the beginning of the third quarter 2012, Airlines joined the scheme, as the first part of transport sector to be factored in the trading system.

Maritime transport is also in discussion, but it will not be included in the emissions trade before the start of the fourth trading period in 2020.[3]

10.1.5 VEHICLE EMISSIONS STANDARDS

The EU is implementing increasingly stringent emissions standards for new vehicles sold in the EU with the aim of reducing air pollution and the associated environmental and health risks.

These standards were first introduced in 1992 and are known as European Emissions Standards (Euro standards). They target a range of pollutants, covering oxides of nitrogen (NOX), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM) emissions. The limits are set at different levels for different vehicle types and compliance is determined by running a vehicle’s engine over a standard test cycle.

While they are not directly focussed on Greenhouse Gases, the actions that vehicle manufacturers have taken to comply with these standards over the last two decades have generally had the effect of improving fuel efficiency and thereby reducing GHG emissions.

The latest standards applicable to Heavy Goods Vehicles, Euro VI, include requirements for engines to have on board diagnostics to detect if the emissions prevention systems are malfunctioning. Some of the technologies required to satisfy Euro VI may slightly reduce fuel efficiency but to the benefit of overall levels of pollution.

[3] http://ec.europa.eu/clima/policies/ets/index_en.htm

10.1.6 CLEAN AIR ZONES

Concerned at the impact of high levels of traffic pollution on their citizens, many European cities have been taking actions to reduce pollution levels within their areas of jurisdiction. One of the first to be introduced was London's Low Emission Zone. The associated legislation requires those operating transport within a specified area of London to either comply with stated emissions standards or else pay a daily charge.

Other cities that have introduced Low Emissions Zones include Berlin, Stockholm and Rome, while Paris is introducing a pilot scheme. Generally, the emissions requirements are linked to Euro standards compliance (see 10.1.5 above).

10.1.7 INFRASTRUCTURE IMPROVEMENTS

As highlighted in the 2011 White paper, the EU is actively working to improve transport infrastructure within Europe, particularly looking to improve the move of freight from roads to rail and sea. The EU TEN-T (Tran-European Network for Transport) initiative includes thirty priority projects planned for completion in 2020, comprising 18 railway projects, 3 mixed rail-road projects, 2 inland waterway transport projects and one referring to 'Motorways of the Sea'.

The Motorways of the Sea concept aims at introducing new intermodal maritime-based logistics chains in Europe, making it easier to integrate port to port moves within a transport network. Increasingly, more use is being made of short sea shipping for moving finished vehicles around Europe.

10.2 SHAREHOLDER INTERESTS

Increasing attention is being focussed on the subject of sustainability: all three aspects need to be considered - economic, environmental and social. With Corporate Sustainability initiatives, a company can create long-term shareholder value by taking advantage of opportunities for improvement and managing risks deriving from economic, environmental and social developments.

A growing number of investors see sustainability as a catalyst for enlightened and disciplined management, and a crucial success factor. As a result, investors are increasingly diversifying their portfolios by investing in companies that consider sustainability in their strategy and action.[4] In this context, there are several indices that verify a company's attempts in terms of sustainability.

The next table shows a range of indices that are in use at the time of writing.

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[4] http://www.pwc.de/de_DE/de/nachhaltigkeit/assets/CDP-G500-2011-Report.pdf, S.9

[5] http://www.environmentalleader.com/2012/07/11/carbon-footprinting-for-products-what-companies-should-know/

[4] http://www.sustainability-indexes.com/images/djsi-world-guidebook_tcm1071-337244.pdf, S. 9

SUSTAINABILITY REPORTING INITIATIVES	
SUPPLIERS	**INDICES OR INDEX CLASSES**
Calvert	The Calvert Social Index
CDP	Carbon Disclosure Leadership Index, Carbon Performance Leadership Index
CRD Analytics	Global Sustainability Index, Cleantech 100, Life Sciences
Domini	Domini 400 Social Index
Dow Jones	Dow Jones Sustainability Index
ECPI	ECPI Indices
EIRIS	FTSE4Good Index Series
EthiFinance	Gaia Index
Maplecroft	Climate Innovation Indexes
MSCI	MSCI ESG Indices
Oekom	Global Challenges Index
OWW	Responsibility Malaysia SRI Index, Responsibility Singapore SRI Index
SAM	Dow Jones Sustainability Index
Sustainalytics	Jantzi Social Index, STOXX Global ESG Leaders Indices
Vigeo	ASPI Eurozone, Ethibel Sustainability Index

Table N°4: Frequently encountered sustainability reporting initiatives

Three that are commonly encountered by automotive OEMs are the Carbon Disclosure Project, the Dow Jones Sustainability Index and the oekom Global Challenges Index. These indices investigate a company's levels of activity and performance in the field of sustainability.

Carbon Disclosure Project Indices

The Carbon Disclosure Project (CDP) is an international, not-for-profit organization providing a global system for companies and cities to measure, disclose, manage and share vital environmental information. Various programs are run including:

- **CDP Investor Program** to provide information on company activities and performance for the use of investor bodies
- **CDP Supply Chain Program** to assist organisations in implementing successful supplier engagement strategies and reduce supply chain environmental impacts, including particularly GHG emissions.

Dow Jones Sustainability Index

Following a rigorous approach, this index aims to measure the performance of the world's sustainability leaders.

Companies are selected for the indices based on a comprehensive assessment of long-term economic, environmental and social criteria that account for general as well as industry-specific sustainability trends.

Only firms that lead their industries based on this assessment and that continually intensify their sustainability initiatives are included in the indices.[5]

The indices are created and maintained according to a systematic methodology, allowing investors to appropriately benchmark sustainability-driven funds and providing an effective engagement platform for companies who want to adopt sustainable best practices. This approach will benefit all stakeholders: investors, employees, customers and, ultimately, society and the environment.

The Dow Jones Sustainability Indexes comprise global and regional benchmarks including European, Eurozone, Nordic, North American, US, Asia Pacific, and Korean indexes.[6]

oekom – Global Challenges Index

This rating is based on a comprehensive set of criteria for ethical assessment of companies. It assesses companies' responsibility towards:

- Persons affected by corporate activities (social sustainability)
- Society and culture (cultural sustainability)
- The natural environment (environmental sustainability)

[5] http://www.djindexes.com/sustainability/
[6] http://www.sustainability-indexes.com/dow-jones-sustainability-indexes/index.jsp

In order to be able to analyse comprehensively the diverse environmental and social challenges relating to the activities of companies, oekom research AG has developed a pool of indicators. These currently number approximately 500. For each company, an average of 100 indicators is selected from this pool on an industry-specific basis so that a targeted evaluation of the problems specific to that company can be carried out.[7]

10.3 CUSTOMER INFORMATION DEMANDS

It is to be expected that the increasing public debate on climate issues and introduction of the topics into educational syllabuses will create increased interest from the public. The greater availability of information leads to wider awareness of actions and effects. Therefore consumers are more aware of their contribution to environmental pollution. As a result, they may wish to minimise their ecological footprint and contribution to global warming made by their purchases and ask for sustainable products.

This will all add to pressure on companies to apply significant environmental action plans, with targets such as: reducing energy consumption, reducing GHG emissions and offering customers eco-friendly products and services that help them control their own energy consumption.

10.4 TECHNOLOGICAL TRENDS

Companies have been increasingly working to reduce energy usage due to its high cost but now it is being done also for environmental reasons. Companies are going beyond simply improving energy procurement activities- companies are now investing in enterprise energy managers and increasing awareness of energy use across locations. Organisational interest in the greenhouse gas emissions of their operations and supply chain is increasing due to factors such as reputation, customer expectation and efficiency goals – not just reducing consumption, but also adding a competitive advantage.

As a result of the growing customer expectations for sustainable products, the investments in sustainable technologies increase and companies which work together with carriers expect them to use equipment that provides environmental improvements on emissions and fuel efficiency. The reduction of fuel consumption has been a focus in the automotive and transport sectors especially.

There are different approaches. The UK Low Carbon Vehicle Project listed ways to improve fuel economy[8]:

- Euro standard engines (complying with latest standards)
- Automatic/ semi-automatic transmissions
- GPS and telemetry
- Fuel additives

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[7] http://www.oekom-research.com/index_en.php
[8] Low Carbon Vehicle Partnership's recommendations for accelerating the market for low carbon HGVs http://www.lowcvp.org.uk/

- Biofuels
- Stop-start technology
- Fleet monitoring & diagnostic equipment
- Active route planning software
- Lubricants
- Tyres
- Cleaner burning engines

The following paragraphs discuss some of the principal approaches:

10.4.1 SPEED REDUCTION, ECO-DRIVING

In the transport sector a low cost way of saving fuel is through more efficient driving techniques. Speed limiters can be used to control the maximum speed that a truck can be driven. Slow-steaming of ocean shipping can save significant quantities of fuel though there can be an adverse effect on transit times.

Due to high energy wastage from excessive braking and running the engine while idle, training in efficient driving techniques can significantly reduce fuel use. Some carriers have already implemented an Eco-driving training programme in their operations to improve driver behaviour and fuel consumption. Truck manufacturers often offer this type of training to their customers. On-board fleet management systems have also evolved to help monitor driver performance.

10.4.2 EQUIPMENT IMPROVEMENTS

Two technologies being introduced widely to improve fuel consumption are aerodynamic design and tyre improvement.

Aerodynamically designed tractor units can yield a further fuel reduction potential of 4 to 5 per cent. Deflectors fitted to tractor roofs can direct airflows smoothly over the top of the trailer unit. Improvements to trailers can include making the back edge curved ("teardrop" design) and fitting skirts along the bottom edge.

Tyre manufacturers have developed low rolling resistance tyres that can be fitted to reduce energy losses caused by the compression of the tyres as they roll along the road surface supporting the weight of the truck.

Other traditional possibilities to decrease the consumption are lightweight construction, optimised tyres and engines.

10.4.3 SYSTEMS DEVELOPMENTS

Increasingly, high tech systems technology is being used to fuel efficiency. An example is the linking of route-planning systems with real-life location information. Speed control that uses GPS data is a new technology which provides an advantage in fuel consumption of 1 to 4 per cent. In maritime transport, voyage management can be linked to an emission reduction tool. Data can be sent to a vessel when there is a delay at the destination port. Knowing this, the speed of the vessel can be reduced to meet a revised arrival time.

10.4.4 CLEANER POWERTRAINS

Research is underway in a variety of directions regarding improving engine technology to reduce emissions. The widespread use of electric power is still some way off freight transport as the heavy loads carried and long distances travelled by freight vehicles mean would require excessive battery storage and a comprehensive charging infrastructure would need to be deployed.

In the meantime, different technologies are being developed to improve engine efficiency and reduce total emissions. Improvements in automatic transmissions and regenerative breaking will reduce energy wastage. Various companies are experimenting with hybrid power (use of combined electric and diesel power supply).

Amongst fuel developments, bio fuels are now in common use, at least as a percentage of fuel make-up in many regions. Although they may make little difference to emissions from the vehicle itself, they can improve the total ('well to wheel') emissions as plant matter removes CO_2 from the atmosphere while it is growing. There are now several generations of technology: from 1st generation - traditional of crops, 2nd generation - special crops and biomass and now 3rd generation - experimentation with the use of algae.

Marine fuel oil creates impacts besides GHG emissions. High sulphur emissions are seen as a problem and reduced sulphur fuels are being introduced. These are likely to increase costs so shipping companies are experimenting with use of natural gas and wind turbines installed on the bow. One shipping line has an objective to develop a "Super Eco Ship" by 2030. This ship will emit only 30% of the emissions of ships today. It is planned to use fuel cells that are energised with liquefied natural gas and solar panels will deliver additional power. Furthermore, the outside of the ship will be coated with special "sharkskin" that reduces the frictional resistance. Using the wind energy as well, sails are also part of the concept.

10.5 SECTOR INITIATIVES

North American EPA SmartWay

Launched in 2004, SmartWay® is a North American program run by the US Environmental Protection Agency (EPA). Its main objective is to reduce transportation-related emissions by creating incentives to improve supply chain fuel efficiency.

It is targeted at both carriers and shippers and comprises five main initiatives:

- SmartWay Transport Partnership - in which freight carriers and shippers commit to benchmark operations, track fuel consumption and improve performance annually.
- SmartWay Technology Program - a testing, verification, and designation program to help freight companies identify equipment, technologies and strategies that save fuel and lower emissions.

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- SmartWay Finance Program - a competitive grant program that makes investing in fuel-saving equipment easier for freight carriers.
- SmartWay Vehicles - a program that ranks light-duty cars and small trucks and identifies superior environmental performers with the SmartWay logo.
- SmartWay International Interests - guidance and resources for countries seeking to develop freight sustainability programs modelled after SmartWay.

Green Freight Europe

Green Freight Europe is a European based initiative inspired by the US SmartWay program. The program fosters reductions of carbon emissions by:

- Establishing a Platform for companies to monitor and report their carbon emissions in a standard format, aiding comparability of results with those of others to assist in sustainable procurement decisions on the right transportation services to choose from
- Promoting collaboration between carriers and shippers which itself drives improvements and monitors progress made
- Establishing a certification system to reward shippers and carriers who fully participate in the program
- Validating technologies for what they can actually provide by way of CO_2 reductions, providing a virtual shop window on the different technologies and, for example, presenting opportunities for obtaining cheaper finance to encourage investments in emission-reducing technologies and practices

It is also the platform for companies to share best practices, promote innovations and communicate sustainability improvements on European road freight.

The programme is recognised by and fosters cooperation with other related initiatives, programmes and working groups globally, such as the US SmartWay programme and Green Freight Asia Network.

11. REFERENCE INFORMATION

This section contains further details of standards and initiatives relevant to these Guidelines including contact web addresses.

Contents:

1. General standards for GHG measurement and reporting
   - ISO Standards
   - Global Reporting Initiative
   - Greenhouse Gas Protocol
2. Standards specific for freight GHG reporting
   - CEN Standard
   - French Decree
   - UK DEFRA Guidance
3. Datasets for use in GHG calculations
4. Other relevant freight GHG initiatives

Note: all information is provided as available in July 2013. Many of these standards and initiatives are under continual development and so it is recommended to refer to the relevant websites to obtain the latest status.

11.1 GENERAL STANDARDS FOR GHG MEASUREMENT AND REPORTING

11.1.1 ISO STANDARDS

The International Standards Organisation has published a range of standards to assist an organisation wanting to report the GHG emissions of its operations:

ISO 14064- General GHG Reporting

The ISO 14064 standards are divided into three parts and relate to GHG emissions from the organisational perspective.

Part 1 - Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals.

This is the standard that is most relevant for GHG reporting for an organisation's overall operations. It has been based on the GHG Protocol's definitions of reporting scopes and to which these Odette Guidelines are also aligned.

Part 2 - Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions, or removal enhancements.

This is really for use when studying the GHG impact of a specific project, rather than regular operations.

Part 3 - Specifies principles and requirements and provides guidance for those conducting or managing the validation and/or verification of greenhouse gas (GHG) assertions.

This is about making sure that reporting is carried out with integrity and discusses how to validate/ verify results. Again the approaches in these Odette Guidelines should ensure compliance.

ISO 14040/14044/ 14067- Life cycle/ Carbon footprint reporting

The life cycle assessment standards, ISO 14040 and 14044 describe respectively the principles and the methodology for performing life cycle assessments of environmental impacts.

The newer ISO 14067 focuses specifically on the carbon footprint of products and provides guidelines for how to utilise the life cycle assessment methodology when only considering the GHG emissions.

These Odette Guidelines support the calculation of freight emissions in a way that will enable them to be easily included within any of the kind of life cycle analysis that these standards cover.

The image below depicts a typical life cycle of a car. The freight elements would fall within the raw material supply, manufacturing and distribution elements.

Figure N°14: Life cycle of a vehicle

ISO 14033- Acquisition of environmental data

ISO 14033 provides support in acquiring and reporting environmental information in a robust manner.

Its approach is used as the basis for the information gathering elements of these Odette Guidelines.

11.1.2 GLOBAL REPORTING INITIATIVE

The **Global Reporting Initiative** (GRI) is a non-profit organisation that was established in late 1997 with the mission to develop globally applicable guidelines for sustainable development and to support the reporting of the economic, environmental, and social performance, initially for companies and thereafter for any governmental or non-governmental organization.

It is in widespread use and covers the reporting a range of different environmental impacts. For reporting on Greenhouse Gas emissions, reference to the GHG Protocol is made.

[https://www.globalreporting.org]

11.1.3 GREENHOUSE GAS PROTOCOL

The **Greenhouse Gas Protocol (GHG Protocol)** is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. The GHG Protocol is published jointly by the World Resource Institute (WRI) and the World Business Council of Sustainable Development (WBCSD).

The protocol comprises 4 standards:

- Corporate Accounting & Reporting Standards
- Project Accounting Protocol & Guidelines
- Corporate Value Chain (Scope 3) Accounting & Reporting Standard
- Product Life Cycle Accounting & Reporting Standard

These Odette Guidelines are aligned to the Greenhouse Gas Protocol Methodology

[http://www.ghgprotocol.org/]

11.2 STANDARDS SPECIFIC FOR FREIGHT GHG REPORTING

11.2.1 CEN STANDARD

The CEN Standard EN 16258:2012 - Methodology for calculation and declaration of energy consumption and GHG emissions of transport services specifies general principles, definitions, system boundaries, calculation methods, apportionment rules (allocation) and data recommendations, with the objective to promote standardised, accurate, credible and verifiable declarations, regarding energy consumption and GHG emissions related to any transport service quantified.

11.2.2 FRENCH DECREE

Article L1431-3 created by the Decree N° 2011-1336 of 24th October 2011 in the French Transport Code (formerly Article 228-II of Act no. 2010-788 of 12 July 2010, the 'Grenelle 2 Act' on the national commitment to the environment), known more simply as "the French Decree", is the first legislation published in Europe requiring the reporting of CO_2 for transport operations.

It is mandatory as from October 2013 for all transport providers loading or unloading in France to report to the transport service beneficiary (can be the client or the supplier) the emissions resulting from kilometres travelled on French territory.

The French Decree has to be read as a specific national initiative which has legal implications and is accompanied by official guidance from ADEME (Methodical Guide to the French Decree), which includes sets of relevant emissions factors.

More details on the requirements within the French Decree are included in Sections 3.3.1 and 8.5.1.

[http://www.developpement-durable.gouv.fr/IMG/pdf/Information_CO2_ENG_Web.pdf]

11.2.3 UK DEFRA GUIDANCE

In its Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations, the UK Department of Environment, Food and Rural Affairs (DEFRA), uses the GHG Protocol as a framework for all its reporting Guidelines.

The Department for Environment, Food and Rural Affairs (Department for Environment, Food and Rural Affairs, or DEFRA) is an executive department of the British Government responsible for the environment and agriculture.

Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations. http://archive.defra.gov.uk/environment/business/reporting/pdf/ghg-freight-guide.pdf

[http://www.defra.gov.uk/]

11.3 DATASETS FOR USE IN GHG CALCULATIONS

The following is a list of sources for emissions and energy related data. It is not comprehensive- there are many other published data sets available- however those listed below are widely recognised and in common usage.

Note that these data sets are generally subject to continual revision in terms of detail and breadth of coverage. For this reason, it is important when selecting emissions factors to note the exact source and date of retrieval for future reference.

The order of the list is alphabetical and not of significance. Help in choosing the most appropriate factors is included in Section 7.3.3.

Base Carbone® (Database published by ADEME)

http://www.basecarbone.fr/

CCWG (Clean Cargo Working Group)

http://www.bsr.org/en/our-work/working-groups/clean-cargo

COPERT http://www.emisia.com/copert/General.html

DEFRA (UK Government) - GHG Conversion Factors for Company Reporting

http://naei.defra.gov.uk/data/emission-factors

EcoTransIT http://www.ecotransit.org/index.en.html

French Decree The emissions factors intended for use with the French Decree are published in the associated Order of April 10th, 2012. Relevant data is also included in the official Methodical Guide to the French Decree written by ADEME

www.developpement-durable.gouv.fr/IMG/pdf/Information_CO2_ENG_Web.pdf

HBEFA (Handbook Emissions Factors Road Transport)

http://www.hbefa.net/e/index.html

IEA (International Energy Agency)

http://www.iea.org/statistics/

NTM (Network for Transport and Environment)

http://www.ntmcalc.org

VDA (Verband der Automobilindustrie)

http://www.vda.de/de/publikationen/publikationen_downloads/detail.php?id=1135

WPCI (World Ports Climate Initiative)

http://esi.wpci.nl/Public/Home

11.4 OTHER RELEVANT FREIGHT GHG INITIATIVES

ADEME

ADEME (French Environment and Energy Management Agency), is a French public agency under the joint authority of the Ministry for Ecology, Sustainable Development and Energy and the Ministry for Higher Education and Research. Its mission is to encourage, supervise, coordinate, facilitate and undertake operations with the aim of protecting the environment and managing energy.

Working on behalf of the French government, ADEME have published the official guidance to the French Decree.

http://www.developpement-durable.gouv.fr/IMG/pdf/Information_CO2_ENG_Web.pdf

[http://www2.ademe.fr]

Clean Cargo Working Group

The Clean Cargo Working Group (CCWG) is a global, business-to-business initiative dedicated to improving the environmental performance improvement through measurement, evaluation and reporting in maritime transportation management.

[http://www.bsr.org/en/our-work/working-groups/clean-cargo]

Clean Shipping Index

The Clean Shipping Index is a non-profit association that today consists of a network of cargo owners around the globe. The shipping companies log their ships and answer a set of questions which describe their environmental performance. The cargo owners can then compare ships and shipping companies to make sound decisions on which company to use and the environmental impact when using a specific vessel.

[www.cleanshippingindex.com]

COFRET

COFRET (Carbon Footprint of Road Freight) is a collaborative research and demonstration project, part-funded by the European Commission, which is working to provide industry, shippers, receivers and logistics providers with the opportunity to remove the current uncertainty over calculating the carbon footprint of freight transport. COFRET is working with existing initiatives already being developed by various stakeholders in the supply chain so that it is aligned with the needs of those responsible for shipping and transporting goods by whatever means. COFRET is using this approach to help in the standardisation of a carbon foot printing approach for supply chains and their individual elements.

[http://www.cofret-project.eu/]

DSLV& CLECAT

DSLV (Deutsche Speditions- und Logistikverband e.V.) is the German freight forwarding and logistics association (DSLV) formed in 2003 from the combination of the Federal Association of Forwarding and Logistics and the Association of German Car Carriers. Based on research work contracted by the German Government, DSLV has produced a guide to application of the CEN 16258 standard.

CLECAT (the European Association for Forwarding, Transport, Logistics and Customs Services) has published an English language version titled “Calculating GHG emissions for freight forwarding and logistics services in accordance with EN 16258 – Terms, Methods, Examples”.

EcoTransIT

EcoTransIT is a project to quantify the emissions of freight transport and to make results available through a free on-line tool, EcoTransIT World.

It was developed by the Institute for Energy and Environmental Research (ifeu), the Öko-Institut and the Rail Management Consultants GmbH (RMCon). Work began with the support of five European railway companies and new partners have subsequently joined. All project partners provide information for the database and constantly update the tool according to national policies and state-of-the-art information.

It provides a valuable source on European rail freight emissions, taking into account different operational aspects of different routings, including source of locomotive power. The tool has been extended to cover other modes (such a road and sea) and beyond the confines of Europe. Its objective is to be fully comprehensive in its coverage on a world scale.

The result of each calculation is presented in the form of diagrams. They compare the energy consumptions and emissions of different environmental pollutants and differentiate between selected modes of transports. Thus, the user can easily select the routes and transportation mode with the lowest environmental impact.

[http://www.ecotransit.org/index.en.html]

ECG

Established in 1997, ECG is the Association of European Vehicle Logistics and represents around 100 leading vehicle logistics companies from 25 countries across Europe, including the Russian Federation, Ukraine and Turkey.

[http://www.ecgassociation.eu/]

The ECG Carbon Calculator is a programme that allows logistics service providers to automate the calculation of CO_2 produced specifically by the transportation of vehicles in Europe by sea, road and rail transport modes.

http://www.eurocartrans.org/Activities/ECGWorkingGroups/CarbonCalculatorEnvironmental/Whatisit.aspx

Green Freight Europe

The programme, which was originally developed under the working title SmartWay Europe, was officially launched on 27 March 2012 under the name Green Freight Europe. It aims to be recognized as the leading independent voluntary program for improving environmental performance of road freight transport across Europe.

[http://www.greenfreighteurope.eu/]

The objectives of Green Freight Europe are discussed in Section 10.5

NTM

The Network for Transport and Environment, NTM

The Network for Transport and Environment, NTM is a non-profit Swedish organisation aiming at establishing a common base of values on how to assess and improve the environmental performance of transport services.

NTM provides a web-based calculator known as NTMCalc.

[http://www.ntmcalc.org]

APPENDIX 1: REPORTING LOGISTICS EMISSIONS WITHIN THE FRAMEWORK OF THE GHG PROTOCOL

The GHG Protocol provides a framework for reporting all different elements of emissions produced as a result of a company's activities and operations.

The approach is based on considering three principal categories of emissions, described as scopes, as depicted in the chart below:

Definition of the scopes and examples

Scope	Definition	Example of emissions sources
SCOPE 1	**Direct Emissions** Are released directly by activities you own or control	Fuel Oil; Chemical Production; Materials processing; Paint shop; foundry; **Owned transport**
SCOPE 2	**Energy Indirect Emissions** Are typically from the generation of purchased electricity you use. The emissions physically occur off-site where the electricity is generated	Power station; Purchased electricity *(defined as electricity that is purchased or otherwise brought into the organizational boundary of the company)*
SCOPE 3	**Other Indirect Emissions** Are a consequence of the activities of the company, but occur from sources not directly owned or controlled by the company	Extraction and production of purchased materials; **Contracted Transport**; Use of sold products and services; Waste disposal

Table N°5: Examples of the three emission scopes

For most component suppliers and automotive manufacturers that sub-contract their freight, it can be seen that the majority of freight emissions lie within Scope 3.

In 2011, the Greenhouse Gas Protocol published a better definition of how to report the different types of emissions with Scope 3, subdividing the scope into 15 categories as you can see in Table N°6 below.

These are intended to cover the whole spectrum of a company's activities and the relevant significance of each category will depend on the nature of the business that the company conducts. An accountancy firm would need to consider office emissions and employee commuting and business travel. Within the Automotive Industry, the biggest source of emissions is the parc of vehicles on the road. This may amount to 80% or more of the overall total.

	CATEGORY	DESCRIPTION
UPSTREAM	1. Purchased goods and services	**- Extraction, production and transportation of goods and services purchased or acquired by the reporting company, not otherwise included in Categories 2 - 8** ***Note: this category includes all supply chain transportation prior to tier 1 shipments***
	2. Capital goods	- Extraction, production and transportation of capital goods purchased or acquired by the reporting company
	3. Fuel- and energy-related activities (not included in scope 1 or scope 2)	- Extraction, production and transportation of fuels and energy purchased or acquired by the reporting company, not already accounted for in Scopes 1 or 2
	4. Upstream transportation and distribution	**- Transportation and distribution between a company's tier 1 suppliers and its own operations whether or not paid for directly by reporting company** **- All other transportation and distribution services purchased by the reporting company, including transportation and distribution between a company's own facilities and outbound logistics** ***Note: this category excludes vehicles/facilities directly owned or controlled by the reporting company, which should be reported in Scopes 1 or 2***
	5. Waste generated in operations	- Disposal and treatment of waste generated in the reporting company's operations (in facilities not owned or controlled by the reporting company)
	6. Business travel	- Transportation of employees for business-related activities in vehicles not owned or operated by the reporting company
	7. Employee commuting	- Transportation of employees between their homes and their worksites in vehicles not owned or operated by the reporting company
	8. Upstream leased assets	- Operation of assets leased by the reporting company and not included in Scopes 1 or 2
DOWNSTREAM	9. Downstream transportation and distribution	**- Transportation and distribution of sold product between the reporting company's operations and the end consumer not paid for by the reporting company, including retail and storage**
	10. Processing of sold products	- Further processing of sold product downstream from the reporting company
	11. Use of sold products	- End use of goods and services sold by the reporting company
	12. End-of-life treatment of sold products	- Waste disposal and treatment of products sold by the reporting company at the end of their life
	13. Downstream leased assets	- Operation of assets owned by the reporting company and leased to other entities and not included in Scopes 1 or 2
	14. Franchises	- Operation of franchises not included in Scopes 1 or 2
	15. Investments	- Operation of investments not included in Scopes 1 or 2

Table N°6 GHG Protocol Scope 3 categories

The 15 categories are divided into 'upstream' and 'downstream' activities. Those categories that are relevant to freight emissions are highlighted in pink in the above table.

Of particular relevance for logistics within the automotive industry, the categorisation will depend on the role of the stakeholder. The main interested stakeholders are:

- Automotive OEM (Original Equipment Manufacturer)
- Automotive Parts Supplier
- Transportation Service Provider
- Warehouse Provider
- Lead Logistics Provider (4PL)

Using an automotive OEM as an example, the different elements of logistics emissions to consider are listed in Table N°7 below.

Item	Direct responsibility	Scope & Reporting Category
Any freight using own or leased transport fleet	OEM	Operational emissions: Scope 1 Manufacture of transport equipment: Scope 3 cat 2
Inbound freight, inter-plant & outbound freight using contracted transport operations	Contracted by OEM but operated by other	Operational emissions: Scope 3 cat 4
Warehousing (owned)	OEM	Operational emissions: Scopes 1,2
Warehousing (sub-contracted)	Contracted by OEM but operated by other	Operational emissions: Scope 3 cat 4
Logistics Provider's office-based work	LLP	Office emissions, employee travel etc.: Scope 3 cat 1
Parts packaging (owned)	OEM	Manufacture of packaging: Scope 3 cat 2
Parts packaging (leased)	Contracted by OEM but owned by packaging supplier	Manufacture of packaging: Scope 3 cat 1

Table N°7: Examples of different sources of logistics related emissions

APPENDIX 2: FURTHER EXAMPLES OF CALCULATIONS IN LINE WITH THE FRENCH DECREE

1 RAILWAY TRANSPORT

LEVEL 1- DEFAULT VALUES

Description (according to the density of the goods transported and the energy source used)	Number of units transported by the means of transport (taking into account unladen journeys)	Rate of consumption of the energy source by the means of transport (in units of measurement of the quantity of energy source per kilometre)
Goods with a density less than or equal to 249 kg/m³		
Electricity	400 tonnes	16,60 kWh / km
Non-road diesel		3,85 kg / km
Mixed: electricity/non-road diesel		Electricity: 14,94 kWh / km Non-road diesel 0,38 kg / km
Goods with a density of between 250 and 399 kg/m³		
Electricity	520 tonnes	16,74 kWh / km
Non-road diesel		3,88 kg / km
Mixed: electricity/non-road diesel		Electricity: 15,07 kWh / km Non-road diesel 0,39 kg / km
Goods with a density greater than or equal to 400 kg/m³		
Electricity	600 tonnes	16,68 kWh / km
Non-road diesel		3,86 kg / km
Mixed: electricity/non-road diesel		Electricity: 15,01 kWh / km Non-road diesel 0,39 kg / km

Table N°8: Default values for railway transportation

Source: The French guidance published to help Decree implementation

If all data about the weight and the volume of the freight is available then it is possible to calculate the freight's density, which would allow the Transport Operator to locate himself in the table provided by the French government.

Then, according to the energy used by the railway wagon, and given the distance between the two points of departure and arrival, the Transport Operator can deduce the energy consumption that will be converted to GHG emissions with the emission factors provided by CEN.

Here is an example of an electric train in France carrying 250 tonnes of freight, whose volume amounts to 700 m^3, for 350 km.

Since the train runs on a French electricity supply, those emission factors values should be applied.

Nature of the energy source	Detailed type of the energy source	Unit of measurement for the quantity of energy source	Emission factor (kg of CO_2 per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	Kilowatt-hour	0,053	0,000	0,053
	Consumed in Europe (excluding France)	Kilowatt-hour	0,420	0,000	0,420
Diesel	Pumped non-road diesel	Kilogram (kg)	0,68	2,95	3,63

Source: The French guidance published to help Decree implementation

Table N°9: Energy source emission factors

The freight density is then 357 kg/m^3 hence the train consumes 16.74 kWh/km and its average loading is 530 tonnes.

Because it is electricity, GHG Tank to Wheel emissions are zero. However, there are emissions from the generation of electricity (these are shown in the chart above under upstream phase). Hence, we can calculate Well To Wheel emissions.

CO_2 emissions WTW = 250(t) × 350(km) × 16.74(kWh/km) × 0.053(g CO_2/kWh) / 530(t)

= 149 kg CO_2

LEVEL 3 -TRANSPORT OPERATOR'S AVERAGE VALUES

From a representative sample of operational data, the transport operator can achieve average energy consumption by type of activity. The calculation of CO_2 emissions is then carried out on the distance travelled and the amount of goods corresponding to the given service.

For instance, let us suppose a train travelling back and forth on the same itinerary in France is driven 550 km by an electric locomotive and 120 km by a diesel locomotive. The average value is established with the train carrying 1200 tonnes of freight the whole distance and returning to the initial point completely empty. The empty train weight 570 tons.

Hence, the average energy consumption was established over 4 segments.

- Segment 1: Electric traction, wagons loaded: 1770 tonnes on 550 km: 11318 KWh;
- Segment 2: Electric traction, wagons empty: 570 tonnes on 550 km: 7358 KWh;
- Segment 3: Diesel traction, wagons loaded: 1770 tonnes on 120 km: 672 litre;
- Segment 4: Diesel traction, wagons empty: 570 tonnes on 120 km: 437 litre.

CO_2 emissions were then calculated, diesel emission factors and electric emissions factors being extracted from the French Decree.

CO_2 emissions WTW = ((672 + 437) × 3.63) + ((11318 + 7358) × 0.053) = 5015 kg CO_2

CO_2 emissions TTW = ((672 + 437) × 2.95) + ((11318 + 7358) × 0) = 3272 kg CO_2

If the same train is loaded with 800 tonnes of goods, the emissions resulting from the whole transport operation, with empty running on the return is:

CO_2 emissions WTW = (800 / 1200) × 5015 = 3343 kg CO_2

CO_2 emissions TTW = (800 / 1200) × 3272 = 2181 kg CO_2

2 AIR TRANSPORT

LEVEL 1-DEFAULT VALUES

The Level 1 value is the distance linking the two airports of departure and destination (extracted from various references such as www.world-airport-codes.com) and the Maximum Take-off Mass (MTM) of the aircraft (extracted from aircraft manuals).

A Boeing 767F aircraft is loaded with 2.5 tonnes of freight between Paris-CDG and Tangiers (Morocco).

The distance between the two airports is 1600 km and the aircraft has a maximum take-off mass (MTM) of 150 tonnes.

The table below, given by the French government, suggests a consumption of 57.5 litre of Kerosene by 100 km per tonne.

Consumption in litres of fuel per 100km/tonne	MTM < 100 tonnes	MTM from 100 to 250 tonnes	MTM > 250 tonnes
0 to 1000 km	105,7	71,9	*
1000 to 4000 km	89,9	57,5	*
4000 to 7000 km	*	*	22,4
Over 7000 km	*	*	22,3

Source: The French guidance published to help Decree implementation

Table N°10: Fuel consumption for different sized aircraft over different distances

CEN suggests 3.10 kg of GHG per litre of Kerosene in WTW emissions and 2.54 kg of GHG per litre of Kerosene in TTW emissions.

Hence, we can deduce the GHG emissions of the B767F for the 2.5 tonnes carried over the whole distance.

GHG emissions WTW = 2018(km) × 2.5(tonne) × 0.575(L×km/tonne) × 3.10(kg/L) =8992 kg

GHG emissions TTW = 2018(km) × 2.5(tonne) × 0.575(L×km/tonne) × 2.54(kg/L) =7368 kg

LEVEL 3 TRANSPORT OPERATOR'S AVERAGE VALUES

An air transport company wishes to prepare an inventory of its whole operation's GHG emissions at level 3 accuracy. It divided those operations based on: airport of departure and of destination and made calculations for each segment as shown in the following example:

On the leg from Paris CDG to Zaragoza ZAZ (Spain), 45 journeys were made carrying 810 tonnes of freight (passengers were converted to tonnes of freight on the basis of each passenger weighing 100kg) and the aircraft consuming 727,200 litres of kerosene. Hence, it was deduced that each plane consumed 16,160 litres of kerosene per flight and carried 18 tonnes of freight.

These values can be then used to calculate emissions of each operation the company made between Paris CDG and Saragossa ZAZ.

For instance, 3 tonnes of freight were carried on that precise flight. Hence;

GHG emissions WTW = 16160 (L) × 3 (tonne) / 18 (tonne) × 3.10 (kg/L) = 8349 kg

GHG emissions TTW = 16160 (L) × 3 (tonne) / 18 (tonne) × 2.54 (kg/L) = 6841 kg

APPENDIX 3: EXAMPLES OF GHG REPORTING FORMATS

The following examples show ways that emissions reports might be developed. The terms 'Level 1 Compliant' and 'Level 2 Compliant' refer to the accuracy levels of emissions data calculated, based on the CEN standard definitions- see Section 7.1.

GENERIC INFORMATION REQUIRED TO SUPPORT REPORTS:

It is useful to include any information that helps understand the basis of the report:

a) How much of a business's whole operation is covered by the report?

Definition: vehicles or tonnage carried compared with the total activity for the customer

Percentage covered: (e.g. 80 %)
Units used: (e.g. numbers of cars carried)

b) Which emissions factors are to be used if default values are needed?

Definition: what source has been selected for any default emissions values used (for Level 1 calculations)? (e.g. French Decree)

1) EXAMPLE OF REPORTING METHODOLOGY 1 (LEVEL 1 COMPLIANT)

This example is for finished vehicle transportation (e.g. from an automotive OEM to their dealerships)

Calculation is based on OEM specific legs, both loaded and unloaded / and specific load factor (how many vehicles per load).

Note: all information relates/ is specific to the OEM under analysis

	Input						Calculation				Output	
	A	B	C	D	E	F	G (B / A)	H (C + D)	I (G x H)	J (E x I)	K (J x F)	L (K / B)
Month	Average Load Factor for OEM A	Total Units Delivered (inc Subcontractor) for OEM A	Average Loaded KM Per Trip	Average Unloaded KM Per Trip	Fuel Consumption: Litres / Kilometre (1) (2)	CO_2 Generated: Kgs / Litre (3) (4) (5)	Trips	Total KM Per Trip	Total Kilometres	Total Litres Consumed	Contract CO_2 (Kgs)	CO_2 per Vehicle (Kgs)
Jan-13	9.5	4,000	280	110	0.4	3.24	421	390	164,210	65,684	212,816	53.20
Feb-13	9.5	4,500	270	110	0.41	3.24	474	380	180,000	73,800	239,112	53.14
Mar-13	9.5	5,500	265	105	0.41	3.24	579	370	214,210	87,826	284,557	51.74
Total		**14,000**							**558,421**	**227,310**	**736,486**	**52.69**

Total Co2 for OEM A. January 2013 - March 2013	**736,486**	**Kgs**
Average Co2 per unit for OEM A. January 2013 - March 2013	**52.69**	**Kg / Unit**

Inputs:

A= Input 'Average load factor' specific to the OEM under analysis. This could be sourced by sampling

B= Input total units delivered for the OEM contract under analysis, including units delivered by Subcontractors

ODETTE

C= Input the ‘Average loaded outbound leg km’s per trip’, specifically related to the OEM contract under analysis. This could be sourced through sampling techniques (i.e. calculate from a 10% sample of loads delivered for the OEM)

D= Input the ‘Average unloaded or repositioning leg km’s per trip’, specifically related to the OEM contract under analysis. This could be sourced through sampling techniques (ie calculate from a 10% sample of loads delivered for the OEM)

E= Input the Transport Operators ‘Average Fuel Consumption’ (ie MPG or Litres per km) for entire fleet

Define what fuel consumption data you factored in for Subcontractors? (e.g. : is it assumed the fuel consumption for Subcontractors, is the same as that for the Transport Operators Fleet?)

Definitions: Level 1: Default value. Level 2: Transport Operator Fleet Values. Level 3: Transport Operator Specific Values. Level 4: Specific measured value.

What are the accuracy levels for your owned fleet?

Level 1: (e.g.: 100 %) Level 2: (e.g.: 0%) Level 3: (e.g.: 0%) Level 4: (e.g.: 0%)

What are the accuracy levels for your sub-contracted fleet?

e.g.: Level 1: (100%) Level 2: (0%) Level 3: (0%) Level 4: (0%)

F = GHG factor: GHG value per unit of fuel consumed

(1) What are the sources of the emission factor? (e.g.: CEN Norm EN16258:2012)
(2) What lifecycle operational phases are covered? (e.g. : Well to Wheel)
(3) What is the unit used as GHG emission factor? (e.g. : CO2 equivalent)

Calculation:

G & H & I = Using above statistics, calculate number of trips, total average KM’s per trip, and total KM’s for the OEM under analysis

J= Using the Transport Operators, ‘Average Fuel Consumption’, calculate litres of fuel that relate to the OEM under analysis.

Outputs:

K & **L** = Using fuel consumed value, calculate total GHG, and GHG per unit delivered

2) EXAMPLE OF REPORTING METHODOLOGY 2 (LEVEL 2 COMPLIANT)

This example is also for finished vehicle transportation (e.g. from an automotive OEM to their dealerships)

Calculation based on average fuel consumption for the entire Operators fleet and not specific to the OEM under analysis

	Input						Calculation			Output (7)	
	A	B	C	D		E	F *(A x B)*	G *(E / D)*	H *(F x G)*	I *(C x H)*	J *(I / E)*
Month	Total Operator Kilometres (inc Subcontract)	Fuel Consumption: Litres / Kilometre (1)	CO2 Generated: Kgs / Litre (2) (3) (4)	Total Units delivered (inc Subcontract) (5)	*Unit (Vehicle / tonne / m3)*	Total Units relating to OEM A	Total Litres Consumed (8)	OEM A units as a % of total units	Litres Consumed (OEM A)	OEM A Contract CO2 (Kg) (6)	OEM A CO2 per Unit carried (kg)
Jan-13	3 500 000	0,4	3,24	80 000	*vehicles*	4 000	1 400 000	5%	70 000	226 800	56,70
Feb-13	3 200 000	0,41	3,24	90 000	*vehicles*	4 500	1 312 000	5%	65 600	212 544	47,23
Mar-13	4 000 000	0,4	3,24	110 000	*vehicles*	5 500	1 600 000	5%	80 000	259 200	47,13
Total	**10 700 000**			**280 000**	*vehicles*	**14 000**	**4 312 000**	5%	**215 600**	**698 544**	**50,35**

Total CO2 for OEM A, January 2013 - March 2013	**698 544**	**Kg**
Average CO2 per unit for OEM A, January 2013 - March 2013	**50,35**	**Kg / Unit**

Inputs:

A= Total kilometres (km) for the Transport Operators Fleet, plus any km's covered by Subcontractors

Input 'Actual' overall km's covered by the Transport Operators fleet, plus any KM's relating to subcontracted deliveries

B= Overall Average Fuel Consumption (litres per km) for the Transport Operators Fleet

Input the Transport Operators 'Average Fuel Consumption' (i.e. mpg or Litres per km)

Define what fuel consumption data you factored in for Subcontractors? (e.g.: is it assumed the fuel consumption for Subcontractors, is the same as that for the Transport Operators Fleet?)

Definitions: Level 1: Default value. Level 2: Transport Operator Fleet Values. Level 3: Transport Operator Specific Values. Level 4: Specific measured value.

What are the accuracy levels for your owned fleet?

Level 1: (e.g.: 100 %) Level 2: (e.g.: 0%) Level 3: (e.g.: 0%) Level 4: (e.g.: 0%)

What are the accuracy levels for your sub-contracted fleet?

e.g.: Level 1: (100%) Level 2: (0%) Level 3: (0%) Level 4: (0%)

C= GHG factor: GHG value per unit of fuel consumed

(1) What are the sources of the emission factor? (e.g.: CEN Norm EN16258:2012)
(2) What lifecycle operational phases are covered? (e.g.: Well to Wheel)
(3) What is the unit used as GHG emission factor? (e.g.: CO2 equivalent)

D= Total units delivered, all contracts, entire business, including those delivered by Subcontractors

Please define the unit? (e.g.: Vehicles)

E= Total units delivered, for the OEM Contract that is being analysed for GHG, including those delivered by Subcontractors

Calculation:

F= Calculate total fuel consumed in litres, relating to entire Transport Operators fleet, including Subcontractors.

G= Identify % of business that is related to the OEM under analysis

H= Apply the OEM volume % to the total fuel consumed

Outputs:

I & **J**= Calculate for OEM under analysis, total GHG, and GHG per unit delivered

APPENDIX 4: GLOSSARY OF TERMS

This Glossary contains both general transport management terms and terms more directly related to Greenhouse Gas reporting that are relevant to these Guidelines.

Terminology used in Logistics can also be found in the Odette Glossary (for Odette Members) at:

http://www.odette.org/publications/file/glossary-of-terms

Term	Definition and Main Section References
Accuracy level	Classification of different data sources for emissions based on the quality of data available, ranging from estimated values to real data (See Section 7.1)
ADEME	Agence de l'environnement et de la maîtrise de l'énergie. French public agency addressing issues relating to energy usage and the environment. (See Section 11.4)
Average data	In this context, emissions data taken from generic data sources in the absence of actual emissions /fuel usage data.
Buyer (of goods)	The one who buys the goods.
Calculated data	In this context, emissions data derived from other data, e.g. average data from internal or external data bases
Carrier	Party undertaking transport of goods from one location to another.
CEN / EN 16258:2012	Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers) / (See Section 4.3)
CCWG	Clean Cargo Working Group (See Section 11.4)
CSI	Clean Shipping Index (See Section 11.4)
CO_2 equivalent	A way of quantifying the emissions of other greenhouse gases in terms of the amount of CO2 that would exhibit the same global warming potential. (See Section 5.6)
COFRET	Carbon Footprint of Freight Transport initiative. (See Section 11.4)
Collection leg	The stage of transport during which the consignment of goods are moved prior the line haul transport stage. Synonym: Pre Carriage.
Collection of goods	The process of collecting goods ready for transport
Consignee	The party receiving goods as stipulated in the transport instruction. The physical receipt is not necessarily done by the consignee.
Consignment	A separately identifiable collection of packages/pieces (available to be) transported from one consignor to one consignee via one or more modes of transport. A consignment can consist of one or several shipments during parts of the whole transport assignment.
Consignment ID	Unique reference to a consignment.
Consignment note	See waybill.

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Term	Definition and Main Section References
Consignor	The party sending goods as stipulated in the transport instruction. The physical despatch is not necessarily done by the consignor. Synonym: Shipper
Consolidation	The grouping together of individual shipments or consignments of goods into a combined consignment for carriage. Related to Break Bulk
CSR	Corporate Social Responsibility - the responsibility of enterprises for their impacts on society
DEFRA	The UK government Department for Environment, Food and Rural Affairs (See Section 11.4)
Delivery	The physical process of handing over goods to the consignee or to the party acting on his behalf. Synonym: drop off.
Despatch advice	The document by means of which the seller or consignor informs the consignee or buyer about the despatch of goods.
Direct transport	The conveyance of goods directly from the consignor to the consignee without intermediate storage or unnecessary delay in the distribution activities.
Distribution leg	The stage of transport during which the consignment of goods are moved following the line haul transport stage. Synonym: On Carriage.
Drop off	See Delivery.
Drop off location	See Place of Delivery.
Eco-driving	Driving in a manner that will minimise fuel usage & emissions (See Section 10.4.1)
EDU	Equivalent Delivery Unit
Emission Factor…	Measure of the average amount of a specific pollutant or material discharged into the atmosphere by a specific process, fuel, equipment, or source
Environmental impact	The consequence of an environmental change that is caused by an 'Environmental load', such as emission of combustion products from a diesel engine, particles or Nitrous oxides (NOX). An environmental impact may be positive or negative.
Environmental impact assessment	Environmental impact assessment means to assess the environmental consequences from a specific human activity, such as a transport service, the life span of a vehicle, a transportation route etc. The Environmental impact assessment identifies the potential environmental changes, and the causes and the consequences of these changes. The environmental impact assessment may result in a quantitative analysis or summary statement. See also EPS.
Environmental load	Emissions or other identified causes of environmental disturbances, such as carbon dioxide, sulphur dioxide, particles, noise and vibrations, land use, etc.

Term	Definition and Main Section References
Environmental performance	Quantitative statement of the environmental status in one or several well-defined dimensions, such as amount of greenhouse gas emissions, or a combined measure of different environmental loads and impacts.
Environmental priorities	It is not practically possible for a business to address all environmental matters with the full attention at all times. The different matters need to be prioritised, depending on significance and available resources. It may be encouraged that prioritisations should be made consciously and transparently.
Environmental weighting method	There is no single way of evaluating impact of environmental changes. Depending on how important the different changes are considered to be they may be assigned different quantitative weights. This is particularly useful when also having calculated the environmental changes using quantitative values.
EPA SmartWay	SmartWay is a public/private collaboration between the US EPA and the freight transportation industry that helps freight shippers, carriers, and logistics companies improve fuel-efficiency and save money.
Euro Emissions Standard	European emission standards define the acceptable limits for exhaust emissions of new vehicles sold in EU member states. The emission standards are defined in a series of European Union directives (Euro 4, Euro 5, ….) staging the progressive introduction of increasingly stringent standards. See Section 10.1.5
Final consignee	The party that holds the final destination of the shipping process.
Fleet Management System	A system for collecting data on vehicle operations (route, fuel consumption, shipments, goods,….) and links this to office systems (ERP, accounting, …)
Fourth party logistics services provider (4PL)	An integrator that assembles the resources, capabilities, and technology of its own organisation and other organisations to design, build, and run comprehensive supply chain solutions. Synonym: Lead logistics provider and Control Tower.
Freight forwarder	The party arranging the carriage of goods including connected services and/or associated formalities on behalf of a consignor or consignee.
Freight invoice	A document issued by a transport service provider, specifying freight costs and charges incurred for a transport operation and stating conditions of payment. Synonym: Freight bill.

Term	Definition and Main Section References
Freight payer	Party responsible for the payment of freight charges.
French Decree	French legislation covering reporting requirements for transport starting or ending in France (See sections 3.3.1 & 8.4.1)
GHG Protocol	Widely used international greenhouse gas reporting tool published by World Resources Institute together with the World Business Council for Sustainable Development. (See section 5.3)
Global Warming Potential (gwp)	The Global Warming Potential is an attempt to provide a simple measure of the relative radiative effects of the emissions of various greenhouse gases. The index is defined as the cumulative radiative forcing between the present and some chosen time horizon caused by a unit mass of gas emitted now, expressed relative to that for a reference gas (usually CO_2). (See Section 2.3)
Greenhouse Gas	A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon Dioxide and Methane are examples of greenhouse gases. (See Section 2.2)
HGV	Heavy Goods Vehicle (typically the kind of road transport used for transporting car parts, materials or finished vehicles). Normally refers to vehicle/ trailer combinations more than 3.5 tonnes.
Information of collection (IOC)	The process of receiving a consignment usually against the issue of a status report. As and from this moment the party accepting the consignment becomes responsible for the consignment.
Information of delivery (IOD)	The process of receiving a consignment usually against the issue of a status report. As and from this moment the party accepting the consignment becomes responsible for the consignment.
Intermodal transport	Movement of goods in which the same loading unit is used in a transport chain in an integrated manner using more than one mode of transport without the goods being unloaded in between.
ISO 4000 Series Standards	Family of standards relating to environmental management- see Section 4.1 & 4.2
ITS (Intelligent Transport System)	The term Intelligent Transport Systems (ITS) refers to information and communication technology (applied to transport infrastructure and vehicles) that improve transport outcomes such as transport safety, transport productivity, travel reliability, informed travel choices, social equity, environmental performance and network operation resilience.
Lead Logistics Provider	An organisation that manages the planning and execution of freight on behalf of another. Synonyms: Control Tower, Third or Fourth Party Logistics Services Provider (3PL and 4PL)

Term	Definition and Main Section References
License Plate	A license plate is assigned to a transport unit by its issuer. The license plate is used for globally unique identification of transport units but could also be used in other applications. Any license plate issuer shall be authorised by an issuing agency in accordance with the rules set up by that agency and ISO 15459-1.
Line haul	The intermediate/line hauls stage of transport in the movement of a consignment of goods. Synonym: Main Carriage.
Load factor	A term describing the transport efficiency of a system, such as a vehicle, a route, a logistic strategy or any other system that performs transportation work. Possible interpretations are for example that a load factor of 100% is a theoretical term that means that no further goods can be added to the transport system, or that 100% means that all vehicles within the transport system are fully loaded. Many other interpretations may also be considered, hence suggesting that the term needs to be defined or replaced by a more precise term to describe transport efficiency.
Loading metres	The length of that part of a vehicle for which the complete width and height over that length can be used for goods.
Location ID/ Location code	Unique identifier for a specific physical location of any type. There are several identification schemes like UN location codes, GS1 location numbers or similar coding based on ISO Data Identifiers.
Logistic unit	In this context Logistic Unit is equivalent to any or all of Package, Piece and Transport Handling Unit. It describes a unit that carries/contains the goods. Can be a parcel, packaging material, pallet, box, bag, container or a trailer unit. Represents lowest packaging unit handled by the transport service provider.
Logistics label	See Transport label. The wording of “Transport label” and “Logistics label” are not always used in a similar way, some strictly differentiate between the two while others see them as synonyms.
Manifest (in transport)	Listing of goods comprising the cargo carried in a means of transport or in a transport-unit. The manifest gives the commercial particulars of the goods.
Multimodal transport	See Intermodal Transport.
NTM	(Network for Transport and Environment) A Swedish non-profit sector based network addressing environmental management of transport (See Section 11.4).
OEM	Original Equipment Manufacturer. In the context of these Guidelines, an automotive manufacturer .
Operating Phase	Term relating to emissions produced during use of fuel (= ‘Tank to Wheel’ emissions). See Section 5.6
Original consignor	The party that initiates the shipping process. Synonym: Original shipper .

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Term	Definition and Main Section References
Package	See Logistic unit.
Package ID	Unique identifier of an individual package – as visible from outside the package, also communicated in the EDI message.
Payee	Party to whom a payment is to be made.
Pick up of goods	See collection of goods.
Pick-up instruction	An instruction given to the driver for picking up logistic unit(s) from a pick-up location.
Pick-up location	See Place of Despatch.
Pick-up request	The process of making a reservation for space on a means of transport for the movement of goods.
Pick-up request confirmation	The notification issued by the transport service provider to confirm the status of the pick-up request, e.g. it is accepted (and that space has been reserved on means of transport for the movement of goods) or that it is rejected.Functional - after business validation. Technical - after system acceptance.
Place of collection	See Place of despatch.
Place of delivery	Place to which the goods are to be delivered under transport contract terms. This may be different from the location of the consignee.
Place of departure	Place from which the means of transport or transport equipment is departing.
Place of despatch	Place at which the goods are taken over for carriage (operational term), this place can be different from the transport contract place of acceptance.
Place of destination	Same as the delivery address city if existing in the message, otherwise same as the receiver's city.
Place of Terms of Delivery	A place which describes the conditions related to the Terms of Delivery.
Product life cycle assessment	A technique to assess the environmental aspects and potential impacts associated with a product, from its creation to its eventual end of life.
Proof of collection (POC)	Evidence for transition of liability, either in printed or in electronic format.
Proof of delivery (POD)	Evidence for transition of liability, either in printed or in electronic format.
Receiver (of goods)	See Consignee.
Reloading	Can be either trans loading, cross-docking or boarding on a ferry (with or without a transport mean). Can be used either in a port terminal, road terminal or railway terminal.
Seller (of goods)	Party selling goods or services to a buyer.
Sender (of goods)	See Consignor.

Term	Definition and Main Section References
Ship from	See Consignor.
Ship to	See Consignee.
Shipment	A separately identifiable collection of packages/pieces (available to be) transported from one original consignor to one final consignee via one or more modes of transport. A shipment can be consolidated to one consignment per transport leg, i.e. possibly several different consignments during the whole transport assignment.
Shipment ID	A Shipment Issuer's unique reference that is non-repeatable within a calendar year and is assigned to a despatch.
Shipper	See Consignor.
Shipping instruction	Information providing all details required for the physical movement of a consignment/shipment.
Subcontractor	In this context the party undertaking transport of goods from one location to another on behalf of the carrier.
Supplier	Party which provides goods and/or services to one or more customers.
Terms of Delivery	All the conditions agreed upon between parties with regard to the ownership of the various responsibilities involved in the delivery of goods and/or services.
Tank to Wheel Emissions	Term to describe emissions use of fuel. See Section 5.6.
Third Party Logistics services provider (3PL)	Supplier of outsourced logistics services that primarily uses its own assets and resources.
Track & trace	In this context the function of retrieving information concerning goods, goods items, shipments, consignments or equipment in order to hold status and deviations.
Trans loading	The process by which goods are transferred from one mean of transport to another.
Transport buyer	The party that is commercially contracting the transport service provider.
Transport equipment	A separately identifiable non powered device (e.g. a 20/40 ft. container, a trailer, a rail car, a handling equipment), but not packaging. See also Logistic unit.
Transport Handling Unit	See Logistic unit.
Transport ID	A unique identifier for a mode of transportation.
Transport information	A generic term for all information exchanged throughout the transport chain.
Transport instruction	A generic term for the information providing the mandatory details to arrange transportation.
Transport label	A label containing barcoded and human readable information about the transport and the goods. Also containing an ID with some kind of uniqueness. The wording of "Transport label" and "Logistics label" are not always used in a similar way, some strictly differentiate between the two while others see them as synonyms. See examples: STILL, STE, GTL, OTL, and MITL.

Term	Definition and Main Section References
Transport means	A separately identifiable powered transport device (e.g. truck, vessel, plane).
Transport mode	The method of transport used for the conveyance of goods or persons, e.g. by rail, by road, by sea.
Transport request	See pick-up request.
Transport Service Provider	Any company who provides a transport service note: A transport service provider can be a freight carrier (acting directly for shippers or as sub-contractor for another freight carrier or for a freight forwarder), a freight forwarder, and a logistics service provider which provides transport services.
Transport status	The status of goods during a transport service. For example, in transit, damaged, delayed, or diverted. Used to collect information for track & trace.
Transport user	User (often buyer) of transport services offered or performed by transport service providers. Can include transport buyer, consignor and consignee.
UCR (Unique Consignment Reference)	A globally unique identification of consignment for customs declarations (WCO framework).
UK Guidance	Within these guidelines, this phrase refers to the guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations in the UK published by DEFRA (Section 11.2.3).
Ultimate consignee	See Final consignee.
UNFCCC	United Nations Framework Convention on Climate Change.
Upstream Phase	Term relating to emissions produced during generation/ delivery of fuel (= 'Well to Tank' emissions) See Section 5.6.
Well to Tank Emissions	Term to describe emissions from generation and delivery of fuel. See Section 5.6.
Well to Wheel Emissions	Term to describe emissions from generation, delivery and use of fuel. See Section 5.6.
VOS	Vehicle Operation System – term used in CEN standard to describe the activities carried out by one or more vehicles to execute a specific transport leg (See Section 6.2.2).

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