

# CO<sub>2</sub> information for transport services

*Application of Article L. 1431-3 of the French transport code*

*Methodological guide*



The MEDDE (French Ministry of Ecology, Sustainable Development and Energy) has entrusted ADEME (Environment and Energy Management Agency) to draw up this methodological guide.

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The Zen'to company has conducted prior interviews on behalf of ADEME with the representatives of the different relevant transport professions, and has produced working papers of this guide.

The OEET (French Observatory for Energy, the Environment and Transport), in which all stakeholders are represented and the technical commission works of which are open to voluntary firms, supervised the collection of comments and proposals for improving this guide. Observations more particularly involved the feasibility of the methods proposed, the clarity of its content and document accessibility. Its validation council approved the provisional version of the guide on the 26th of September 2012.

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## Editorial

France has set itself ambitious objectives in terms of reducing greenhouse gas emissions. In one vision on energy transition, this also involves promoting a simpler, more efficient economy in terms of energy consumption.

In order to reach these objectives in France, a set of provisions has been established, in particular in terms of environmental labelling and eco-friendly approaches.

Goods and passenger transport and home moving services are concerned by this, with the implementation on the 1<sup>st</sup> of October 2013 of a disclosure requirement regarding the quantity of carbon dioxide (CO<sub>2</sub>) emitted during the transport service. The transport activities affected by this are those departing from or travelling to a location in France.

This disclosure of information was made mandatory by Article 228 of the French law of 12 July 2010 on France's national commitment to the environment and was integrated into the French transport code. This mandatory requirement is based on the European standard defining the methodologies to be used to calculate the greenhouse gas emissions for the transport services provided. It therefore plays a part in standardising methods throughout Europe.

A methodological guide was considered as potentially useful in helping transport professionals implement the device, to be published in anticipation of the 1<sup>st</sup> of October 2013 deadline.

This is the purpose of this document, drawn up thanks to the active participation of transport professionals, whom we would like to thank, at the meetings organised by the Observatory for Energy, the Environment and Transport and with the support of the Environment and Energy Management Agency.

This guide is a new, practical tool for transport professionals and local authorities who are committed to this approach for disclosing information to their customers and users, and in particular for small businesses.

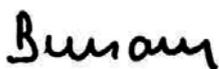
It is intended to be both pragmatic and operational, while taking into account the complexity of all components of transport services. This is the result of experience sharing and feedback work.

The first chapter of this guide presents the device in full and provides in-depth details on the terms and conditions for implementing the regulatory provisions and explains the method used to calculate CO<sub>2</sub> emissions. This presentation is followed by a series of fact sheets representing the different transport professions and comprising practice calculation examples. The annex to this document contains the legal and regulatory texts applicable and the method elements used to define the reference data (emission factors and values referred to as "level 1" values).

Further to the examples presented in this guide, company feedback obtained from developing their methodologies and information disclosure means is used to improve practices.

This guide shall be updated as required to suit the needs expressed by professionals and the evolutions taking place with regard to the reference data and texts.

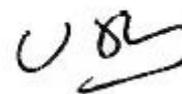
A device implementation report, to be produced by the 1<sup>st</sup> of January 2016, shall be used to draw up an assessment of the first years of application.



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# Introduction

## *Objectives of this guide*

The purpose of this guide is to help the stakeholders concerned to calculate and provide information on the quantity of carbon dioxide emitted during a given transport service.

This document specifies the range and scope of this measure, presents the principle for calculating the CO<sub>2</sub> emissions generated by a given transport service and tackles any aspects connected to the terms and conditions for transmitting information to the beneficiaries.

The guide comprises a set of specific fact sheets for each of the different professions affected by this requirement, providing solutions to meet the expectations of each sector of activity in a precise manner.

## Who is this guide aimed at?

This guide is aimed at all French and foreign professionals affected by the regulation. This refers to:

- private or public stakeholders transporting goods and/or passengers, or home moving businesses;
- structures organising transport services by subcontracting the transport of goods or passengers to subcontractors;
- future beneficiaries of the CO<sub>2</sub> information and in particular transport service purchasers in a professional context.

## How to use this guide

This guide begins by presenting the main aspects of the regulation (chapters 1 and 2) and focuses on the following elements:

- a reminder of the regulation;
- transverse regulatory issues connected to the implementation of the disclosure requirement and which may affect all sectors of activity.

Chapters 3, 4 and 5 provide support for the practical aspects of drawing up CO<sub>2</sub> information, based on examples corresponding to various passenger or goods transportation activities. These chapters are developed in the form of "profession-based fact sheets" containing the following elements:

- a description of the activity or profession concerned via a fact sheet;
- the operational implementation of the calculation method using "level 1" values, accessible to any company or profession concerned (the use of national means corresponding to the relevant sector of activity);
- the operational implementation of the calculation method using values specific to the company, "level 2, 3 or 4" values (reflecting the company's activity);
- an illustration of the communication means (media, transmission modes, etc.) that can be used to inform the customer.

Finally, the annexes appended hereto group together all of the regulatory texts and in-depth information on the data used.

**The information in this guide is provided to help users implement the device. Some proposals contained in the fact sheets are simple recommendations and do not constitute obligations. Each industry, federation or company is free to adopt its own method for implementing the regulations, provided that it complies with the official texts (article of law, decree and orders) stipulated hereinafter.**

## Why provide CO<sub>2</sub> information for transport services?

*"You can't manage what you don't measure", "You can only correctly manage that which is measured", "Nothing can be improved until it is measured"<sup>2</sup> ...*

The purpose of providing CO<sub>2</sub> information for transport services is to raise the awareness of all stakeholders in the transport chain to their contributions to greenhouse gas emissions, and to help them better direct their choices, where applicable, towards less-emitting solutions. For businesses, those that receive this information can collate the results provided by their service providers to assess the weight, in terms of CO<sub>2</sub> emissions, of their transport activities (goods or passengers).

This new and innovative device contributes to meeting four fundamental requirements:

- achieving the national objectives set with regard to reducing greenhouse gas emissions;
- for transport operators providing this information: adding value to their low-emitting services and highlighting the progress made;
- for users or companies receiving this information: knowing the impact of their journeys (users) or activities (businesses), and for businesses, using this information to assess indirect emissions in their emission assessments;
- improving and standardising methods for assessing CO<sub>2</sub> emissions: a lot of information can be obtained from CO<sub>2</sub> calculators or eco-comparison tools, however no common framework yet exists for all modes of transport.

CO<sub>2</sub> emission calculations are therefore connected to the issue of reducing the environmental impacts of a large number of stakeholders, who are also affected by other provisions stipulated in the French law No. 2010-788 of 12 July 2010 on France's national commitment to the environment:

- **Article 75** provides for the mandatory obligation at the end of 2012, for corporate bodies governed by private law employing more than 500 employees (or more than 250 employees for overseas departments and regions), of producing a greenhouse gas emissions assessment identifying potential areas for reducing these emissions; this regulation applies to transport service providers;
- **environmental labelling of consumer goods (Article 228-I)**, tested on the 1<sup>st</sup> of July 2011, with the aim of allowing for the environmental labelling (greenhouse gas emissions making up one of the criteria) of products marketed in France; the environmental impact of transport may constitute an important element in product environmental labelling.

In the merchandise industry, transport and general logistics activities are at the very heart of the notion of an "extended enterprise", which enables an organisation to work with a set of upstream industrial partners (manufacturers, importers, etc.) or downstream partners (distributors, wholesalers, etc.) to design, manufacture and market products and services. CO<sub>2</sub> information makes up a key part of a virtuous logistics chain. It must create a dialogue between the transport professionals producing the information and the prime contractors or users benefiting from this information. This dialogue promotes the improved organisation of flows and transport means while reducing the CO<sub>2</sub> emissions generated by these activities.

The emissions generated by the transport sector also play an important role in assessing the emissions connected to the activities undertaken by the local authorities.

<sup>2</sup> Common expressions, used by management auditors among others, and derived from the saying "Nothing exists until it is measured" by Niels Bohr (Nobel prize in physics in 1922).

## CO<sub>2</sub> information and environmental actions

CO<sub>2</sub> information meets a need for increased awareness and an individual right to environmental information. Many voluntary initiatives undertaken by carriers (in particular for air and rail transport and certain public transport networks, etc.) and by third party bodies have led to the creation of CO<sub>2</sub> calculators and have laid the foundations for the provision of such information. However these actions don't yet benefit from any common methodological framework or homogeneous rules.

Although CO<sub>2</sub> information for transport services constitutes an important tool for the implementation of an approach to improve the environmental performance of the transport operator, this is not the only element that must be taken into account.

Indeed, the generation of greenhouse gas emission reports for the entire scope of the activity, and in particular for logistics activities, the subscription to environmental charters or programmes (for example the "Objectif CO<sub>2</sub> - Les transporteurs s'engagent" French CO<sub>2</sub> charter signed by carriers for goods and passenger transport by road<sup>3</sup>), the subscription to international programmes, the implementation of an ISO 14001 certification process for transport and logistics activities, or any initiative involving other environmental aspects (pollution, noise, etc.) constitute actions enabling transport professionals to go even further in their environmental commitment.

It should also be noted that clear synergies exist between the actions to be conducted (collection of information, segmentation of activities, production of indicators) for setting up CO<sub>2</sub> information systems and producing greenhouse gas emissions reports, and other environmental actions.

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<sup>3</sup> <http://www.objectifCO2.fr>.

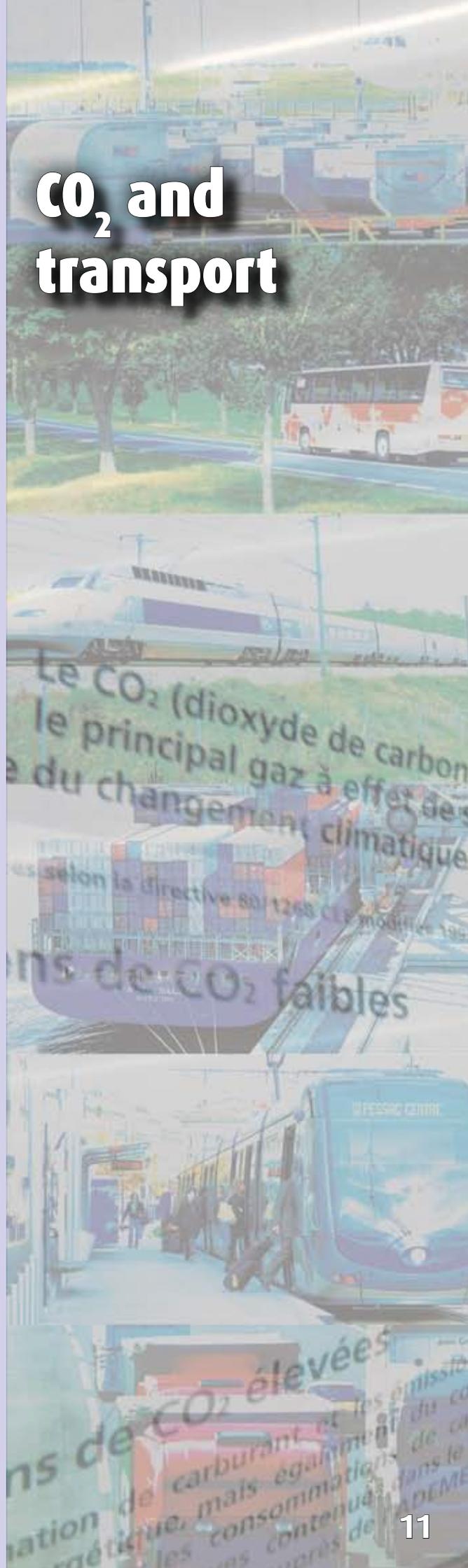


# Chapter 1

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# CO<sub>2</sub> and transport



## 1.1. Greenhouse gas emissions in the transport sector

The transport sector, which is a major problem area with regard to the consumption of fossil fuel resources (in particular oil), is the number one emitter of greenhouse gases in France. Indeed, in 2010 in mainland France, 36,5 %<sup>4</sup> of all CO<sub>2</sub> emissions and 27,3 % of greenhouse gas emissions are caused by transport activities.

As part of international negotiations, an objective has been set to cut global greenhouse gas emissions (all sectors combined) in half by the year 2050 in relation to 1990 levels. This is based on the assumption of significant reductions in the emissions generated in the more developed countries. More particularly, France has set itself the objective of reducing its emissions by 75 % by the year 2050 (compared to 1990 levels).

During the Grenelle de l'Environnement and with regard to the transport sector, France set itself the target of reducing its greenhouse gas emissions by 20 % to bring them back to their 1990 levels.

The transport sector is therefore subject to considerable measures to encourage the least emitting modes of transport (development of rail and river infrastructures and public transport) and to improve vehicle efficiency (ecological bonus-malus for the purchase of new vehicles). The measures recently implemented include for example the integration of aviation in the European Union Emissions Trading System.

CO<sub>2</sub> information makes up part of the measures implemented to raise user and customer awareness. It complements other similar measures such as the CO<sub>2</sub>-labelling of new vehicles by dealers or, outside of the transport sector, the development of an environmental labelling system for consumer goods.

## 1.2. Assessing CO<sub>2</sub> and greenhouse gases

Greenhouse gases are gaseous atmospheric components that absorb and reflect certain rays emitted by the Earth's surface, the atmosphere and the clouds. The exaggerated increase in these gases, caused by human activities, is one cause of global warming.

The main gases referred to as greenhouse gases (often shortened to as GHGs) are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFC) and perfluorocarbons (PFC).

The number one greenhouse gas emitted by the transport industry is carbon dioxide (CO<sub>2</sub>), which is emitted during electricity generation and during fuel production and use.

With regard to the regulation subject to this guide of application, only the **carbon dioxide emissions are taken into account**. The measurements taken provide CO<sub>2</sub> quantities expressed in weight (grams, kilograms or tonnes).

The European standard EN16258 (to be published late 2012), also takes into account the other main greenhouse gases and all emissions are measured in carbon dioxide equivalent (referred to as CO<sub>2</sub>e)<sup>5</sup>. Annex 1 of this guide describes the links and differences between the French regulation and the European standard.

<sup>4</sup> Source: CITEPA / format SECTEN - April 2012

<sup>5</sup> CO<sub>2</sub>e: CO<sub>2</sub> equivalent is a conventional unit of measurement used to measure the global warming power of each greenhouse gas with reference to carbon dioxide.

## How are CO<sub>2</sub> emissions given values?

The values attributed to the greenhouse gas emissions generated following the combustion of an energy source are based on principles drawn up within the scope of works conducted by the IPCC<sup>6</sup>.

National and international calculation methods resulting from these works are all based on the same principle: **converting the consumption of a quantity of an energy source** into carbon dioxide or carbon dioxide equivalent (when taking into account other greenhouse gases in addition to CO<sub>2</sub>) by using an **emission factor** specific to the element consumed.

For example, the consumption of 20 litres of diesel generates 61,4 kg of CO<sub>2</sub> given that the emission factor of this fuel is 3,07 kg of CO<sub>2</sub> per litre (see below).

In order to cover all emissions generated and for comparison purposes with different energy sources, this value attributed to the emissions generated must take into account any emissions produced upstream during their production. For fuels, this means integrating the operations performed to extract the crude product (oil), its refining operations and any fuel transport operations, instead of merely the combustion process itself.

For electricity (for example rail transport), although vehicle operation itself does not generate emissions, greenhouse gases (and in particular CO<sub>2</sub>) are produced when generating the electricity.

This is why this CO<sub>2</sub> information device for transport services takes into account all operations making up the **operating phase** and **upstream phase**:

- **the operating phase** corresponds to the use made of the means of transport, and therefore to the combustion of the energy source (fuels);
- **the upstream phase** corresponds to the activities implemented to supply the means of transport with its energy source (whether this is diesel, NGV or electricity, etc): this may therefore involve extracting the oil, refining it and distributing the fuel from the refinery to the pump. For biofuels, this more particularly involves cultivating the plant and its transformation steps to produce the fuel. For electricity, this involves extracting the fuel used by the power plant, its transport and the emissions connected to its use in the power plant<sup>7</sup>.

For example, within the scope of this guide, the emission factors for kerosene are 0,48 kg of CO<sub>2</sub> per litre for the upstream phase and 2,52 kg of CO<sub>2</sub> per litre for the operating phase. Therefore, the overall emissions generated for one litre of kerosene are  $2,52 + 0,48 = 3,00$  kg of CO<sub>2</sub>.

The emission factors for the different energy sources, including the upstream and operating phases, are set out in annex I of the French order of 10 April 2012 (see table hereinafter). These values are regularly updated, by amendment to the French order of 10 April 2012, in particular following developments in knowledge. The most recently published values should therefore be used.

<sup>6</sup> The Intergovernmental Panel on Climate Change.

<sup>7</sup> It should be noted that the emissions generated by the upstream electricity production phase vary greatly according to the geographic location of the energy supply, as the means and primary energy sources implemented to produce this energy are not the same in all countries.

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of the energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of the energy source)		
			Upstream phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	Kilowatt-hour	0,053	0,000	0,053
	Consumed in Corsica	Kilowatt-hour	0,583	0,000	0,583
	Consumed in Guadeloupe	Kilowatt-hour	0,688	0,000	0,688
	Consumed in French Guiana	Kilowatt-hour	0,350	0,000	0,350
	Consumed in Martinique	Kilowatt-hour	0,825	0,000	0,825
	Consumed in Mayotte	Kilowatt-hour	0,765	0,000	0,765
	Consumed in the Reunion Island	Kilowatt-hour	0,764	0,000	0,764
	Consumed in Europe (excluding France)	Kilowatt-hour	0,420	0,000	0,420
Aviation fuel	Wide-cut jet fuel (jet B)	Litre	0,488	2,480	2,968
	Aviation fuel (AvGas)	Litre	0,488	2,480	2,968
	Kerosene (Jet A1 or Jet A)	Litre	0,480	2,520	3,000
Automotive fuel	Pumped fuel (SP 95-SP 98)	Litre	0,47	2,24	2,71
	E 10	Litre	0,49	2,18	2,67
	E 85	Litre	0,87	0,36	1,23
Fuel oil	Light fuel oil ISO 8217 Classes RMA to RMD	Kilogram	0,61	3,15	3,76
	Heavy fuel oil ISO 8217 Classes RME to RMK	Kilogram	0,46	3,12	3,58
Diesel	Pumped road diesel	Litre	0,58	2,49	3,07
	Pumped non-road diesel	Litre	0,58	2,49	3,07
		Kilogram	0,68	2,95	3,63
	B 30	Litre	0,79	1,86	2,65
Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,61	3,15	3,76	
Liquefied petroleum gas (LPG)	LPG for road vehicles	Litre	0,19	1,58	1,77
	Marine butane	Kilogram	0,35	2,92	3,27
	Marine propane	Kilogram	0,35	2,94	3,29
Natural gas	Compressed natural gas for road vehicles (CNG)	Litre	0,32	1,81	2,13
	Marine liquefied natural gas (LNG)	Kilogram	0,52	2,77	3,29

Table 1: energy source emission factors of the French Order of 10 April 2012.

### Vehicle Euro emissions class and CO<sub>2</sub> emissions: false friends!

The purpose of the European emission standards, known as the Euro standards and applied to combustion engine vehicles, is to set the limits in terms of **pollution and the emission of particulate matter**. These include the following: carbon monoxide (CO); unburned hydrocarbons (HC); non-methane hydrocarbons (NMHC); nitrogen oxides (NO<sub>x</sub>).

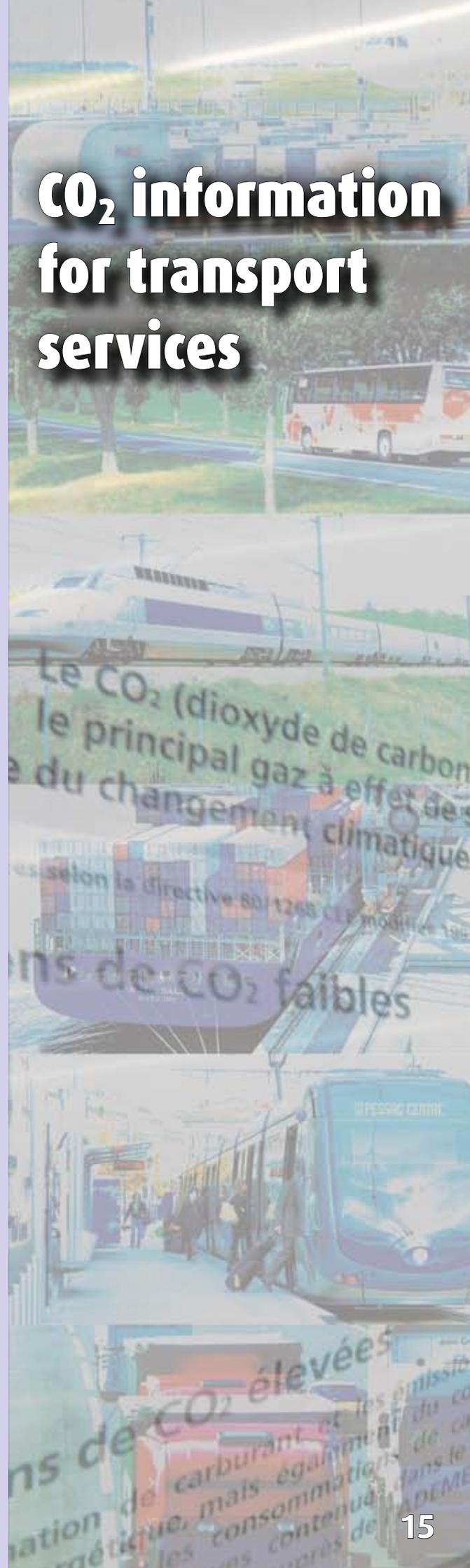
**The attribution of a Euro class to a vehicle does not therefore enable us to determine the quantity of CO<sub>2</sub> emitted for a given transport service. The calculation shall be based on the amount of fuel consumed by this vehicle when in use.**

The fact remains that recent Euro-classed vehicles often benefit from technology enabling them to consume less fuel than those of the previous classes. The modernisation of the vehicle fleet is fundamental in any approach undertaken by a transport operator to limit the environmental impact of its activities.

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# CO<sub>2</sub> information for transport services



## 2.1. Legal and regulatory texts

CO<sub>2</sub> information for transport services is a provision derived from the Grenelle de l'Environnement. Its compulsory application was introduced by an article of the "Grenelle II" law, and integrated into article L1431-3 of the French transport code. This device is subject to three regulatory texts:

- French **decree No. 2011-1336 of 24 October 2011** on the provision of information regarding the quantity of carbon dioxide emitted during a transport service: this specifies the terms and conditions for the implementation of article L1431-3 of the French transport code;
- French order **of 10 April 2012 implementing articles 5, 6 and 8 of the French decree No. 2011-1336 of 24 October 2011 on the provision of information regarding the quantity of carbon dioxide emitted during a transport service**: this order in particular sets out the emission factors for the different energy sources and the default values (known as level 1 values) that can be used;
- French order **of 10 April 2012 implementing article 14 of the French decree No. 2011-1336 of 24 October 2011 on the provision of information regarding the quantity of carbon dioxide emitted during a transport service**; this order sets the 1<sup>st</sup> of October 2013 as the date from which such CO<sub>2</sub> information disclosure requirements become mandatory.

Another order shall appear subsequent to the publication of this guide and shall specify the terms and conditions for certifying the compliance of the calculation methods used.

The legal and regulatory texts are appended to this guide (Annex 3).

## 2.2. Who is subject to this disclosure requirement?

### 2.2.1. According to the nature of the activity

CO<sub>2</sub> information applies to *"any public or private persons organising or selling transport services for passengers, goods or moving purposes, carried out using one or several means of transport, departing from or travelling to a location in France, with the exception of transport services organised by public or private persons for their own behalf"* (refer to article 2 of the French decree No. 2011-1336).

The following are therefore subject to CO<sub>2</sub> information disclosure requirements:

- all professionals **selling transport services** for the behalf of other people, whether carried out by themselves or by partner transport operators;
- **home moving companies** for moving services;
- all French and foreign economic stakeholders, whether public or private, **organising transport services**.

The following are therefore **concerned by this regulation (non-exhaustive list)**:

- ▶ transport operators;
- ▶ local authorities:
  - for transport services under direct management (including free services);
  - when organising school transport services;
- ▶ travel agencies selling transport services.

**CO<sub>2</sub> information disclosure is mandatory, even with regard to free services (for example city bus services provided free-of-charge by local authorities).**

**Businesses only involved in providing the transport vehicles and not involved in performing the service as such, in particular** self-driven vehicle rental companies (private cars, lorries, short or long-term rental, etc.) are not subject to this requirement.

### For the behalf of others or for its own behalf

CO<sub>2</sub> information must be disclosed by all persons organising or selling a transport service for the behalf of another person. This other person can be a "shipper" (industrialist or distributor), another transport service provider or transport organiser or any other third party (user, etc.).

Conversely, the transport operations carried out for its own behalf, i.e. those performed for its own needs using its own vehicles and drivers, are not subject to the CO<sub>2</sub> information disclosure requirement.

Nonetheless, a company, for example a shipper, can voluntarily calculate the CO<sub>2</sub> emissions generated by the transport operations carried out for its own behalf so as to integrate this information into a monitoring chart containing all of the emissions generated by its logistics activities. To achieve this, it can reuse the different calculation methods and data presented in this guide, according to the modes of transport implemented and the activities performed.

## 2.2.2. According to the size of the structure

**The CO<sub>2</sub> information disclosure requirement for transport services applies regardless of the size of the company or local authority.** No threshold exists beneath which an organisation is exempt from disclosing such information.

However, the decree contains a provision aiming at easing the implementation of this device for services providers with less than 50 employees: the latter will be able to use default values for the calculations, known as level 1 values.

For businesses with more than fifty employees, the French decree No. 2011-1336 stipulates that level 1 values can be used until the 1<sup>st</sup> of July 2016. The implementation of this provision shall be subject to an examination within the scope of the report provided for by article 14 of this decree.

## 2.2.3. According to the scale of the service provided

The CO<sub>2</sub> information disclosure requirement applies regardless of the scale of the service provided. No threshold exists beneath which a service is not subject to the disclosure requirement.

Small-scale home moving activities or small-quantity services for goods are extremely numerous and when added together represent high emission levels. The decision has therefore been made not to exclude such services from this device.

However, provisions exist in some cases to simplify implementation.

Therefore, for a taxi ride or an underground journey, the simple on-board display of the emissions generated per kilometre will suffice.

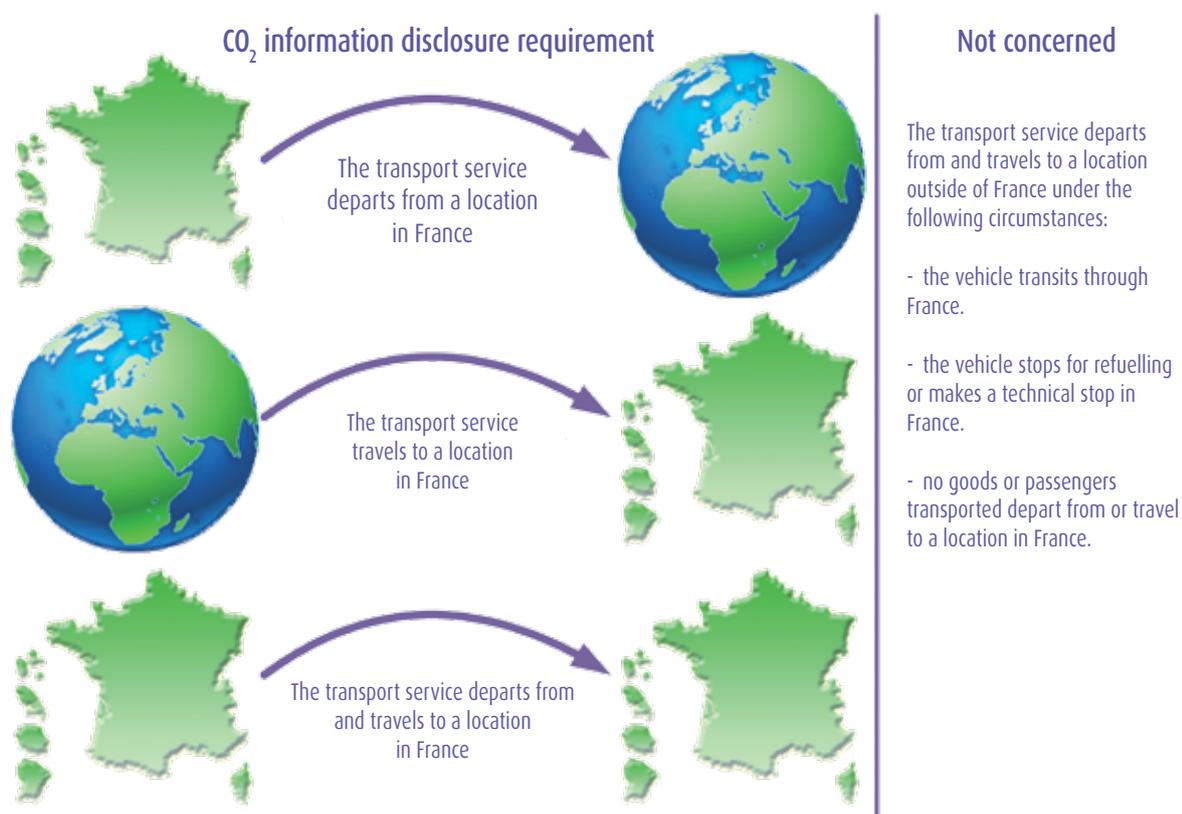
## 2.2.4. According to the origin or destination of the services provided

The services subject to CO<sub>2</sub> information disclosure requirements are all journeys that depart from or travel to a location in France<sup>8</sup>.

For example, for a service departing from France and travelling to a foreign country, the CO<sub>2</sub> information requirement relates to the journey made up to the final destination of the service and corresponds to the entire service.

This requirement does not apply to international journeys that do not stop in France or that simply stop for refuelling. **This however does apply to coasting trade transport operations carried out in France.**

**For the shipment of goods, the scope of the CO<sub>2</sub> information that must be provided often depends on the commercial terms drawn up in the shipping agreement. Therefore, the integration of a post-delivery journey on foreign soil will depend on the liability transfer conditions defined for the service drawn up between the service provider and its beneficiary.**



<sup>8</sup> The CO<sub>2</sub> transport regulation is compulsory in mainland France and in its overseas departments and territories.

## 2.3. How to draw up this information?

### 2.3.1. Presenting the method

French decree No. 2011-1336 describes the method to be used to calculate the CO<sub>2</sub> emissions generated by transport services.

This method contains four steps:

- breaking down the transport service into segments<sup>9</sup> (see article 4 of the decree);
- calculating the quantity of the energy source consumed for each segment (see articles 6 and 7 of the decree);
- converting the quantity of the energy source used into a quantity of carbon dioxide produced for each segment (see article 5 of the decree); this conversion takes place using the emission factors appended to the French order of 10 April 2012.
- adding together the quantities of carbon dioxide generated by the different segments.

### 2.3.2. The main calculation formulae

The four formulae below can be used to calculate the quantity of CO<sub>2</sub> emitted during a service, according to the different instructions provided:

- ☛ Example No. 1: the quantity of the energy source consumed is known and the means of transport only involves a single beneficiary.

All emissions are allocated to the beneficiary.

The calculation formula is as follows:

$$\text{CO}_2 \text{ Information} = \text{energy source consumption} \times \text{emission factor} - (\text{formula No. 1})$$

- ☛ Example No. 2: the quantity of the energy source consumed is known and the means of transport involves multiple beneficiaries.

The emissions generated must therefore be broken down and shared between the beneficiaries.

The calculation formula is as follows:

$$\text{CO}_2 \text{ Information} = \text{energy source consumption} \times [\text{number of units transported for the service} / \text{number of units in the means of transport}] \times \text{emission factor} - (\text{formula No. 2})$$

- ☛ Example No. 3: the quantity of the energy source consumed is not known for the specific service and the means of transport only involves a single beneficiary.

The quantity of the energy source consumed must be estimated by means of a mean consumption rate (often per kilometre) and the journey travelled (often the distance in kilometres).

The calculation formula is as follows:

$$\text{CO}_2 \text{ Information} = \text{energy source consumption rate} \times \text{distance} \times \text{emission factor} \\ (\text{formula No. 3})$$

- ☛ Example No. 4: the quantity of the energy source consumed is not known for the specific service and the means of transport involves multiple beneficiaries.

The quantity of the energy source consumed must be estimated on the one hand by means of a mean consumption rate and the journey travelled. Secondly, the emissions generated must be broken down and shared between the beneficiaries.

The calculation formula is as follows:

$$\text{CO}_2 \text{ Information} = \text{energy source consumption rate} \times \text{distance} \times \text{emission factor} \times [\text{number of units transported for the service} / \text{number of units in the means of transport}] - (\text{formula No. 4})$$

<sup>9</sup> "Segment": "any part of the route taken or to be taken by a transport service over which the person or goods is/are transported by the same means of transport" (extract from article 1 of the French decree No. 2011-1336 of 24 October 2011). For illustration purposes, in a combined rail-road transport service, three segments can be identified: two road segments for the pre- and post-journeys and one rail segment. However, the term 'means of transport' can also apply to the same mode of transport following the example of a parcel delivery company classically implementing three different segments on road-based modes of transport, however using different means: collection round, journey, distribution round.

### 2.3.3. Aggregate data and simplifying formula No. 4

Formula No. 4 shows three terms (highlighted in purple) which do not depend on each service, and which the service provider will therefore use for multiple services corresponding to the same means of transport, the same energy source and the same type of transport.

It is therefore easier to group these three terms together into a single "aggregate data item":

$$\text{Aggregate data} = \left[ \frac{\text{Energy source consumption rate}}{\text{number of units in the means of transport}} \right] \times \text{emission factor} - \text{(formula No. 5)}$$

The corresponding simplified calculation formula is as follows:

$$\text{CO}_2 \text{ Information} = \text{aggregate data} \times \text{number of units transported for the service} \times \text{distance} \text{ (formula No. 6)}$$

### 2.3.4. Calculating CO<sub>2</sub> information and data levels

Decree No. 2011-1336 provides for four levels of accuracy for the following two data items used in the calculation:

- the rate of consumption of the energy source used by the means of transport;
- the number of units transported by the means of transport.

A different level can be used for each of the two data items within the same calculation; this provides for the use of a more accurate level for one of the two data items where possible.

These levels are classed in ascending order of accuracy.

#### 2.3.4.1. Level 1 values

**Level 1 values are default values provided for each mode of transport per type of activity or means of transport.**

The French order of 10 April 2012 implementing articles 5, 6 and 8 of the French decree No. 2011-1336, and hereinafter referred to as "order of 10 April 2012", sets out the level 1 data values. These values shall be updated and further added to during the years to come.

When two different service providers assess the same service with the same level 1 values, the results are identical. This is only an approximation, as their relative efficiency levels in terms of consumption per kilometre and vehicle fill rate may be substantially different.

The level 1 values are drawn up from mean statistics or estimates and may, according to the fields of activity, hide significant differences between the different stakeholders. Given that the representative accuracy of these values can be perfected, higher level values should therefore be used where possible.

The use of level 1 values is permitted:

- for service providers with less than fifty employees;
- to assess subcontracted activities, where subcontractors do not supply the CO<sub>2</sub> information for the subcontracted services within the necessary deadlines, or where this information is clearly erroneous;
- for service providers using a new means of transport, for calculations specifically involving this new means of transport;
- for service providers with fifty or more employees until the 1<sup>st</sup> of July 2016.

It should be noted that the French decree No. 2011-1336 of 24 October 2011 stipulates that a report shall be drawn up before the 1<sup>st</sup> of January 2016. It shall relate to the application of the device in general, and in particular to the deadline of the 1<sup>st</sup> of July 2016 for service providers with fifty or more employees.

*The table below shows an extract of the tables of values provided by the order:*

Description (according to the nature of the vehicle and the type of transport service, indicating the energy source[s])	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 the energy source per kilometre)
Straight truck with a GVW of 12 tonnes - Miscellaneous goods - Road diesel fuel	1,80 tonnes	0,240 ℓ / km

**Example**

For a road transport service carrying miscellaneous goods weighing a total of 500 kg (i.e. 0,5 tonnes) over a distance of 150 km with a vehicle such as a "straight truck with a GVW of 12 tonnes" operating using diesel, the calculation with level 1 values is as follows (see formula No. 4 described in § 2.3.2):

$$\text{CO}_2 \text{ Information} = 0,240 \text{ ℓ / km} \times 150 \text{ km} \times 3,07 \text{ kg CO}_2 / \text{ℓ} \times (0,5 \text{ t} / 1,8 \text{ t}) = 30,7 \text{ kg CO}_2$$

Where:

- 0,240 ℓ / km is the level 1 value of the energy source consumption rate of the vehicle;
- 0,5 t corresponds to the goods transported;
- 1,8 t is the level 1 value of the number of units transported corresponding to the average tonnage carried by this type of vehicle, integrating unladen journeys;
- 3,07 kg CO<sub>2</sub> / ℓ constitutes the pumped road diesel emission factor (also provided by order).

### 2.3.4.2. Level 1 aggregate data

To simplify the calculation, the direct use of aggregate data combining the two level 1 values (the mean number of units transported and the rate of consumption per kilometre) and the corresponding emission values may be useful.

**Example**

For urban passenger transport in electric mode in a city of less than 250 000 inhabitants, the level 1 values and the emission factor used are:

- consumption rate: 2,60 kWh / km
- electricity emission factor: 0,053 kg CO<sub>2</sub> / kWh
- number of units transported: 20 passengers

The corresponding aggregate data is (see formula No. 5 described in § 2.3.3):

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

$$\text{Aggregate data} = [2,6 \text{ kWh} / \text{km} / 20 \text{ passengers}] \times 0,053 \text{ kg CO}_2 / \text{kWh}$$

$$\text{Aggregate data} = 6,89 \text{ g CO}_2 / \text{passenger.km}$$

### 2.3.4.3. Level 2 values

**Level 2 values correspond to average figures calculated by the service provider for all of its activities.**

The calculation principles are identical, however the values used are produced by the company using its own mean energy consumption figures and/or load or occupancy indicators. **These mean values correspond to all of its activities.**

**Example**

A road carrier owning 15 vehicles can determine a level 2 value, referring to the kilometre consumption rate (in litres per km) of its fleet, by dividing the sum of the fuel purchases made over a given period (for example over one year) by the total distance travelled (both with load and unladen) by all of its 15 vehicles during this period.

Therefore, for an annual consumption of 264 000 ℓ and a mileage in kilometres of 800 000 km for all 15 vehicles, the level 2 value of the energy source consumption rate is 0,330 ℓ / km.

The duration over which the level 2 values are calculated must not exceed three years and these mean values must be updated at the same rate.

When the service provider's activity has heterogeneous characteristics (varied fleet, varying operating conditions, services of different natures, etc.), the use of level 2 values is not appropriate and level 3 or 4 values must be privileged.

*Note: the service provider may draw up and use level 2 aggregate data on the model presented for level 1 aggregate data.*

#### 2.3.4.4. Level 3 values

**Level 3 values correspond to mean values calculated by the service provider based on a complete breakdown of its activity (per logistics organisation, type of route, customer, type of means of transport or any other appropriate complete breakdown).**

The use of such data requires the prior collection of more in-depth data and statistics on the energy consumed, the load or the occupation of the vehicles than for the previous method, as this involves analysing the transport operations according to a more detailed and functionally homogeneous breakdown.

##### **Example No. 1**

A road transport service provider owns 20 vehicles, 15 of which are heavy goods vehicles and 5 of which are lightweight commercial vehicles.

In order to take into account the very different characteristics of its vehicles, the service provider can calculate the different energy source consumption rates and mean numbers of units transported:

- for all of its 15 heavy goods vehicles;
- for all of its 5 lightweight commercial vehicles.

##### **Example No. 2**

Taking the example of a road-based parcel delivery service provider owning multiple collection/distribution agencies and an inter-agency carrier service, the implementation of level 3 values corresponds, for example, to the calculation of data specific to:

- each of its agencies, taking into account the means of transport used by each agency for collection and distribution activities;
- the inter-agency carrier activity for the means of transport used.

In each case, the service provider determines:

- a consumption rate per kilometre travelled by the means of transport;
- a mean number of units transported (which equals an average vehicle load rate per collection/distribution cycle and for the inter-agency carrier service).

Unlike for level 2 data, the company divides its activities into segments and produces data for each sub-segment: in the aforementioned examples, the segmentation system is based on the type of vehicles or the location and activity of the delivery company's agencies.

The duration over which the level 3 mean values are calculated must not exceed three years and these mean values must be updated at the same rate.

*Note 1: the service provider may draw up and use level 3 aggregate data on the model presented for level 1 aggregate data.*

#### 2.3.4.5. Level 4 values

**Level 4 values are calculated based on real data for the transport service.**

The use of level 4 values involves the collection of information on the real operating conditions of the service (energy consumption, load, occupancy, etc.) in order to produce CO<sub>2</sub> information based on measured data. This use is particularly relevant for the "number of units transported by the means of transport" when the vehicle's load is known and intended for multiple customers.

For the "energy source consumption rate", the use of a level 4 value may be considered, in particular when the measurement of the amount of energy consumed by the journey has already been taken in a systematic manner by the service provider.

**The level 4 cannot however be used for the data item on the "energy source consumption rate" if the CO<sub>2</sub> information is made available before the transport operation (ex-ante information).**

**The level 4 also requires the handling of empty journeys on a case by case basis (see § 2.3.7).**

#### Example

Taking the example of privately-owned waterway transport operators (river transport), for a given service:

- the operator can measure the **amount of fuel consumed** between its previous unloading point or its home port and its destination;
- it also identifies the number of units of the load transported for each customer, as defined in the shipping order.

It can also therefore calculate the CO<sub>2</sub> information for each customer using level 4 values.

Therefore, for the shipment of 150 sea freight containers of twenty-foot equivalent units (TEU) (50 for customer A and 100 for customer B) in a ship that consumed 4 000 litres of off-road diesel fuel from its departure point to its arrival point, its CO<sub>2</sub> information can be calculated as follows, using formula No. 2 (§ 2.3.2):

$$\text{CO}_2 \text{ Information (Customer A)} = 4\,000 \text{ l} \times (50/150) \times 3,07 \text{ kg CO}_2 / \text{l} = 4\,093 \text{ kg CO}_2$$

$$\text{CO}_2 \text{ Information (Customer B)} = 4\,000 \text{ l} \times (100/150) \times 3,07 \text{ kg CO}_2 / \text{l} = 8\,186 \text{ kg CO}_2$$

Where 3,07 kg CO<sub>2</sub> / l is the off-road diesel emission factor.

## 2.3.5. Assessing distance

When used to calculate CO<sub>2</sub> information, distance is important and this information must be collected or assessed in an appropriate manner.

The assessment must differentiate between the following:

1. the **distance travelled by the means of transport**, which is used to assess the amount of the energy source consumed by the means of transport when this is not measured;
2. the **distance in relation to the passengers or goods transported**, which is often required for previously calculating level 2, 3 or 4 values and for the final CO<sub>2</sub> information calculations; this distance can be different from the physical distance travelled, as described below.

### 2.3.5.1. Distance travelled by the means of transport

Distance can be **"collected"** using measurement instruments present in the means of transport (mileage counters, GPS tracking, etc.) and collated in a statistical manner in the operational follow-up reports for the service providers.

Distance can also be **"assessed"** (for example the supply of ex-ante or ex-post information without data collection activities, etc.) using distance calculators specific to the mode of transport used. Here are a few examples of free distance calculators:

- for maritime transport, the tool available at <http://www.portworld.com/map/> calculates distances between ports (IATA codes);
- for air transport, distance can be calculated using a tool such as [www.world-airport-codes.com](http://www.world-airport-codes.com), which calculates the orthodromic distance<sup>10</sup> between two airports. In compliance with the rule selected in the European Union Emissions Trading System for air-based activities, the distance between two airports must be calculated by adding 95 kilometres to the orthodromic distance;

<sup>10</sup> See glossary

- for the transport of goods or passengers by road, road itinerary distance calculators can be used (for example Mappy or ViaMichelin), ideally with the option taking into account any restrictions connected to heavy goods vehicles where applicable;
- for the shipment of goods, the EcoTransIT World tool integrates a distance calculator for all modes of transport (road, rail, air, sea and river);
- for river transport, the distance calculator of the Voies Navigable de France can be used: <http://www.vnf.fr/calculitinerairefluvial/app/Main.html>.

In the absence of any distance calculator for passenger rail transport, a road distance calculator can be used; the shortest route option must therefore be selected.

### 2.3.5.2. Distance in relation to the passengers or goods transported

The distance in relation to the passengers or goods transported is used in the following calculations:

- when determining a level 2, 3 or 4 value for the number of units transported (see 2.3.6);
- when calculating CO<sub>2</sub> information using formula No. 3, 4 or 6 (see §2.3.2).

For some activities, the distance travelled by the persons or goods transported is a stable, predictable parameter. For example, the passenger of a local bus line travels the line's distance between the two stops of his/her journey. In this example, the information in § 2.3.5.1 can be used to assess the distance travelled.

However, for other activities, the distance travelled by the passengers or goods transported depends on variable or even subjective factors. For example, in a parcel delivery round, the last customer delivered (therefore the end of the cycle) could have been the first if the round was organised to take place in the opposite direction. A fairer option would therefore be to measure the distance travelled in relation to each beneficiary in a manner that does not take into account the detours made by the means of transport or the order in which the different beneficiaries have been delivered. This therefore no longer relates to the distance physically travelled by these passengers or goods. According to this logic, two possibilities can be identified to characterise the distance between the points of departure and destination of the passengers or goods transported:

1. using the orthodromic distance travelled;
2. using the direct distance travelled (or the shortest possible distance travelled by the means of transport in question).

The service provider can choose to use either of these distances, however once this decision has been made, this choice must be applied in a systematic and coherent manner.

## 2.3.6. *Calculating the number of units transported by the means of transport*

For level 1 values, the mean number of units transported is represented by a value provided by the order of 10 April 2012, which integrates empty journeys, i.e. which represents the mean vehicle fill rate for all distances travelled, including empty journeys.

For levels 2, 3 and 4, the service provider must determine the number of units transported by the means of transport. It must always integrate empty journeys into the CO<sub>2</sub> information calculation, however is not required to do this using this number of units value: this can be calculated for example by differentiating between journeys with and without load (for each service, the distance with load and its associated distance without load must therefore be defined).

### 2.3.6.1. For the shipment of goods

The following paragraphs concern the production of a level 2 or 3 value.

The number of units transported can be calculated according to the following method:

1. the service provider chooses a period (quarter, year, etc.) that it deems as representative of its activity;
2. over this period, it considers:
  - ▶ either all of its vehicles and the services performed with these vehicles (level 2);
  - ▶ or the sub-groups derived from a comprehensive and appropriate breakdown of its activity (level 3).

3. it collects the following information over this period:
- ▶ per service:
    - distance in relation to the goods shipped (see § 2.3.5.2);
    - number of units transported.
  - ▶ per vehicle:
    - distance travelled with load;
    - distance travelled without load;
    - or simply the total distance travelled

4. the following two tables can thus be completed:

	Distance in relation to the goods shipped (in kilometres)	Number of units transported (in tonnes)	Corresponding tonne-kilometres (t.km)
Service 1	150 km	10 t	(150 x 10)
Service 2	120 km	6 t	(120 x 6)
Service 3	100 km	8 t	(100 x 8)
Service n	y km	z t	(y x z)
...	...	...	...
...	...	...	...
<b>Total</b>			$\Sigma (t \times km)$

	Distance travelled with load (in km)	Distance travelled without load (in km)	Total distance travelled (in km)
Vehicle 1	12 500 km	1 430 km	13 930 km
Vehicle 2	13 800 km	2 375 km	16 175 km
Vehicle 3	9 400 km	1 270 km	10 670 km
Vehicle n	y km		
...	...	...	...
...	...	...	...
<b>Total</b>	$\Sigma km$ with load	$\Sigma km$ without load	$\Sigma km$ in total

5. the number of units transported can therefore be calculated in the following manner:

$$\Sigma (t \times km) / \Sigma km \text{ in total} = \text{number of units transported per vehicle (including empty journeys)}$$

this is therefore a mean value weighted according to the criteria of the total distance travelled, which integrates empty journeys.

6. a value can also be calculated in relation to the journeys travelled with load:

$$\Sigma (t \times km) / \Sigma km \text{ with load} = \text{number of units transported per vehicle (excluding journeys without load)}$$

This is a mean value weighted according to the criteria of the distance travelled with load.

### 2.3.6.2. For the transport of passengers

The following paragraphs concern the production of a level 2 or 3 value.

The number of units transported by the means of transport is **the mean number of passengers transported, weighted according to the distance that they travelled**. The calculation principles are the same as those for goods. The service providers can use two types of sources:

- statistics connected to Departure - Destination tickets with reservations (available for certain main line trains for example) which can be used to determine the number of passengers and the distances travelled for each passenger;
- occupancy surveys or studies in the event that the journeys undertaken by their users are not known (for example public transport with a single-tariff system or passes).

### 2.3.7. Calculating the energy source consumption rate

When drawing up level 2 or 3 values, the service provider must calculate the energy source consumption rates for its means of transport. These calculations require the following data, collected over a reference period:

- the quantities of the energy source (fuel or electricity) consumed by the means of transport;
- the activity carried out by the means of transport; this is often assessed by the distance travelled, measured in kilometres; in some cases the service provider may prefer to use a different unit of measurement specific to the activity concerned (a flight between 2 airports, the sea link between 2 ports, the crossing).

The consumption rate is obtained by dividing the quantities of the energy source consumed by the activity carried out by the means of transport.

For illustration purposes, dividing the total amount of fuel consumed by the service provider by the the total distance travelled in kilometres by its means of transport, produces a level 2 energy source consumption rate.

It should be noted that the energy source consumption rates must be based on elements that can be measured by the service provider. All fuel consumptions or purchases and the distances travelled are subject to specific monitoring procedures, which can be used as a basis for this calculation.

Conversely, the theoretical consumption rate of a given vehicle (rate provided by the vehicle manufacturer) is not a level 2 or 3 data item.

### 2.3.8. Taking into consideration empty journeys

#### Definition of an empty journey

The CO<sub>2</sub> information calculation must take into account both laden and empty journeys (outward journeys or relocation journeys) carried out by the means of transport (all modes combined).

Below are a few examples of empty journeys:

- relocation journey of a bus or coach from the depot to its first stop;
- journey performed by an unladen heavy goods vehicle, river barge or ship between a delivery point and the next loading point (outward journey or relocation journey);
- deadhead rail journeys.

This therefore covers all situational journeys during transport operations.

Conversely, **journeys relating to vehicle maintenance (washes, repairs, etc.), sorting operations at railway platforms and journeys performed for purposes other than the professional activity conducted (for example the use of a taxi outside of business hours) are not taken into account.**

#### Empty journeys and the number of units transported

**In the level 1 values provided by order, empty journeys or relocation journeys are taken into account in the "number of units transported" data item.** This value does not correspond to the mean number of units transported during journeys with load; it also takes into account journeys without load. The proportion of empty journeys varies according to the profession.

For level 2 or 3 values, the service provider can choose:

- to either integrate empty journeys into the "number of units transported" data item and calculate the emissions generated while only taking into account the distance travelled for the service;
- or not to integrate empty journeys into the "number of units transported" data item and calculate the emissions generated while taking into account the distance travelled for the service, increased by the distance travelled without load.

When producing level 2 or 3 data, journeys without load can be expressed in the form of a percentage of journeys with load or of all journeys, calculated on the basis of statistics for the service provider's activity.

When an empty journey can be allocated to a specific service, this journey can be measured and this distance used for the calculation. Such is the case of calculations using level 4 values based on real data for the service.

### Allocating an empty journey to a given service

Neither the French decree of 24 October 2011 or the order of 10 April 2012 set out the rules to be applied with regard to the terms and conditions for allocating the quantity of CO<sub>2</sub> emitted during empty journeys to specific beneficiaries.

As previously stated, empty journeys can be integrated into the mean value calculated for the number of units transported. These are therefore uniformly allocated to the different beneficiaries.

Empty journeys can also be allocated to specific services.

For example, for the shipment of goods by river, the work meetings held by the OEEET (French Observatory for Energy, the Environment and Transport) showed consensus on the notion that outward unladen journeys (journey from an unloading point to the loading point of a new transport operation) shall be allocated to the customer whose goods shall be loaded.

It should be noted that the European standard EN16258 does not propose any rules on this point, but provides two examples:

- in the simple example of an "outward journey without load, return journey with load" (or vice-versa), the journey without load is allocated to the journey with load;
- in the more complex example of a succession of collection and unloading points (rounds) including empty journeys, these empty journeys are shared between all of the services performed during the round.

These allocation methods are only references and other methods may be applied according to the transport operations and varying contexts. This said, regardless of their allocation, empty journeys must be taken into account for the correct application of the device.

## 2.4. Subcontracted services

Subcontracting covers a wide range of cases and information provided by the subcontractor can be integrated in several different ways.

When a service provider resorts to subcontracting a service in a one-off manner, the information can be processed on a case by case basis. The information provided to the customer for the full service can be determined by adding together:

- the emissions calculated for the portion directly carried out by the service provider;
- and the information transmitted by the subcontractor for the operations that it has performed.

This however can in practice be rather difficult when, for example, the information from the subcontractor is transmitted within a timeframe that is not compatible with the deadline requested by the customer for receiving its own CO<sub>2</sub> information.

For the shipment of goods, this method is also unsuitable when the service provider uses many different subcontractors. A means must therefore be found to integrate subcontracting in a more general manner into the calculation method used by the service provider.

Until the 1<sup>st</sup> of July 2016, the service provider can use level 1 values for all of its services (subcontracted and non-subcontracted services), regardless of its size.

Another possibility consists in producing a mean value, for example for all of the services subcontracted over the previous year, on a mode by mode basis (road, sea, rail, air and river transport operations). The service provider must therefore use the CO<sub>2</sub> information provided by its subcontractors. It must estimate the quantities of goods and the distances involved in these operations. In the event that the subcontractor has not provided its CO<sub>2</sub> information (for example for a portion of the service executed outside of France) or in the event that the CO<sub>2</sub> information is clearly erroneous, the

service provider can use level 1 values to determine the values of the corresponding operations (without any limit in time). The collation of all of this data enables the service provider to calculate the following, for example for all services subcontracted during the previous year and for each mode:

- the total quantity of CO<sub>2</sub> emitted;
- its corresponding tonne-kilometres.

By dividing this quantity of CO<sub>2</sub> by these tonne-kilometres, the service provider produces an aggregate data item in g CO<sub>2</sub>/t.km.

It can then use this aggregate data item, determined for the services performed during the previous year, to calculate the CO<sub>2</sub> information of its services performed or to be performed during the year underway.

The possibility described hereinabove is not the only solution. A model can also be developed for the CO<sub>2</sub> emissions generated by subcontracted activities<sup>11</sup>. In order to achieve this, the service provider could use in-depth information obtained from its subcontractors to help choose the decisive criteria and configure the model's parameters. One condition that must be complied with is that the model must take into account all emissions generated by the activity<sup>12</sup>. The service provider must therefore assess its overall emissions and take into account the emissions generated by its own vehicles and by those of its subcontractors, either by collecting the information transmitted when available and correct, or when this is not the case, by reproducing this information using level 1 values. The service provider must then compare its overall emissions thus calculated with the total emissions obtained via the model during the reference period used. In the event of discrepancies, the service provider must adjust the model's parameters so that the two results are identical.

## 2.5. Reference data to be used

As previously explained, the CO<sub>2</sub> information framework for transport services provides the following reference data to be used in the calculations:

- the energy source emission factors;
- the level 1 values relating to the energy source consumption rates of the means of transport and the number of units transported in the means of transport.

Each service must use up-to-date reference data: the first versions of this data are provided in the order of 10 April 2012 and repeated in this application guide. However, this data shall evolve over time. The order shall therefore be modified as a consequence of these data changes. The most recently published data should therefore be used.

This data has already been integrated and made available free of charge by ADEME on the Base Carbone website (<http://www.basecarbone.fr/>), which also contains all emission factors that can be used by companies and local authorities for producing emission reports within the scope of article 75 of the Grenelle II law.

**N.B.:** with regard to the energy source emission factors, the "In-depth data" sheet must be read to find the value corresponding to CO<sub>2</sub> gas emissions alone, and not to all greenhouse gas emissions.

The level 1 values for air transport are not appended to the order of 10 April 2012. These are integrated into the CO<sub>2</sub> aviation emissions calculator uploaded by the DGAC (French General Directorate for Civil Aviation)<sup>13</sup>, which can be found at the following address: <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/>.

The DGAC shall update this calculator annually during the 4<sup>th</sup> quarter of each year.

<sup>11</sup> Within the scope of level 3 methodologies, modelling is one possibility for breaking down activities.

<sup>12</sup> The definition of level 3 values provided in article 8-1 of the French decree No. 2011-1336 clearly states that any breakdown must be comprehensive.

<sup>13</sup> Direction Générale de l'Aviation Civile - French Civil Aviation Authority.

## 2.6. How to issue this information

### 2.6.1. What information must be shown?

The service provider must provide the beneficiary with the quantity of carbon dioxide emitted for all upstream and operating phases.

This information must be given in kilograms (kg), grams (g) or tonnes (t) of CO<sub>2</sub>. The unit chosen must appear on the document issued or made available to the beneficiary. The value given by the service provider must correspond to the service performed. This is therefore an absolute result.

The information must be given at least for each service. One service may correspond to several shipping orders (goods) or journeys (passengers) if, for example, they are carried out within the scope of the same contract (regardless of the contract term). The service provider can, if so desired, provide more in-depth information (per shipping order or per journey), however this is not compulsory.

### 2.6.2. When must this information be issued?

The time at which the service provider must provide this information to the beneficiary differs according to the case:

- for the shipment of goods, this time may be subject to an agreement between the two parties (the service provider and the beneficiary). Such an agreement may, for example, stipulate that the information shall be given in the quote ("ex-ante" information), or on the other hand after the execution of the service ("ex-post" information). In the absence of any agreement between the parties, the decree stipulates that this information must be provided within two months from the completed execution of the service;
- for passenger transport services, information must be provided "prior to the purchase of the ticket, and if no ticket is issued, at the completed execution of the service at the latest".
- for passenger transport services not comprising identified points of departure or destination, subject to a pass or if no ticket is issued, the information can be disclosed "by means of a sign displayed on-board the means of transport or in train stations".

### 2.6.3. How must this information be issued?

The possible methods available for communicating this information are numerous; they must be adapted to suit the nature of the profession (transport of passengers or goods) and the relationship with the customer (notion of a user or individual customers for passenger transport, notion of professional customers or shippers).

The information disclosure requirement can be complied with by means of any document issued or made available to the beneficiary on real or dematerialised media: this can involve a quote (ex-ante communication), an invoice or any other specific document.

The transmission of information by email, SMS or even in some cases verbally<sup>14</sup> is therefore possible. Furthermore, the possibility made available to the beneficiary of accessing information corresponding to its services, via an electronic link providing access to a computer software item<sup>15</sup>, also constitutes a valid communication means. In this case, the service provider is responsible for transmitting the link to the beneficiary upon each service, with this link providing the beneficiary with access to customised information. This last possibility shall be more particularly used for service providers with a very large number of beneficiaries and services.

Conversely, forwarding the beneficiary to a simple calculation engine is not sufficient to comply with the information disclosure obligation.

<sup>14</sup> Verbal transmission is however not recommended, as it is difficult to determine whether the information has been correctly transmitted and understood, however this can be considered during an initial phase.

<sup>15</sup> For example via the internet.

## 2.6.4. Further information

Optionally, the values corresponding to the emissions generated during the upstream phase and those generated during the operating phase can be provided to complement this information. This additional information may prove useful, for example in air transport where information on the emissions generated during the operating phase is already widely used.

Information can be accompanied by appended documentation containing a **declaration of the methods and values used**:

- this document does not have to be systematically provided to the beneficiary, however must be provided upon request or be freely accessible, for example via a website. Only the information on the calculation method and energy sources used must be provided to the beneficiary if so requested;
- if this information is not automatically made available, the beneficiary desiring this information must send a request to the service provider within one month from the date of receipt of the CO<sub>2</sub> information. The latter must send the information requested to the beneficiary within two months from the date of receipt of such a request;
- this document can be issued in an immaterial format;
- in preparation for such a request, it is recommended that the service provider draws up a methodological document valid for all services and updated according to any modifications made to the method;
- the document may in particular describe:
  - a. the level of data used for the portions of the service carried out by its own fleet;
  - b. the method used for the portions of the service carried out by subcontracted service providers;
  - c. the potential segmentation of activities for assessing the values of its own fleet and the assessment method used (for example: sampling over a given period of time);
  - d. the energy sources used, emission factors and data sources used;
  - e. the methods used to calculate distances and the principles applied for integrating empty journeys.

With regard to this declaration of the methods and values used, the beneficiary can apply the principles of a "transparent description of the method" stipulated in the **European standard EN16258**.

## 2.7. Who is targeted by this information?

### 2.7.1. Don't confuse beneficiary and recipient

The decree specifies the notion of a CO<sub>2</sub> information beneficiary. This refers to:

- the person purchasing the ticket for the transport of passengers, or, should no ticket exist, the passenger (for example free transport);
- the co-contractor of the service provider (carrier-shipper for goods or any other intermediary service provider) for the shipment of goods.

### 2.7.2. The principle of intermediary liability

This information must be disclosed **to the direct beneficiary of the service**. If the latter is also the service provider operating on behalf of another beneficiary (e.g.: travel agency, local authority, transport operator, etc.), the latter must comply with the information disclosure requirement with regard to the end recipient of the service (user, tourist, shipper, etc.).

Following the example of school transport services provided by transport operators on behalf of a general council: these are required to provide CO<sub>2</sub> information to the local authority, which is the direct beneficiary.

The local authority is then required to implement a CO<sub>2</sub> information communication system for the services carried out on behalf of the end beneficiary (the pupils' parents).

## 2.8. How to read CO<sub>2</sub> information

The beneficiary of CO<sub>2</sub> information, above all when this is a professional (for example a shipper or transport operator for the shipment of goods) shall receive large amounts of information from different service providers. Studying the information received requires certain precautions to be taken during analysis.

The CO<sub>2</sub> information received from a service provider is expressed in grams, kilograms or tonnes of CO<sub>2</sub> (absolute value).

If the beneficiary would prefer a relative value, it can divide this result by the quantity of units transported (according to each case, it can choose between: number of passengers, number of passenger-kilometres, number of tonnes, number of tonne-kilometres, etc.).

If the beneficiary is looking to compare data from multiple service providers, it must pay close attention to the following points:

- studying the different information calculation conditions taking into account the data levels used by each service provider. In this regard, the production of annexes or documents by the service providers explaining the value levels used may enable the beneficiary to better understand the figures presented;
- comparing two different pieces of CO<sub>2</sub> information originating from two different service providers (benchmarking) must be performed with care, as the value levels used may complicate or even prevent comparison in some cases. The result also depends on the allocation method chosen by the service provider when breaking down and distributing its CO<sub>2</sub> emissions between its different service providers;
- furthermore, comparing two pieces of CO<sub>2</sub> information, calculated using the same value levels, must also be performed with care, as it may hide real circumstances occurring during performance of the services (roads with hills, difficult access and deviations, etc.), which may penalise some situations. This is why studying the additional information provided by the service provider is important when analysing the information (for example the method used for assessing distances).

Finally, when assessing a sustainable development approach undertaken by its service provider, a higher or lower CO<sub>2</sub> information value must not constitute the sole analysis criteria. The qualitative assessment of other actions undertaken by the service provider in this respect may prove useful (existence of a greenhouse gas reporting process, subscription to good practice charters, environmental improvement programme, certification approach, etc.).

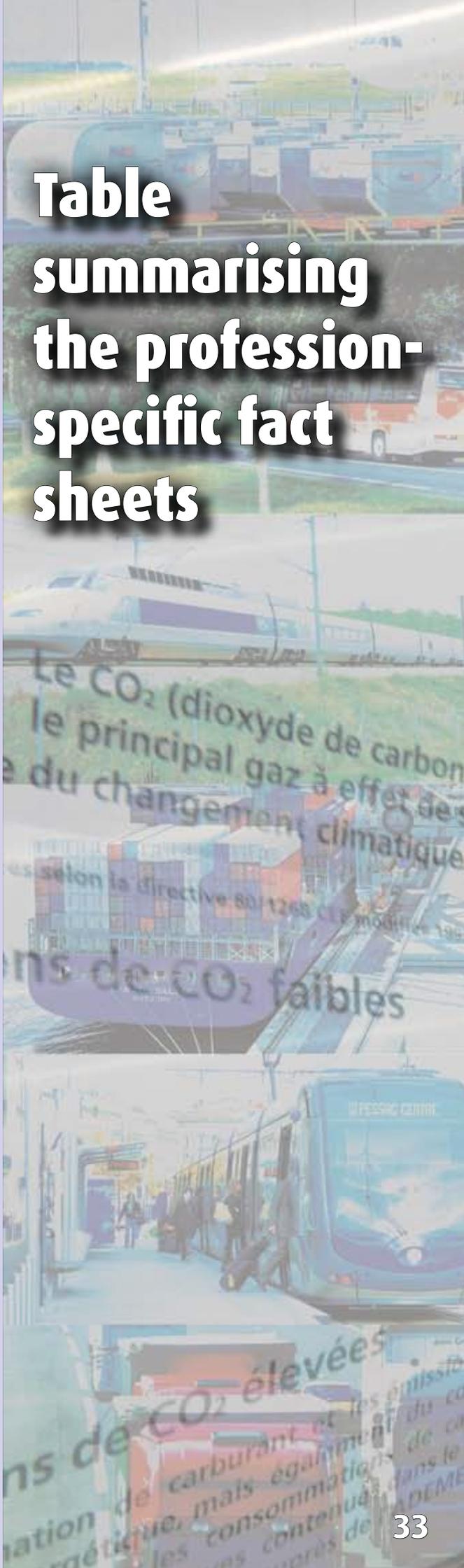
## 2.9. How to have CO<sub>2</sub> information verified

Article 10 of the decree provides for the possibility of certifying the compliance of the method implemented by an accredited body. An order of the Minister of Transport will specify the procedure for the enforcement of this article. The publication date for this order was not known at the time of writing this guide (likely to take place in 2013).



# Chapter 3

# Table summarising the profession- specific fact sheets



The table below presents all 34 profession-specific fact sheets detailed in chapters 4 and 5, with their main characteristics.

The 19 freight sheets (chapter 4) and 15 passenger transport sheets (chapter 5) provide varying calculation methods for each profession, in particular using concrete examples.

**Important: The fact sheets incorporate statistics currently available for the level 1 values in addition to energy source emission factors.**

Table 2: summary of the different methods and units used

Information	Levels	Reference	Special features
1 - Freight by air - combined and cargo	1 and 3	Tonne	Combined passenger and freight; passenger/weight conversion Calculator specific to aviation Using the number of flights to replace the distance
2 - Freight by rail	1, 2, 3 and 4	Tonne	Taking into account the density of the goods Combined use of level 2, 3 and 4 values in the same method
3 - Freight by river - full load consignments	1 and 4	Tonne	Full load consignment Identifying an unladen journey
4 - Freight by river - partial load consignments	1 and 3	Tonne or m <sup>3</sup>	Partial load consignment
5 - Freight by river - containers	1 and 3	Tonne or TEU	
6 - Freight by sea - container ship	1 and 3	Tonne or TEU	Using two energy sources
7 - Freight by sea - motorway of the sea service	1 and 2	Tonne	Using an objective value Using the number of journeys to replace the distance
8 - Freight by sea - bulk freight	1 and 3	Tonne	
9 - Combined sea transport - to and from islands	1 and 3	Tonne	Combined passengers and freight
10 - Freight by road - full load consignments	1	Tonne	Full load consignment Identifying an unladen journey
11 - Freight by road - partial load consignments	1 and 3	Tonne	Partial load consignment
12 - Freight by road - parcel delivery	1 and 3	Tonne	Multiple legs Using orthodromic distances
13 - Freight by road - temperature-controlled parcel delivery service	1	Tonne	Multiple legs Using orthodromic distances
14 - Freight by road - courier services	1 and 2	Tonne or parcel	
15 - Multi-modal freight - freight forwarders	1	Tonne	Reusing the subcontractor's information to draw up mean values Producing a model



Table 2 continued: summary of the different methods and units used

Information	Levels	Reference	Special features
16 - Multi-modal freight - express	1	Tonne	Multiple legs Multi-modal transport by road and by air
17 - Multi-modal freight - unaccompanied combined rail-road freight	1 and 3	Tonne	Multi-modal service legs
18 - Multi-modal freight - rolling highway	1	Tonne	Using an objective value
19 - Multi-modal freight - home moving	1 and 2	m <sup>3</sup>	
20 - Transport of passengers by air	1 and 3	Passenger	
21 - Transport of passengers by rail	1 and 3	Passenger	Services with connecting lines
22 - Transport of passengers by river - cruises	1 and 3	Passenger	
23 - Combined sea transport	1 and 3	Passenger, vehicle, tonne	Managing passenger/vehicle decks (Ropax)
24 - Transport of passengers by sea - to and from islands	1 and 3	Passenger, tonne	
25 - Private transport of passengers - taxi drivers	1 and 2	Courier	
26 - Private transport of passengers - taxi companies	1 and 2	Courier	
27 - Private transport of passengers - commercial chauffeur-driven car hire (VTC)	1 and 2	Courier	
28 - Private transport of passengers - private chauffeur-driven car hire	1 and 2	Courier	
29 - Private transport of passengers by two or three-wheeled motor vehicles	1 and 2	Courier	Combined use of level 1 and 2 values in the same method
30 - Public transport of passengers - combustion engine-powered	1.2 and 3	Passenger	Using a specific method
31 - Public transport of passengers - school transport services	1 and 2	Passenger	Using a specific method
32 - Public transport of passengers - electricity-powered	1 and 2	Passenger	Using a specific method
33 - Public transport of passengers - cable cars	1 and 2	Passenger	
34 - Travel agent and tour operator activities	1	Passenger	Reusing the values provided by the transport operator



# Chapter 4

# Application to the freight

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## 4.1. Freight by air

### 4.1.1. Reference data

#### 4.1.1.1. The energy source emission factors used

The energy source emission factors required for air transport, provided by annex I of the French order of 10 April 2012, have been copied into the table below. The values are updated in the CO<sub>2</sub> aviation emissions calculator available at the following address: <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/decret.php>.

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 <sub>2</sub> per unit of measurement for the quantity of energy source)		
			Upstream phase	Operating phase	Total
Aviation fuel	Wide-cut jet fuel (jet B)	Litre (l)	0,488	2,480	2,968
	Aviation fuel (AvGas)	Litre (l)	0,488	2,480	2,968
	Kerosene (Jet A1 or Jet A)	Litre (l)	0,480	2,520	3,000

Table 3: fuel emission factors - freight by air

#### 4.1.1.2. Level 1 values and level 1 aggregate data

The French Civil Aviation Authority (DGAC) provides a CO<sub>2</sub> aviation emissions calculator, which is available at the following address: <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>. Fact sheet No.s 1 and 20 describe how to use this calculator for air transport.

This calculator differentiates between three types of level 1 values:

1. values for combi aircraft (passengers and goods) and links between two airports known by the calculator. The calculator thus contains values for approximately 1 000 links; these values do not appear in an explicit manner;
2. values for combi aircraft (passengers and goods) and links between two airports not known by the calculator (very few in number). These values are provided by the calculator in the form of a consumption rate (litres per 100 km) for the aircraft and a mean number of passengers per flight. The flight distance (in km) and type of aircraft (capacity in number of seats) must be previously entered into the calculator.

Table 4 hereinafter provides the corresponding values in the form of an aggregate data item (consumption of kerosene in litres per kilometre and per passenger).

In order to produce "goods" values, the conversion rule must be applied as set out by the order of 10 April 2012: the value of the standard weight for one passenger is 100 kg.

Table 5 provides the corresponding aggregate data (in g CO<sub>2</sub>/ t.km);

Consumption of kerosene in litres per kilometre per passenger, broken down into distance slices and aircraft category (capacity in number of seats)					
Distance (km)	0 to 50 seats	50 to 100 seats	100 to 180 seats	180 to 250 seats	More than 250 seats
0 - 1 000	0,1225	0,08125	0,05625	0,0525	
1 000 - 2 000	0,163	0,05625	0,04625	0,03875	
2 000 - 3 000	0,215	0,038	0,0425	0,038	
3 000 - 4 000			0,04125	0,04125	0,045
4 000 - 5 000			0,0525	0,055	0,04625
5 000 - 6 000			0,05125	0,04125	0,04
6 000 - 7 000				0,04	0,038
7 000 - 8 000				0,03625	0,038
8 000 - 9 000				0,04	0,041
9 000 - 10 000				0,03875	0,040
10 000 - 11 000					0,039
More than 11 000 km					0,040

Table 4: data for air transport in a combi plane - links not known by the calculator

Source: CO<sub>2</sub> aviation emissions calculator, known values in September 2012

CO <sub>2</sub> emission rate in g per tonne-kilometre, broken down into distance slices and aircraft category (capacity in number of seats)					
Distance (km)	0 to 50 seats	50 to 100 seats	100 to 180 seats	180 to 250 seats	More than 250 seats
0 - 1 000	3,675	2,438	1,688	1,575	
1 000 - 2 000	4,890	1,688	1,388	1,163	
2 000 - 3 000	6,450	1,140	1,275	1,140	
3 000 - 4 000			1,238	1,238	1,350
4 000 - 5 000			1,575	1,650	1,388
5 000 - 6 000			1,538	1,238	1,200
6 000 - 7 000				1,200	1,140
7 000 - 8 000				1,088	1,140
8 000 - 9 000				1,200	1,230
9 000 - 10 000				1,163	1,200
10 000 - 11 000					1,170
More than 11 000 km					1,200

Table 5: level 1 aggregate data - freight by air in a combi plane - links not known by the calculator -

Source: CO<sub>2</sub> aviation emissions calculator, known values in September 2012

3. the values for cargo-only planes (no passengers). Table 6 hereinbelow presents data in an aggregate form in litres of kerosene per 100 km per tonne transported for 3 types of aircraft defined according to their Maximum Take-Off Weight (MTOW) and according to the distance travelled. Table 7 presents this data in the form of level 1 aggregate data (in g CO<sub>2</sub>/ t.km).

Consumption of kerosene in litres per 100 kilometres per tonne according to the Maximum Take-Off Weight (MTOW)			
Distance	MTOW < 100 tonnes	MTOW from 100 to 250 tonnes	MTOW > 250 tonnes
0 to 1 000 km	105,7	71,9	
1 000 to 4 000 km	89,9	57,5	
4 000 to 7 000 km			22,4
More than 7 000 km			22,3

Table 6: mean consumption values for a cargo plane

Source: CO<sub>2</sub> aviation emissions calculator, known values in September 2012

CO <sub>2</sub> emission rate in grams per tonne-kilometre according to the Maximum Take-Off Weight (MTOW)			
Distance	MTOW < 100 tonnes	MTOW from 100 to 250 tonnes	MTOW > 250 tonnes
0 to 1 000 km	3,171	2,157	
1 000 to 4 000 km	2,697	1,725	
4 000 to 7 000 km			672
More than 7 000 km			669

Table 7: level 1 aggregate data - freight by air in a cargo plane

Source: CO<sub>2</sub> aviation emissions calculator, known values in September 2012

**N.B.:** The values used by the calculator shall be updated annually (in the 4<sup>th</sup> quarter of each year). The calculator must therefore be re-used to obtain up-to-date level 1 values.



## Fact sheet No. 1

# Freight by air - combined and cargo

### 1.1. Activities concerned

This sheet involves airlines or structures organising or selling freight services using combi aircraft, i.e. incorporating both passenger and transport services, or by cargo plane, i.e. an aeroplane dedicated to freight.

The services subject to this information framework include all journeys departing from or travelling to a location in France. This information disclosure requirement is not compulsory for aircraft travelling between two airports located outside of France. See § 2.2.4 for more information.

### 1.2. The calculation methods presented in this sheet

This fact sheet presents several different calculation methods:

- the 1<sup>st</sup> uses level 1 values for services performed by a combi aircraft;
- the 2<sup>nd</sup> uses level 1 values for services performed by a cargo plane;
- the 3<sup>rd</sup> uses level 3 values for services performed by a combi aircraft.

Distances are assessed with the same rules as those in effect within the scope of the European Union Emissions Trading System (EU ETS) as per the provisions of articles L. 229-5 to L. 229-19 and R. 229-37 of the French environmental code. To draw up level 2, 3 or 4 values, fuel consumption can also be calculated according to the rules in effect for the European Union Emissions Trading System.

### 1.3. Calculation method using level 1 values for services performed by a combi aircraft

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The CO<sub>2</sub> aviation emissions calculator provided by the DGAC can be used to estimate the quantity of CO<sub>2</sub> emitted during a flight: (<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>).

**1<sup>st</sup> possibility: the link between the departure airport and arrival airport is known by the calculator.**

Using the information entered regarding the departure and arrival airports, the "Home" tab directly provides the quantity of CO<sub>2</sub> emitted per passenger. The service provider converts this value using the following rule: "the standard weight of one passenger is 100 kg". The service provider thus obtains an aggregate level 1 data item expressed in tonnes of CO<sub>2</sub> per tonne of goods and per flight.

It therefore applies formula No. 6 (in which distance is expressed in number of flights, and generally equals 1 flight for a given goods item):

$$\text{CO}_2 \text{ information} = \text{aggregate data} \times \text{weight (service)} \times \text{number of flights}$$

#### Example

Freight weighing 2,5 tonnes is shipped between Paris-CDG and Tokyo-Narita by an Airbus A340.

The calculator provides the quantity of CO<sub>2</sub> emitted for 1 passenger per flight: 1,071 tonne of CO<sub>2</sub> (898 kg of which are generated during the "operating phase" and 173 kg of which during the "upstream" phase).

This value is converted into 10,71 tonnes of CO<sub>2</sub> per tonne of goods.

The application of formula No. 6 gives:

$$\text{CO}_2 \text{ information} = 10,71 \text{ t CO}_2 / \text{t} / \text{flight} \times 2,5 \text{ t} \times 1 \text{ flight} = 26,8 \text{ t CO}_2$$



## Fact sheet No. 1

### 2<sup>nd</sup> possibility: the link between the two airports is not known by the calculator

The calculation must be broken down in the following manner:

- identifying the distance of the flight in km (the distance between two airports can be estimated using websites such as [www.world-airport-codes.com](http://www.world-airport-codes.com));
- identifying the capacity of the aircraft concerned in number of passenger seats. This information can be assessed according to the type of aircraft concerned;
- the "Decree of 24/10/2011" tab contains a calculation tool which, based on the two aforementioned pieces of information, provides the quantity of kerosene consumed per passenger per 100 km and the mean number of passengers transported;
- using the conversion rule where the standard weight of one passenger is 100 kg, to deduce the number of units in the means of transport, expressed in tonnes;
- using the kerosene emission factor: 3,00 kg CO<sub>2</sub> per litre;
- applying formula No. 4:

$$\text{CO}_2 \text{ Information} = \text{Energy source consumption rate} \times \text{distance} \times \text{emission factor} \times \left[ \frac{\text{number of units transported for the service}}{\text{number of units in the means of transport}} \right]$$

### Example

For freight weighing 2,5 tonnes shipped between Paris-CDG and Yaoundé - NSI (Cameroon) by an Airbus A330:

- ▶ the distance calculated between the airports is 5 014 km;
- ▶ the A330 has a number of seats greater than 250;
- ▶ the calculator estimates the flight's consumption to equal 1 465 litres of kerosene per 100 km and provides the mean number of 361 passengers per flight;
- ▶ this number of passengers is converted into tonnes:  $361 \text{ passengers} / [0,1 \text{ t} / \text{passenger}] = 36,1 \text{ t}$ ;
- ▶ the application of the formula therefore gives:  
 $\text{CO}_2 \text{ information} = (1\,465 \text{ l} / 100 \text{ km}) \times 5\,014 \text{ km} \times 3,00 \text{ kg CO}_2 / \text{l} \times [2,5 / 36,1] = 15,3 \text{ t CO}_2$

## 1.4. Calculation method using level 1 values for services performed by a combi aircraft

To obtain the level 1 values, the following must be determined:

- ▶ the flight distance (the distance between two airports can be estimated using websites such as [www.world-airport-codes.com](http://www.world-airport-codes.com));
- ▶ the maximum take-off weight (MTOW) of the aircraft.

Then table 7 ("level 1 aggregate data - freight by air in a cargo aeroplane") provides the CO<sub>2</sub> emission rate to be applied.

The calculation formula to be used is formula No. 6:

$$\text{CO}_2 \text{ Information} = \text{aggregate data} \times \text{number of units transported for the service} \times \text{distance}$$

### Example

Example of a transport service for a 2,5 tonne consignment between Paris-CDG and Tripoli (Libya) in a Boeing 767F (one-way):

- ▶ the distance calculated between the airports is 2 018 km;
- ▶ the B767F has a Maximum Take-Off Weight (MTOW) of 150 tonnes;
- ▶ table 7 provides the value of 1 725 g CO<sub>2</sub> / t.km;
- ▶ the application of the formula gives:  
 $\text{CO}_2 \text{ information} = 1\,725 \text{ g CO}_2 / \text{t.km} \times 2,5 \text{ t} \times 2\,018 \text{ km} = 8,70 \text{ t CO}_2$

## Fact sheet No. 1

### 1.5. Calculation method using level 3 values for services performed by a combi aircraft

The principle for implementing a level 3 method is as follows:

- identifying the types of activities for which mean values must be used: short/medium/long-distance journeys - Cover per geographical zone - Types of rotation (shuttles, regular lines, charters, etc.);
- for each scope of analysis, information is measured and collected using real journeys so as to gather the following data:
  - ▶ the quantity of fuel consumed on flights;
  - ▶ the number of flights performed;
  - ▶ the number of passengers transported;
  - ▶ the quantity of freight shipped.
- the quantity of fuel consumed can be collected in a general manner and divided by the number of flights performed. This is referred to as production information and is theoretically recorded. The mean consumption rate per kilometre is thus calculated for the category considered;
- the number of passengers and the quantity of freight transported must be collected per flight. The mean number of load units (in kg or in tonnes) can thus be determined for each flight. The conversion rule: "the standard weight of one passenger is 100 kg" must be used.



#### Example

An airline is looking to calculate the CO<sub>2</sub> information for its freight shipping services using level 3 values.

1. To achieve this, its transport activity has been previously segmented according to each section of the journey (departure airport → arrival airport).
2. The following data is collected per section for the journeys travelled during the previous year:
  - ▶ the quantity of fuel consumed (aeroplanes are equipped to perform this type of monitoring operation<sup>1</sup>);
  - ▶ the number of flights performed;
  - ▶ the number of units transported for each flight.

It was therefore able to calculate the following level 3 values for each section:

- ▶ the consumption rate per flight;
  - ▶ the number of units transported.
3. For example, for the section from Paris CDG → Zaragoza ZAZ, it collected the following data:
    - ▶ consumption of 727 200 ℓ of kerosene;
    - ▶ 45 flights performed;
    - ▶ 810 tonnes transported (passengers included, converted into tonnes using the standard weight of 100 kg per passenger).

It therefore determined the following level 3 values for this section from Paris CDG → Zaragoza ZAZ:

- ▶ consumption rate: 16 160 ℓ / flight;
  - ▶ number of units transported: 18 t.
4. Application to a transport service shipping 3 tonnes of freight from Paris CDG to Bahrain (BAH) in a cargo plane  
The flight plan indicates that the service comprises two air legs, broken down as follows:
    - ▶ leg No. 1: Paris CDG → Zaragoza ZAZ on a plane owned by the airline;
    - ▶ leg No. 2: Zaragoza ZAZ → Bahrain BAH on a plane owned by another subcontracted airline;

#### Calculations for leg No. 1:

- ▶ the airline re-uses the level 3 values for the section from Paris CDG → Zaragoza ZAZ presented above;
- ▶ it uses formula No. 4 (in which distance in this case is the number of flights):

<sup>1</sup> Furthermore, the collection and collation of fuel consumption data from aircraft, is already subject to regulations within the scope of the EU ETS directive. Therefore, the information collected within the scope of this directive can be reused to produce CO<sub>2</sub>.

## Fact sheet No. 1



**CO<sub>2</sub> information (leg No. 1) = 16 160 ℓ / flight x 1 flight x 3,00 kg CO<sub>2</sub> / ℓ x (3 t / 18 t) = 8 080 kg CO<sub>2</sub>**

### Calculations for leg No. 2:

- ▶ the airline chooses to reuse the provisional data that it obtained upstream from its subcontractor (presumed data produced in compliance with French regulations for integration without modification);
- ▶ for the section (ZAZ - BAH), the information given by the subcontracted airline for this service is 10,040 kg CO<sub>2</sub>.

### Result for the full service

- ▶ this requires adding the results obtained for the two legs:  
**CO<sub>2</sub> information = 8 080 kg + 10 040 kg = 18 120 kg CO<sub>2</sub>**

5. For further information, the airline may provide the emissions from the upstream and operating phases. This also requires breaking down the subcontractor's emissions into its upstream and operating phases. This can be easily determined given that the fuel used is kerosene, the emission factors of which are known (0,48 kg CO<sub>2</sub> / ℓ and 2,52 kg CO<sub>2</sub> / ℓ for the upstream and operating phases respectively). The calculation is therefore as follows:

- ▶ for the section performed by the airline (CDG - ZAZ), the upstream phase is calculated to emit 8,080 kg CO<sub>2</sub> x (0,48 / 3) = 1 293 kg CO<sub>2</sub> and the operating phase to emit 8 080 kg CO<sub>2</sub> x (2,52 / 3) = 6 787 kg CO<sub>2</sub>;
- ▶ for the subcontracted section, the upstream phase is calculated to emit 10 040 kg CO<sub>2</sub> x (0,48 / 3) = 1 606 kg CO<sub>2</sub> and the operating phase to emit 10 040 kg CO<sub>2</sub> x (2,52 / 3) = 8 433 kg CO<sub>2</sub>.

The CO<sub>2</sub> emissions generated during the "upstream" phase for the entire service are calculated to equal 1 293 + 1 606 = 2 899 kg CO<sub>2</sub>.

The CO<sub>2</sub> emissions generated during the "operating" phase for the service are calculated to equal 6 787 + 8 433 = 15 220 kg CO<sub>2</sub>.



## 1.6. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this question is covered in chapter 2.6.*

### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is the value in gram, kilogram or tonne of CO<sub>2</sub> for the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service. Communicating CO<sub>2</sub> information essentially involves beneficiaries representing businesses or intermediaries. This information can therefore be disclosed in various forms or be adapted to suit the volume and frequency of the services performed.

Here is an example of a freight shipping contract drawn up between the service provider and the customer for a term of 6 months. The service can be considered to correspond to the entire contract and the CO<sub>2</sub> information can be provided for this 6-month period.

However, the service provider and its customer are not prohibited from transmitting information on part of the services alone, for example monthly information on the emissions generated by the operations performed.

Particularly subject to competition and comparisons with international stakeholders, airlines can differentiate between the "upstream phase" value and the "operating phase" value to provide additional information.

### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the levels of the values used when calculating the information;
- ▶ the methods used to segment the activities performed when drawing up level 3 values;
- ▶ the energy source emission factors used in the calculation;
- ▶ the distance calculation methods used and where applicable, the distance calculator used.

## 4.2. Freight by rail

### 4.2.1. Reference data

#### 4.2.1.1. The energy source emission factors used

The energy source emission factors to be used for rail transport are as follows:

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 <sub>2</sub> 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

Table 8: energy source emission factors - freight by rail

**N.B.:** The "upstream phase" value for electricity incorporates a part of the "network losses": the kWh lost in the electricity transmission lines between the place of electricity production and the place of electricity distribution (sub-stations) is taken into account when calculating the emission factor, however not the kWh lost by catenary systems.

#### 4.2.1.2. Level 1 values

The level 1 values are specified in the French order of 10 April 2012. The energy consumption rates per kilometre and the number of units transported are provided according to the density of the goods transported, i.e. the ratio between their gross weight (in kg) and their volume (in m<sup>3</sup>).

In the table below, where two energy sources are given, the mass of carbon dioxide emitted per kilometre is obtained by multiplying the rate of consumption of each energy source by the corresponding emission factor and then adding together the two numbers thus calculated. Furthermore, the level 1 values in this table apply regardless of the train's carrying capacity. They are determined based on a full 1 000-tonne train.

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/m <sup>3</sup>		
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/m <sup>3</sup>		
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/m <sup>3</sup>		
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 9: level 1 values - freight by rail

### 4.2.1.3. Level 1 aggregate data

The level 1 values and CO<sub>2</sub> emission factors of the energy sources can be used to produce level 1 aggregate data.

Description (according to the density of the goods transported and the energy source used)	CO <sub>2</sub> emissions rate per tonne-kilometre
Goods with a density less than or equal to 249 kg/m <sup>3</sup>	
Electricity Consumed in France	2,20 g CO <sub>2</sub> / t.km
Electricity Consumed in Europe	17,4 g CO <sub>2</sub> / t.km
Non-road diesel	34,9 g CO <sub>2</sub> / t.km
Mixed: Electricity Consumed in France/non-road diesel	5,43 g CO <sub>2</sub> / t.km
Goods with a density of between 250 and 399 kg/m <sup>3</sup>	
Electricity Consumed in France	1,71 g CO <sub>2</sub> / t.km
Electricity Consumed in Europe	13,5 g CO <sub>2</sub> / t.km
Non-road diesel	27,1 g CO <sub>2</sub> / t.km
Mixed: Electricity Consumed in France/non-road diesel	4,26 g CO <sub>2</sub> / t.km
Goods with density greater than or equal to 400 kilograms per metre cubed	
Electricity Consumed in France	1,47 g CO <sub>2</sub> / t.km
Electricity Consumed in Europe	11,7 g CO <sub>2</sub> / t.km
Non-road diesel	23,4 g CO <sub>2</sub> / t.km
Mixed: Electricity Consumed in France/non-road diesel	3,69 g CO <sub>2</sub> / t.km

Table 10: level 1 aggregate data - freight by rail



## Freight by rail

### Fact sheet No. 2

#### 2.1. Activities concerned

This may involve transport services shipping goods by rail in a full load train consignment or via carriage-based consignments.

These services can be integrated into multi-modal services such as combined transport operations.

#### 2.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses values of different levels.

The use of level 1 values may be required, for example for a freight forwarder organising a comprehensive service comprising a rail leg and looking to provide information forecasts before selecting its train subcontractor.

For large train companies, tools have already been developed and encourage the fast generalisation of the use of level 2 or 3 values. The use of level 4 values may be selected, in particular for the "number of units transported", in parallel with a level 2 or 3 value for the "energy consumption rate".

#### 2.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 10 ("level 1 aggregate data - freight by rail") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are the two level 1 values in this case.

1. The service provider notes the tonnage given "weight (service)" and the volume of the goods corresponding to the service requested.
2. It calculates the density of the goods by dividing their tonnage by their volume.
3. It identifies the energy source used: electricity or non-road diesel. If the energy source used is not known, and if the journey is made in France, it shall consider that the energy source is a mixture of both (combined to the rate of 90 % electric and 10 % combustion-powered).
4. It notes the level 1 aggregate data in table 10 according to the density of the goods and the energy source identified.
5. The service provider collects the distance travelled by the service (distance between the departure and unloading points).
6. The service provider finally applies formula No. 6:

$$\text{CO}_2 \text{ information} = \text{aggregate data} \times \text{weight (service)} \times \text{distance}$$

## Fact sheet No. 2



### Example

For a transport service shipping 250 tonnes of goods, the volume of which is calculated as 700 m<sup>3</sup> over a distance of 350 km, powered using electricity:

- ▶ the service provider assesses the density of the load subject to this service:  $250 \text{ t} / 700 \text{ m}^3 = 357 \text{ kg} / \text{m}^3$ ;
- ▶ table 10 provides the aggregate data corresponding to an electric train for a goods density of between 250 and 399 kg / m<sup>3</sup>: 1,7 g CO<sub>2</sub> / t.km
- ▶ the application of formula No. 6 gives:

$$\text{CO}_2 \text{ information} = 1,7 \text{ g CO}_2 / \text{t.km} \times 250 \text{ t} \times 350 \text{ km} = 149 \text{ kg CO}_2$$

### 2.4. Calculation method using different value levels (levels 2, 3 and 4)

Based on a representative sample of operating data, the company can generate mean energy consumption values (electric and diesel) per type of activity. It can also draw up more complex models, for example energy consumption curves (electric and diesel) according to the train's tonnage.

The CO<sub>2</sub> emissions are then calculated based on the distance travelled and the quantity of goods shipped during the given service.

**N.B.:** the electricity consumption value taken into account by the railway service provider must comprise catenary losses.



### Example

A rail company is looking to produce a level 3 value to calculate its CO<sub>2</sub> information. It determines the energy consumption curves according to the tonnage transported and differentiates between the type of traction used (electric or diesel). As per the definition of the level 3 values, the CO<sub>2</sub> emissions must be broken down in full. If the consumption curves are drawn up for the year 2011, they must enable all CO<sub>2</sub> emissions to be regenerated when applied to the traffic taking place in 2011. Consumption curve modelling must not therefore lead to under-evaluating the company's emissions.

Therefore, in order to calculate the CO<sub>2</sub> information for a train comprising 22 carriages travelling along a partially electrified itinerary in France, the calculation mode is as follows:

- ▶ collection of data regarding the itinerary: the direct distance of the railway infrastructure is 618 km, however train loading requires a detour, bringing this distance to 670 km. This journey therefore comprises an electricity-powered leg of 550 km and a diesel-powered leg of 120 km;
- ▶ collection of weight-related data: 1 200 tonnes of goods and 570 tonnes of light weight i.e. 1 770 gross tonnes;
- ▶ for this type of goods, the company defines that the carriages return to their departure point without load.

The quantity of energy is calculated based on consumption curves according to four steps for each leg, using distance, gross weight and energy type data:

1. electricity-powered leg - transport of loaded railway carriages: 1 770 t over 550 km; 11 318 kWh;
2. electricity-powered leg - transport of unladen railway carriages: 570 t over 550 km; 7 358 kWh;
3. diesel-powered leg - transport of loaded railway carriages: 1 770 t over 120 km; 672 ℓ;
4. diesel-powered leg - transport of unladen railway carriages: 570 t over 120 km; 437 ℓ.

The quantity of CO<sub>2</sub> is therefore calculated in the following manner:

$$((672 + 437) \times 3,07) + ((11\,318 + 7\,358) \times 0,053) = 4\,395 \text{ kg CO}_2 \text{ for the entire train.}$$

CO<sub>2</sub> information for an 800-tonne transport service making up part of this train can be calculated in the following manner:

$$\text{CO}_2 \text{ information} = (800 \text{ t} / 1\,200 \text{ t}) \times 4,395 \text{ kg CO}_2 = 2\,930 \text{ kg CO}_2$$

## Fact sheet No. 2

A small icon consisting of a white rectangular box with a paperclip at the top left corner. Inside the box, the text "CO<sub>2</sub> Info" is written in a bold, sans-serif font. The box is tilted slightly to the right.

CO<sub>2</sub> Info

### 2.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ the segmentation methods selected, in the event of a level 3 method;
- ▶ the methods used to determine the energy source consumption rates, in particular when they occur in the form of a model according to the train's tonnage.
- ▶ the energy source emission factors used in the calculation, in particular when the service is performed in foreign countries;
- ▶ the distance calculation methods used and where applicable, the distance calculator used;
- ▶ the methods and hypotheses used to calculate the density of the units transported.

## 4.3. Freight by river

### 4.3.1. Reference data

#### 4.3.1.1. The energy source emission factors used

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Pumped non-road diesel	Litre (ℓ)	0,58	2,49	3,07

Table 11: energy source emission factors - freight by river

#### 4.3.1.2. Level 1 values

Level 1 values are presented for the freight by river according to the type of ship used and its load capacity in tonnes of deadweight tonnage.

Description (according to the nature and capacity of the means of transport)	Number of units transported by the means of transport (taking into account unladen journeys)	The rate of consumption of the energy source used by the means of transport (in units of measurement of the quantity of energy source per kilometre)
Self-propelled with a capacity of less than 400 tonnes of deadweight tonnage - Non-road diesel	207 tonnes	6,30 ℓ / km
Self-propelled with a capacity of between 400 and 649 tonnes of deadweight tonnage - Non-road diesel	331 tonnes	7,30 ℓ / km
Self-propelled with a capacity of between 650 and 999 tonnes of deadweight tonnage - Non-road diesel	497 tonnes	8,30 ℓ / km
Self-propelled with a capacity of between 1,000 and 1,499 tonnes of deadweight tonnage - Non-road diesel	773 tonnes	12,20 ℓ / km
Self-propelled with a capacity greater than or equal to 1,500 tonnes of deadweight tonnage - Non-road diesel	1 214 tonnes	19,90 ℓ / km
Pusher tug with barge(s) <sup>(1)</sup> with a capacity of less than 590 kW - Non-road diesel	1 104 tonnes	9,40 ℓ / km
Pusher tug with barge(s) <sup>(1)</sup> with a capacity of between 590 and 879 kW - Non-road diesel	1 270 tonnes	14,40 ℓ / km
Pusher tug with barge(s) <sup>(1)</sup> with a capacity greater than or equal to 880 kW (excluding container shipping) - Non-road diesel	2 208 tonnes	28,40 ℓ / km
Pusher tug with barge(s) <sup>(1)</sup> with a capacity greater than or equal to 880 kW (container shipping) - Non-road diesel	1 200 tonnes	28,40 ℓ / km

Table 12: level 1 values - freight by river

<sup>1</sup> The level 1 values in this line of the table apply regardless of the number of barges being pushed

### 4.3.1.3. Level 1 aggregate data

Level 1 aggregate data can be defined by combining the level 1 values with the energy source emission factors (in this case the emission factors for non-road diesel).

Description (according to the nature and capacity of the means of transport)	CO <sub>2</sub> emissions rate per unit transported and per km
Self-propelled with a capacity of less than 400 tonnes of deadweight tonnage - Non-road diesel	93,4 g CO <sub>2</sub> / t.km
Self-propelled with a capacity of between 400 and 649 tonnes of deadweight tonnage - Non-road diesel	67,7 g CO <sub>2</sub> / t.km
Self-propelled with a capacity of between 650 and 999 tonnes of deadweight tonnage - Non-road diesel	51,3 g CO <sub>2</sub> / t.km
Self-propelled with a capacity of between 1 000 and 1 499 tonnes of deadweight tonnage - Non-road diesel	48,5 g CO <sub>2</sub> / t.km
Self-propelled with a capacity greater than or equal to 1 500 tonnes of deadweight tonnage - Non-road diesel	50,3 g CO <sub>2</sub> / t.km
Pusher tug with barge(s) <sup>(2)</sup> with a capacity of less than 590 kW - Non-road diesel	26,1 g CO <sub>2</sub> / t.km
Pusher tug with barge(s) <sup>(2)</sup> with a capacity of between 590 and 879 kW - Non-road diesel	34,8 g CO <sub>2</sub> / t.km
Pusher tug with barge(s) <sup>(2)</sup> with a capacity greater than or equal to 880 kW (excluding container shipping) - Non-road diesel	39,5 g CO <sub>2</sub> / t.km
Pusher tug with barge(s) <sup>(2)</sup> with a capacity greater than or equal to 880 kW (container shipping) - Non-road diesel	72,7 g CO <sub>2</sub> / t.km

Table 13: level 1 aggregate data - freight by river



## Fact sheet No. 3

# Freight by river - full load consignments

### 3.1. Activities concerned

River transport companies are diverse in nature.

A large portion of river transport is performed by small-scale waterway operators, which covers all river transport operators not employing more than 6 employees.

A few large river operators do exist, operating a fleet of ships capable of reaching up to several tens in number.

Small-scale waterway operators can operate via subcontracting or on behalf of river companies.

### 3.2. The calculation methods presented in this sheet

This fact sheet presents three different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses unladen distance and the level 1 value for the consumption rate;
- the 3<sup>rd</sup> uses level 4 values.

### 3.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following description presents the use of the level 1 **aggregate data**. For reference, this aggregate data is available in table 13 ("level 1 aggregate data - freight by river") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are the two level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the nature and capacity of the means of transport used from table 13.

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
- ▶ the distance travelled by these units, represented by "distance (service)".

3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data item x number of units (service) x distance (service)**

**N.B.:** Potential unladen journeys are taken into account in this formula in the "number of units in the means of transport", by producing level 1 values for the number of units.

## Fact sheet No. 3



### Example

A service provider shipping goods by river is looking to calculate its CO<sub>2</sub> information for the full load consignment services that it carries out, using level 1 values.

1. The service provider identifies:
  - ▶ the type of ship used for these services, from the list provided in table 13; it is assumed that this involves a self-propelled ship with a capacity greater than 1 500 tonnes of deadweight tonnage;
  - ▶ the level 1 aggregate data item corresponding to the nature of the ship "self-propelled with a capacity greater than 1 500 tonnes of deadweight tonnage" in table 13: 50,3 g CO<sub>2</sub> / t.km.
2. Application to a 1 300-tonne transport service shipping full load consignments from the port of Bonneuil-sur-Marne to the port of Le Havre for one of its customers
  - ▶ The service provider collects the distance of the service performed. In order to achieve this, it uses a distance calculator and obtains the distance between the port of Le Havre and the port of Bonneuil-sur-Marne = 360 km.
  - ▶ The number of units transported corresponds to the weight of the goods shipped for the customer: 1 300 tonnes.
  - ▶ Then, the service provider applies the following formula:  
**CO<sub>2</sub> information = 50,3 g CO<sub>2</sub> / t.km x 1 300 t x 360 km = 23 540 kg CO<sub>2</sub> i.e. 23,5 tonnes of CO<sub>2</sub>.**

### 3.4. Calculation method using unladen distance and the level 1 value for the energy source consumption rate

This is an alternative to the aforementioned method, which assumes that the service provider has identified the unladen distance to be taken into account in the calculation. This may, for example, relate to the approach journey performed without load and before loading the goods subject to this service. For further information regarding the integration of unladen journeys in the calculations, see § 2.3.8.

The method thus becomes:

1. The service provider notes the level 1 value corresponding to the nature and capacity of the means of transport used from table 12 ("level 1 values - freight by river").
2. It notes the energy source emission factor from table 11 ("energy source emission factors - freight by river"), i.e. in this example 3,07 kg CO<sub>2</sub> per litre.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the distance travelled for the service with load;
  - ▶ the distance allocated to the service without load.
4. The service provider thus obtains the total distance travelled by the ship to perform the service, represented by "total distance (service)".
5. For each service, calculation formula No. 3 must be applied:  
**CO<sub>2</sub> information = energy source consumption rate x total distance (service) x emission factor**

## Fact sheet No. 3

### 3.5. Calculation method using level 4 values

As previously described, this method requires the service provider to define the rules for allocating unladen journeys to particular services. This is based on the hypothesis that the rule selected is that comprising the allocation of the unladen approach journey: the unladen journey is allocated to the subsequent service.

1. For a given service transporting full load consignments, the service provider notes the quantity of fuel consumed between its departure from the unloading point for the previous service and the end of the unloading operation for the service being assessed.
2. It must use the non-road diesel emission factor provided in table 11 (3,07 kg CO<sub>2</sub> / ℓ).
3. It therefore obtains its CO<sub>2</sub> information by applying calculation formula No. 1:

$$\text{CO}_2 \text{ information} = \text{energy source consumption} \times \text{emission factor}$$

#### Example

For the freight of a full load consignment on a ship that consumed 4 130 ℓ of fuel in total (unladen approach journey included), the CO<sub>2</sub> information is calculated as follows:

$$\text{CO}_2 \text{ information} = 4\,130 \ell \times 3,07 \text{ kg CO}_2 / \ell = 12\,679 \text{ kg CO}_2$$



### 3.6. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ where necessary, the presentation of the segmentation operation performed to draw up the level 3 values;
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;
- ▶ the methods used to allocate unladen journeys and approach journeys.





## Fact sheet No. 4

# Freight by river - partial load consignments

## 4.1. Activities concerned

River transport companies are diverse in nature.

A large portion of river transport is performed by small-scale waterway operators, which covers all river transport operators not employing more than 6 employees.

A few large river operators do exist, operating a fleet of ships capable of reaching up to several tens in number.

Small-scale waterway operators can operate via subcontracting or on behalf of river companies.

## 4.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

## 4.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 13 ("level 1 aggregate data - freight by river") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are the two level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the nature and capacity of the means of transport used from table 13.
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)" expressed in tonnes. The quantities of goods expressed in m<sup>3</sup> may require conversion: the density of the liquids or solids transported is thus used;
  - ▶ the distance travelled by these units, represented by "distance (service)";
3. The calculation formula to apply to each service is as follows:
 

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 4



### Example

A service provider shipping goods by river is looking to calculate its CO<sub>2</sub> information for the partial load consignment services that it carries out, using level 1 values.

1. The service provider identifies:
  - ▶ the type of ship used for these services, from the list provided in table 13; it is assumed that this involves a self-propelled ship with a capacity greater than 1 500 tonnes of deadweight tonnage;
  - ▶ the level 1 aggregate data corresponding to the nature of the ship "self-propelled with a capacity greater than 1 500 tonnes of deadweight tonnage" in table 13: 50,3 g CO<sub>2</sub> / t.km
2. Application to a transport service shipping 20 m<sup>3</sup> of sand, as a partial load consignment, from the port of Le Havre to that of Bonneuil-sur-Marne.
  - ▶ The service provider collects the distance of the service performed. In order to achieve this, it uses a distance calculator and obtains the distance between the port of Le Havre and the port of Bonneuil-sur-Marne = 360 km.
  - ▶ The number of units transported corresponds to the weight of the goods shipped for the customer. It therefore converts the load from metres cubed into tonnes: by selecting a density of 1,85 t / m<sup>3</sup>, the 20 m<sup>3</sup> of sand corresponds to 37 tonnes.
  - ▶ Then, the service provider applies the following formula:  
**CO<sub>2</sub> information = 50,3 g CO<sub>2</sub> / t.km x 37 t x 360 km = 670 kg CO<sub>2</sub>**

### 4.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer, etc.), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport;
- ▶ the number of units transported by the means of transport.

In this example, the service provider can create the corresponding level 3 aggregate data using the following formula:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
- ▶ the distance travelled by these units, represented by "distance (service)".

3. The calculation formula to apply to each service is as follows:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

## Fact sheet No. 4



### Example

A service provider shipping goods by river is looking to calculate its CO<sub>2</sub> information for the partial load consignment services that it carries out, using level 3 values.

1. It chooses to segment its transport activities according to the types of transport services performed: transport of vehicles, fuelling, bulk freight, transport of waste.
2. Based on this segmentation, the service provider collects the following information over a 6-month period, which it deems representative of its "bulk freight" activity:
  - ▶ 84 650 ℓ of diesel consumed;
  - ▶ 6 530 km travelled;
  - ▶ 7 183 000 t.km performed (see chapter 2.3 to calculate the number of units transported).
3. It notes the energy source emission factor for "Non-road diesel": 3,07 kg CO<sub>2</sub>/ℓ.
4. It therefore draws up the corresponding level 3 values:
  - ▶ energy source consumption rate: 84 650 ℓ / 6 530 km = 13,0 ℓ / km;
  - ▶ number of units transported by the means of transport: 7 183 000 t.km / 6 530 km = 1 100 t.
5. It can then calculate the aggregate data in the following manner:
  - ▶ aggregate data (Bulk freight) = [13,0 ℓ / km / 1 100 t] x 3,07 kg CO<sub>2</sub> / ℓ = 36,3 g CO<sub>2</sub> / t.km
6. Application to a given service: bulk freight via a partial load consignment of 30 tonnes of goods over 500 km:  
**CO<sub>2</sub> information = 36,3 g CO<sub>2</sub> / t.km x 30 t x 500 km = 545 kg CO<sub>2</sub>**



### 4.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ where necessary, the presentation of the segmentation operation performed to draw up the level 3 values;
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;
- ▶ the methods used to allocate unladen journeys and approach journeys, and in particular their allocation to the different loads.



## Fact sheet No. 5

# Freight by river - container shipping

## 5.1. Activities concerned

From the different activities carried out by river transport operators, container traffic constitutes a specific type of activity; river transport operation can take place as part of a multi-modal chain, where the container for example arrives by sea and completes its journey by road.

This fact sheet however is restricted to the river portion of the container's journey.

## 5.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

One specific feature of this fact sheet is the illustrated possibility of using the container (instead of weight) as a reference for quantifying the number of units transported.

## 5.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3..*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 13 ("level 1 aggregate data - freight by river") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities in this fact sheet, the vehicle category used and the type of transport operation performed are "Pusher tug with barge(s) with a capacity greater than or equal to 880 kW (container shipping) - Non-road diesel".
2. The service provider notes the level 1 aggregate data corresponding to the category of the vehicle used and the type of transport operation performed from table 13: 72,7 g CO<sub>2</sub> / t.km.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)". The weight to be taken into account is the gross weight of the containers (light weight or "box" included);
  - ▶ the distance travelled by these units, represented by "distance (service)".
4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 5



### Example

A river transport service provider is looking to calculate its CO<sub>2</sub> information for the container shipping services that it carries out between the port of Le Havre and the port of Bonneuil-sur-Marne, using level 1 values.

1. It collects the aggregate data as follows: 72,7 g CO<sub>2</sub> / t.km
2. Application to a given service: example of the freight of 5 containers from Le Havre to Bonneuil-sur-Marne:
  - ▶ Using a distance calculator, the service provider notes the distance by river between the port of departure and the destination port: 360 km.
  - ▶ It notes the gross weight of the 5 containers from the shipping documents: 84 tonnes.
  - ▶ It applies the following calculation formula:  
**CO<sub>2</sub> information = 72,7 g CO<sub>2</sub> / t.km x 84 t x 360 km = 2,20 t CO<sub>2</sub>**

### 5.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider performing a river transport service shipping containers can choose this activity as a whole to form a subgroup of all of its activities, for which it will draw up specific values known as level 3 values. If it operates in different basins (Seine and Rhone for example), it can even dissociate these services according to these basins.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport;
- ▶ the number of units transported by the means of transport, with the reference "twenty-foot equivalent units" (TEU) and not the reference "weight".

In this example, the service provider can create the corresponding level 3 aggregate data using the following formula:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)". As per the reference specified hereinabove, this is the number of containers measured in TEU;
- ▶ the distance travelled by these units, represented by "distance (service)".

3. The calculation formula to apply to each service is as follows:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 5



### Example

A river transport service provider is looking to calculate its CO<sub>2</sub> information for the container shipping services that it carries out, using level 3 values.

1. It collects the following information over a 1-year period for its "container shipping" activity:
  - ▶ 84 650 ℓ of non-road diesel consumed;
  - ▶ 4 790 km travelled;
  - ▶ 718 500 TEU.km shipped. The calculation was made according to the principles defined in chapter 2.3 of this guide.
2. It therefore draws up the corresponding level 3 values:
  - ▶ energy source consumption rate:  $84\,650\ \ell / 4\,790\ \text{km} = 17,7\ \ell / \text{km}$ ;
  - ▶ number of units transported by the means of transport:  $718\,500\ \text{TEU.km} / 4\,790\ \text{km} = 150\ \text{TEU}$ .
3. It notes the energy source emission factor for "Non-road diesel":  $3,07\ \text{kg CO}_2 / \ell$ .
4. It can then determine the corresponding level 3 aggregate data:
  - ▶ aggregate data (container shipping) =  $[17,7\ \ell / \text{km} / 150\ \text{TEU}] \times 3,07\ \text{kg CO}_2 / \ell = 362\ \text{g CO}_2 / \text{TEU.km}$
5. Application to a given service: freight of 10 containers representing 15 TEU over a distance of 450 km:  
**CO<sub>2</sub> information = 362 g CO<sub>2</sub> / TEU.km x 15 TEU x 450 km = 2,44 t CO<sub>2</sub>**



### 5.5. How must this information be transmitted to the beneficiary?

Reminder: general information regarding this question is provided in chapter 2.6 of this guide.

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ where necessary, the presentation of the segment performed for drawing up level 3 values and the units used as a reference to calculate these values (t.km, TEU.km, etc.);
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;
- ▶ the methods used to allocate unladen journeys and approach journeys, and in particular their allocation to the different loads;
- ▶ the conversion assumptions used for containers in tonnes if conversions have been made.

## 4.4. Freight by sea

### 4.4.1. Reference data

#### 4.4.1.1. The energy source emission factors used

The emission factors for the fuels used to ship goods by sea are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement for the quantity of energy source	Emission factor (in kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Fuel oil	Heavy fuel oil ISO 8217 Classes RME to RMK	Kilogram	0,46	3,12	3,58
Diesel	Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,61	3,15	3,76
Natural gas	Marine liquefied natural gas (LNG)	Kilogram	0,52	2,77	3,29
Liquefied petroleum gas (LPG)	Marine butane	Kilogram	0,35	2,92	3,27
	Marine propane	Kilogram	0,35	2,94	3,29

Table 14: fuel emission factors - freight by sea

**N.B.:** hereinafter, "Heavy Fuel Oil" and "Marine Diesel Oil" shall be referred to as HFO and MDO respectively.

## 4.4.1.2. Level 1 values

The level 1 values for the freight by sea are presented in the order of 10 April 2012 and repeated in this chapter. In the table below, where two energy sources are given for a ship, the mass of carbon dioxide emitted per kilometre is obtained by multiplying the rate of consumption of each energy source by the corresponding emission factor and then adding together the two numbers thus calculated.

Description (according to the nature and capacity of the vessel)	Number of units transported by the means of transport (taking into account unladen journeys)	The rate of consumption of the energy source used by the means of transport (in units of measurement for the quantity of energy source per kilometre)
Handysize bulk carrier - deadweight tonnage of less than 40 250 tonnes	12 800 tonnes	Heavy fuel oil: 39,20 kg / km
Handymax bulk carrier - deadweight tonnage between 40 250 and 63 499 tonnes	24 700 tonnes	Heavy fuel oil: 39,70 kg / km
Panamax bulk carrier - deadweight tonnage between 63 500 and 127 500 tonnes	33 000 tonnes	Heavy fuel oil: 49,40 kg / km
Capesize bulk carrier - deadweight tonnage of greater than 127 500 tonnes	79 600 tonnes	Heavy fuel oil: 79,80 kg / km
Product tanker small oil tanker - deadweight tonnage of less than 26 500 tonnes	7 990 tonnes	Heavy fuel oil: 55,00 kg / km Marine diesel oil: 0,50 kg / km
Handy product oil tanker - deadweight tonnage between 26 500 and 68 499 tonnes	15 500 tonnes	Heavy fuel oil: 76,00 kg / km Marine diesel oil: 3,40 kg / km
Aframax oil tanker - deadweight tonnage between 68 500 and 200 000 tonnes	48 700 tonnes	Heavy fuel oil: 72,50 kg / km Marine diesel oil <sup>(1)</sup>
VLCC oil tanker - deadweight tonnage of greater than 200 000 tonnes	144 000 tonnes	Heavy fuel oil: 133,00 kg / km Marine diesel oil <sup>(1)</sup>
Small LPG tanker	1 830 tonnes	Heavy fuel oil: 25,90 kg / km Marine diesel oil: 1,50 kilograms
VLGC gas tanker	22 300 tonnes	Heavy fuel oil: 90,00 kilograms Marine diesel oil <sup>(1)</sup>
Small bulk carrier/sea-river vessel	2 630 tonnes	Heavy fuel oil <sup>(1)</sup> Marine diesel oil: 12,80 kg / km
Container ship - Less than 1 200 TEU	3 650 tonnes	Heavy fuel oil: 32,30 kg / km Marine diesel oil: 0,80 kg / km
Container ship - From 1 200 to 1 899 TEU	11 000 tonnes	Heavy fuel oil: 66,30 kg / km Marine diesel oil <sup>(1)</sup>
Container ship - From 1 900 to 3 849 TEU	18 500 tonnes	Heavy fuel oil: 103,70 kg / km Marine diesel oil <sup>(1)</sup>
Container ship - From 3 850 to 7 499 TEU	46 400 tonnes	Heavy fuel oil: 174,00 kg / km
Container ship - Greater than 7 500 TEU	74 900 tonnes	Heavy fuel oil: 210,50 kg / km
Night ferry	1 290 tonnes	Heavy fuel oil: 18,45 kg / km Marine diesel oil: 12,04 kg / km
Day ferry	2 350 tonnes	Heavy fuel oil: 33,51 kg / km Marine diesel oil: 4,28 kg / km
Ro-Pax	1 730 tonnes	Heavy fuel oil: 32,20 kg / km
Ro-Ro	1 970 tonnes	Heavy fuel oil: 54,30 kg / km Marine diesel oil: 1,40 kg / km

Table 15: level 1 values - freight by sea

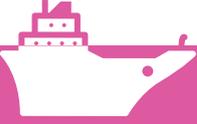
(1) Low indeterminate value, to be considered a null value.

#### 4.4.1.3. Level 1 aggregate data

The level 1 values and CO<sub>2</sub> emission factors of the energy sources can be used to produce level 1 aggregate data.

Description (according to the nature and capacity of the vessel)	CO <sub>2</sub>
Handysize bulk carrier - deadweight tonnage of less than 40 250 tonnes	11,0 g CO <sub>2</sub> / t.km
Handymax bulk carrier - deadweight tonnage between 40 250 and 63 499 tonnes	5,75 g CO <sub>2</sub> / t.km
Panamax bulk carrier - deadweight tonnage between 63 500 and 127 500 tonnes	5,36 g CO <sub>2</sub> / t.km
Capesize bulk carrier - deadweight tonnage of greater than 127 500 tonnes	3,59 g CO <sub>2</sub> / t.km
Product tanker small oil tanker - deadweight tonnage of less than 26 500 tonnes	24,9 g CO <sub>2</sub> / t.km
Handy product oil tanker - deadweight tonnage between 26 500 and 68 499 tonnes	18,4 g CO <sub>2</sub> / t.km
Aframax oil tanker - deadweight tonnage between 68 500 and 200 000 tonnes	5,33 g CO <sub>2</sub> / t.km
VLCC oil tanker - deadweight tonnage of greater than 200 000 tonnes	3,31 g CO <sub>2</sub> / t.km
Small LPG tanker	53,7 g CO <sub>2</sub> / t.km
VLGC gas tanker	14,4 g CO <sub>2</sub> / t.km
Small bulk carrier/sea-river vessel	18,3 g CO <sub>2</sub> / t.km
Container ship - Less than 1 200 TEU	32,5 g CO <sub>2</sub> / t.km
Container ship - From 1 200 to 1 899 TEU	21,6 g CO <sub>2</sub> / t.km
Container ship - From 1 900 to 3 849 TEU	20,1 g CO <sub>2</sub> / t.km
Container ship - From 3 850 to 7 499 TEU	13,4 g CO <sub>2</sub> / t.km
Container ship - Greater than 7 500 TEU	10,1 g CO <sub>2</sub> / t.km
Night ferry	86,3 g CO <sub>2</sub> / t.km
Day ferry	57,9 g CO <sub>2</sub> / t.km
Ro-Pax	66,6 g CO <sub>2</sub> / t.km
Ro-Ro	101 g CO <sub>2</sub> / t.km

Table 16: level 1 aggregate data - freight by sea



## Fact sheet No. 6

# Freight by sea - container ships

## 6.1. Activities concerned

Containers are shipped by sea by shipping companies either owning or renting ships.

The services included in the scope of this order are those departing from or travelling to a location in France. For an international connection with a port of call in France, the regulations regarding CO<sub>2</sub> information do not apply if the goods remain on-board the ship.

## 6.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

## 6.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 16 ("level 1 aggregate data - freight by sea") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities covered in this fact sheet, the category of the vehicle used and the type of transport operation performed must be selected from the 5 container ships shown in table 16; if this information is not available, the service provider may choose the intermediary category "from 1 900 to 3 849 TEU".
2. The service provider notes the level 1 aggregate data corresponding to the nature and capacity of the container ship used from table 16.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)"; this number must be expressed in units of weight. If the load in number of TEU containers is known, this value can be converted into gross tonnes;
  - ▶ the distance travelled by these units, represented by "distance (service)". Assessing the distance travelled requires the use of a specific distance calculator integrating seaways (such as <http://www.portworld.com/map/>).
4. The calculation formula to apply to each service is as follows:
 

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 6



### Example

A shipping company is looking to calculate its CO<sub>2</sub> information for the container shipping services that it carries out, using level 1 values.

1. It selects the category of container ships corresponding to its operation, from among the 5 categories proposed in table 16: it is assumed that this involves the category "Container ships - Greater than 7 500 TEU".
2. It notes the corresponding aggregate data as provided above: 10,1 g CO<sub>2</sub> / t.km
3. Application to a given service: freight of 20 containers from Le Havre to Tokyo:
  - ▶ Using the marine distance calculator <http://www.portworld.com/map/>, it collects the distance between the ports of Le Havre (IATA code: FRLEH) and Tokyo (IATA code: JPTYO): 21 039 km.
  - ▶ It notes the gross weight of the 20 containers from the shipping documents: 208 tonnes.
  - ▶ It applies the following calculation formula:
 
$$\text{CO}_2 \text{ information} = 10,1 \text{ g CO}_2 / \text{t.km} \times 208 \text{ t} \times 21 \text{ 039 km} = 44,2 \text{ t CO}_2$$

### 6.4. Calculation method using level 3 values:

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (this normally involves breaking down activities per line or type of ship, however other segmentations are possible), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ energy source consumption rate for the means of transport; in some cases, the service provider uses two energy sources (HFO and MDO);
- ▶ the number of units transported by the means of transport, with the reference "twenty-foot equivalent units" (TEU) and not the reference "weight".

In this example, the service provider can create the corresponding level 3 aggregate data using the following formula:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

Or for two different energy sources (represented by 1 and 2 in the formula below):

$$\text{Aggregate data} = [\text{Consumption rate1} / \text{number of units in the means of transport}] \times \text{emission factor1} + [\text{Consumption rate2} / \text{number of units in the means of transport}] \times \text{emission factor2}$$

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)". As per the reference specified hereinabove, this is the number of containers measured in TEU;
- ▶ the distance travelled by these units, represented by "distance (service)".

3. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

## Fact sheet No. 6



### Example

A shipping company is looking to calculate its CO<sub>2</sub> information for the container shipping services that it carries out, using level 3 values.

1. It collects the following information over a 1-year period for its "container shipping" activity:
  - ▶ 79 948 t of HFO consumed;
  - ▶ 8 800 t of MDO consumed;
  - ▶ 420 000 km travelled by its entire container fleet;
  - ▶ 1 831 200 000 TEU.km shipped. The calculation was made according to the principles defined in chapter 2.3 of this guide.
2. It therefore draws up the corresponding level 3 values:
  - ▶ energy source consumption rate, HFO: 79 948 t / 420 000 km = 190 kg / km;
  - ▶ energy source consumption rate, MDO: 8 800 t / 420 000 km = 21,0 kg / km;
  - ▶ number of units transported by the means of transport: 1 831 200 000 TEU.km / 420 000 km = 4 360 TEU.
3. It notes the emission factors of the energy sources used: HFO: 3,58 kg CO<sub>2</sub> / kg; MDO: 3,76 kg CO<sub>2</sub> / kg.
4. It can then determine the corresponding aggregate data:
 

Aggregate data (container shipping):

$$[190 \text{ kg / km} / 4 360 \text{ TEU}] \times 3,58 \text{ kg CO}_2 / \text{kg} + [21,0 \text{ kg / km} / 4 360 \text{ TEU}] \times 3,76 \text{ kg CO}_2 / \text{kg}$$

Aggregate data (container shipping) = 174 g CO<sub>2</sub> / TEU.km
5. Application to a given service: freight of 10 containers representing 15 TEU from Le Havre to Tokyo
  - ▶ Using the marine distance calculator <http://www.portworld.com/map/>, it collects the distance between the ports of Le Havre (IATA code: FRLEH) and Tokyo (IATA code: JPTYO): 21 039 km;
  - ▶ Then, the service provider applies the formula:  
**CO<sub>2</sub> information = 174 g CO<sub>2</sub> / TEU.km x 15 TEU x 21 039 km = 54,9 t CO<sub>2</sub>**



### 6.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

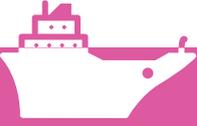
#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ where necessary, the presentation of the segment performed for drawing up level 3 values and the units used as a reference to calculate these values (t.km, TEU.km, etc.);
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;
- ▶ the conversion assumptions used for containers in tonnes if conversions have been made.



## Fact sheet No. 7

# Freight by sea - motorway of the sea service

### 7.1. Activities concerned

A "motorway of the sea" is a regular seagoing service transporting road vehicles accompanied or not by their driver(s), at a high rate of frequency.

This shuttle frequency rate guarantees a regular service and contributes to its attractiveness.

This may involve significant variations in ship load.

### 7.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values and objective values;

### 7.3. Calculation method using level 1 values

Reminder: general information on level 1 values is provided in chapter 2.3.

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 16 ("level 1 aggregate data - freight by sea") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities covered by this fact sheet, the category of the vehicle used and type of transport operation performed are in principle either the "Ro-Ro" ship or the "Ro-Pax" ship.
2. The service provider notes the level 1 aggregate data corresponding to the nature and capacity of the ship used from table 16.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ The number of units transported for the service being assessed, represented by "number of units (service)".
  - ▶ The distance travelled by these units, represented by "distance (service)".  
Assessing the distance travelled requires the use of a specific distance calculator incorporating seaways such as <http://www.portworld.com/map/>.

4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 7



### Example

A shipping company is looking to calculate CO<sub>2</sub> information for a regular seagoing service transporting road vehicles that it carries out between ports A and B, using level 1 values.

1. It selects the category of ship corresponding to its operations from those provided in table 16. In this example, this is a Ro-Ro ship.
2. The company notes the aggregate data corresponding to the Ro-Ro ship from table 16: 101 g CO<sub>2</sub> / t.km.
3. Application to a given service: transport, between ports A and B, of a semi-trailer truck
  - ▶ Using the marine distance calculator <http://www.portworld.com/map/>, it collects the distance between ports A and B: 502 km.
  - ▶ It notes the gross weight of the entire road vehicle (vehicle + its load) from the shipping documents: 35 tonnes.
  - ▶ It applies the following calculation formula:  
**CO<sub>2</sub> information = 101 g CO<sub>2</sub> / t.km x 35 t x 502 km = 1,77 t CO<sub>2</sub>**

### 7.4. Calculation method using level 2 values and objective values

*Reminder: general information on level 2 values is provided in chapter 2.3.*

#### 1. Determining the objective value

In the first 3 years of performing the mass transport service, the service provider can use the objective value defined in the order for the number of units transported.

This value is set by the order of 10 April 2012 (article 4) at 40 % of the maximum capacity of the ship, expressed in tonnes of deadweight tonnage, for sea transport.

#### 2. Drawing up a level 2 value for the energy source consumption rate

The service provider looking to use level 2 values must calculate the mean figures for all of its motorway of the seas activity between ports A and B.

It must define the duration over which the mean values are calculated. For example, it can follow an annual update principle, which allows the service provider to take into account a large volume of traffic and therefore smooth out any possible periodic variations.

To draw up the level 2 value for the energy source consumption rate of the means of transport, the service provider collects the total quantity of fuel consumed during this period and divides this number by the number of journeys performed during the same period between the two ports A and B. It thus obtains a consumption rate per journey.

#### 3. Aggregate data

The service provider can then determine the corresponding aggregate data, which is more convenient when calculating results for each service. This aggregate data item is expressed in tonnes of CO<sub>2</sub> per tonne of goods and per journey. It then uses formula No. 5:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{objective value}] \times \text{emission factor}$$

#### 4. To calculate the CO<sub>2</sub> information for a given service:

The service provider must know the number of units transported for the service being assessed, represented by the "number of units (service)", expressed in tonnes and the number of journeys performed for each unit transported.

Calculation formula No. 6 must be applied for each service (in which distance is expressed in number of journeys):

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{number of journeys}$$

## Fact sheet No. 7



### Example

A shipping company is looking to calculate CO<sub>2</sub> information for a regular seagoing service transporting road vehicles that it carries out between ports A and B, using the objective value in addition to a level 2 value for the consumption rate.

#### 1. Calculating the objective value

- ▶ The service is carried out by a Ro-Ro ship, the deadweight tonnage capacity of which is 50,000 t.
- ▶ The service provider applies the rate of 40 % of this capacity to obtain the objective value:  
50 000 t x 40 % = 20 000 t.

#### 2. Drawing up the level 2 value

- ▶ Over a one-month period and for all of its activities (20 journeys), the company recorded a fuel consumption of 502 000 kg of Heavy Fuel Oil and 13 052 kg of Marine Diesel Oil. This consumption corresponds to the 20 journeys performed.
- ▶ The consumption rates per journey are therefore: 502 000 kg HFO / 20 journeys = 25 100 kg HFO / journey and 13 052 kg MDO / 20 journeys = 652,6 kg MDO / journey.

#### 3. Aggregate data

This information enables it to calculate the aggregate data item for its service:

$$[25\,100\text{ kg} / 20\,000\text{ t} \times 3,58\text{ kg CO}_2 / \text{kg}] + [652,6\text{ kg} / 20\,000\text{ t} \times 3,76\text{ kg CO}_2 / \text{kg}] = 4,62\text{ g CO}_2 / \text{kg per journey}$$

#### 4. Application to a given service: transport, between ports A and B, of a semi-trailer truck

- ▶ The service provider notes the gross weight of the entire vehicle (vehicle + load) from the shipping documents: 35 tonnes.
- ▶ It applies the following calculation formula:

$$\text{CO}_2 \text{ information} = 4,62\text{ g CO}_2 / \text{kg/journey} \times 35\text{ t} \times 1\text{ journey} = 162\text{ kg CO}_2$$



### 7.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

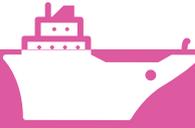
#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ when drawing up level 2 values, this involves specifying the units used as a reference to calculate the reference values (the unit used in the example provided above is tonnes) and that the objective value was used for the number of units transported in the means of transport;
- ▶ the period used to constitute the sample of representative data to produce level 2 or 3 data.



## Fact sheet No. 8

### Freight by sea - bulk freight

#### 8.1. Activities concerned

Shipping companies carry out bulk freight operations by sea using ships either owned or rented by the company. The services included in the scope of this order are those departing from or travelling to a location in France.

For an international connection with a port of call in France, the regulations regarding CO<sub>2</sub> information do not apply if the goods remain on-board the ship.

Bulk freight activities involve the freight of "unpackaged" solid and liquid materials, in particular in containers. This may involve the freight of solid bulk goods (e.g. raw materials) or liquid bulk goods (chemical agents, fuels, gas, etc.). This category includes the freight of oil products.

#### 8.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

#### 8.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 16 ("level 1 aggregate data - freight by sea") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider must identify the ship used and the transport activity performed from those listed in table 16. To achieve this, it must know the nature of the bulk product (solid or liquid) and identify the reference ship according to its maximum capacity expressed in tonnes of deadweight tonnage.

2. The service provider notes the corresponding level 1 aggregate data from this table.

3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)". If the load corresponding to the service is expressed in m<sup>3</sup> rather than in tonnes, this must be converted into gross tonnes using the density coefficient for the goods transported;
- ▶ the distance travelled by these units, represented by "distance (service)". Assessing the distance travelled requires the use of a specific distance calculator incorporating seaways such as <http://www.portworld.com/map/>.

4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 8



### Example

A shipping company is looking to calculate its CO<sub>2</sub> information for a transport service shipping 50 000 tonnes of oil from the port of Bahrain (IATA code: BH BAH) to the port of Fos sur Mer (IATA code: FR FOS) in an Aframax oil tanker with a capacity of 113 000 tonnes.

1. It notes the aggregate data corresponding to the "Aframax oil tanker" category in table 16: 5,33 g CO<sub>2</sub> / t.km
2. Then it groups together the data characterising the service:
  - ▶ the distance between the ports of Bahrain (IATA code: BH BAH) and Fos sur Mer (IATA code: FR FOS) is obtained using the distance calculator <http://www.portworld.com/map/>: 8 486 km;
  - ▶ the number of units transported corresponds to the weight of the goods: 50 000 tonnes.
3. It applies the following calculation formula:
 
$$\text{CO}_2 \text{ information} = 5,33 \text{ g CO}_2 / \text{t.km} \times 50\,000 \text{ t} \times 8\,486 \text{ km} = 2\,262 \text{ t CO}_2$$

## 8.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer, etc.), then produce the corresponding values for each subgroup.

This fact sheet covers the example that the service provider is drawing up level 3 values for its bulk freight activities by sea and for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport. For this, the service provider must collect, over a sample period representative of this activity, the total quantity of fuel consumed and the sum of the distances travelled by all of the ships dedicated to this activity; this total consumption is then divided by the sum of the distances;
- ▶ the number of units transported by the means of transport. Here, the service provider collects, over the same period previously described, the quantity of goods shipped (in tonnes, in m<sup>3</sup>) and the distance travelled by these goods.

In this example, the service provider can create the corresponding level 3 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)". If the load corresponding to the service is expressed in m<sup>3</sup> rather than in tonnes, this must be converted into gross tonnes using the density coefficient for the goods transported;
- ▶ the distance travelled by these units, represented by "distance (service)".

3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 8



### Example

A shipping company provides a wide range of shipping activities: bulk shipping, container shipping, etc. These activities also include the freight of oil products using a dedicated fleet of oil tankers. It is looking to calculate its CO<sub>2</sub> information for the oil freight services that it carries out, using level 3 values.

1. It collects the following information over a 1-year period for its "oil-based product freight activity":
  - ▶ 47 600 t of HFO (Heavy Fuel Oil) consumed;
  - ▶ 5 290 t of MDO (Marine Diesel Oil) consumed;
  - ▶ 680 000 km travelled by its entire oil tanker fleet;
  - ▶ 30,6 billion t.km; the calculation was made according to the principles defined in chapter 2.3 of this guide.

2. It therefore draws up the corresponding level 3 values:

- ▶ energy source consumption rate, HFO: 47 600 t / 680 000 km = 70,0 kg / km;
- ▶ energy source consumption rate, MDO: 5 290 t / 680 000 km = 7,78 kg / km;
- ▶ number of units transported by the means of transport: 30 600 000 000 t.km / 680 000 km = 45 000 t.

3. It notes the emission factors of the energy sources used: HFO: 3,58 kg CO<sub>2</sub> / kg; MDO: 3,76 kg CO<sub>2</sub> / kg.

4. It can then determine the corresponding aggregate data:

Aggregate data (oil tankers) = [70,0 kg/km / 45 000 t] x 3,58 kg CO<sub>2</sub> / kg + [7,78 kg/km / 45 000 t] x 3,76 kg CO<sub>2</sub> / kg

Aggregate data (oil tankers) = 6,22 g CO<sub>2</sub> / t.km

5. Application to a given service: freight of 20 000 tonnes from Bahrain to Fos sur Mer.

- ▶ Using the distance calculator <http://www.portworld.com/map/> it calculates the distance between the ports of Bahrain (BAH) and Fos sur Mer (FOS): 8 486 km.
- ▶ Then, the service provider applies the formula:  
**CO<sub>2</sub> information = 6,22 g CO<sub>2</sub> / t.km x 20 000 t x 8 486 km = 1,06 t CO<sub>2</sub>**



### 8.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

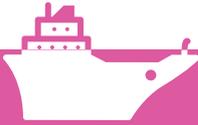
#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ when using level 2 or 3 values, the period used to constitute the representative data sample to produce the level 2 or 3 data.



## Fact sheet No. 9

# Combined sea transport - to and from islands

### 9.1. Activities concerned

The services travelling to and from islands may involve both passenger and goods transport, with sea links between the continent and the islands or inter-island links.

One characteristic example of this type of service are the sea links to and from the islands off of the coast of Brittany (Ouessant, Molène, etc.).

This fact sheet presents one example of application for the freight.

### 9.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

It must be noted that the level 1 values as previously defined are not typical of current island services. Indeed, the level 1 values were drawn up based on Ferry-type ships, generally larger in size and with a greater capacity than those used for island services<sup>1</sup>.

This is why companies providing sea transport services to and from islands should implement values above the level 1 values.

### 9.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 16 ("level 1 aggregate data - freight by sea") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the nature and capacity of the ship used from table 16. To achieve this, it must identify whether this involves day transport (day ferry) or night transport (night ferry).

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
- ▶ the distance travelled by these units, represented by "distance (service)".  
Assessing the distance travelled requires the use of a specific distance calculator incorporating seaways such as <http://www.portworld.com/map/>.

3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

<sup>1</sup> For illustration purposes, the level 1 values incorporate ferries for transporting passengers, vehicles and goods, whereas some ships travelling to and from islands do not transport vehicles and have a maximum capacity of 200 passengers.

## Fact sheet No. 9



### Example

A shipping company carries out a regular freight service from the continent to the islands. This company is looking to calculate its CO<sub>2</sub> information in relation to a transport service shipping 2 tonnes of goods from the continent to Molène island, 50 km away. The goods shipped travel with other goods sent to this island and other islands.

To calculate its CO<sub>2</sub> information using level 1 values, the company collects:

- ▶ the distance travelled by the service, by calculating the distance between the two ports. I.e. 50 km;
- ▶ the number of units transported corresponding to the weight of the goods shipped for the customer: 2 tonnes.

The company notes the aggregate data corresponding to the "CO<sub>2</sub> emission rate per unit transported and per km" for the "Day ferry" category of ship from table 16. I.e. 58 g CO<sub>2</sub> / t.km.

It then uses the following calculation formula:

$$\text{CO}_2 \text{ information} = 58 \text{ g CO}_2 / \text{t.km} \times 2 \text{ t} \times 50 \text{ km} = 5,8 \text{ kg CO}_2$$

## 9.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer, etc.), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport. To achieve this, the service provider collects the total quantity of fuel consumed during the period considered for this activity. These values, once divided by the total distance travelled by all of the ships for each segment of activity, are used to produce the energy source consumption rate for the means of transport;
- ▶ the number of units transported by the means of transport. For ferry transport, the service provider identifies the total gross weight of its load (vehicles + cargo) using transport statistics and the overall weight of the passengers transported using the tickets sold or via an occupancy study. It then draws up the mean weight transported per journey.

In this example, the service provider can create the corresponding level 2 aggregate data using the following formula:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
- ▶ the distance travelled by these units, represented by "distance (service)".

3. The calculation formula to apply to each service is as follows:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

## Fact sheet No. 9



### Example

A shipping company provides a transport service to and from 3 islands. The services are carried out via sea links in the form of a 150 km circle connected the continent to the 3 islands. The first island is located 30 km from the continent, the second 40 km from the first island, the third 50 km from the second island and the ship's return journey to the continent covers a distance of 30 km.

This example repeats that shown in fact sheet No. 24 "Transport of passengers by sea - to and from islands". Please refer to this example (example provided in § 24.4).

When shipping goods weighing a total of 8 tonnes from island A to island B:

$$\text{CO}_2 \text{ information} = 0,794 \text{ kg CO}_2 / \text{t.km} \times 8 \text{ t} \times 40 \text{ km} = 254 \text{ kg CO}_2$$



### 9.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ when using level 2 or 3 values, the period used to constitute the representative data sample to produce the level 2 or 3 data.

## 4.5. Freight by road

### 4.5.1. Reference data

#### 4.5.1.1. The energy source emission factors used

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 <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Pumped road diesel	Litre (ℓ)	0,58	2,49	3,07
	Pumped non-road diesel	Litre (ℓ)	0,58	2,49	3,07

Table 17: energy source emission factors - freight by road

#### 4.5.1.2. Level 1 values

The table hereinbelow presents the level 1 values for the freight by road.

This list of values cannot possibly cover all possible types of vehicle. The values that should be used are those provided in the row the closest to the vehicle used and type of transport operation performed. Where two energy sources are given for a vehicle, the mass of carbon dioxide emitted per kilometre is obtained by multiplying the rate of consumption of each energy source by the corresponding emission factor and then adding together the two numbers thus calculated.

Description (according to the nature of the vehicle and the type of transport service, indicating the energy source[s] 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)
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (mail, courier services) - Road diesel	0,26 tonnes	0,160 ℓ / km Road diesel
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (parcels) - Road diesel	0,46 tonnes	0,160 ℓ / km Road diesel
Straight truck with a GVW of 19 tonnes - Express - Road diesel	2,50 tonnes	0,270 ℓ / km Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery - Road diesel	6,00 tonnes	0,342 ℓ / km Road diesel
Straight truck with a GVW of 19 tonnes - Parcel delivery - Road diesel	2,50 tonnes	0,270 ℓ / km Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	7,10 tonnes	Road diesel: 0,342 ℓ / km Non-road diesel 0,070 ℓ / km
Straight truck with a GVW of 19 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	3,30 tonnes	Road diesel: 0,270 ℓ / km Non-road diesel 0,055 ℓ / km



Description (according to the nature of the vehicle and the type of transport service, indicating the energy source[s] 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)
Straight truck with a GVW of 7,5 tonnes - Miscellaneous goods - Road diesel fuel	0,90 tonnes	0,220 ℓ / km - Road diesel
Straight truck with a GVW of 12 tonnes - Miscellaneous goods - Road diesel fuel	1,80 tonnes	0,240 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 26 tonnes - Large volumes - Road diesel	6,00 tonnes	0,305 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 35 tonnes - Car carrier - Road diesel	6,00 tonnes	0,370 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/long-distance - Road diesel	12,50 tonnes	0,342 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/regional - Road diesel	12,50 tonnes	0,338 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Large volumes - Road diesel	12,50 tonnes	0,379 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - With refrigerated unit - Road diesel/non-road diesel	12,50 tonnes	Road diesel: 0,332 ℓ / km Non-road diesel 0,070 ℓ / km
Semi-trailer truck with a GCW of 40 tonnes - Public works truck - Road diesel	12,50 tonnes	0,427 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Grain truck - Road diesel	12,50 tonnes	0,405 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Container truck - Road diesel	12,50 tonnes	0,373 ℓ / km - Road diesel
Semi-trailer truck with a GCW of 40 tonnes - Tanker- Road diesel	12,50 tonnes	0,353 ℓ / km - Road diesel
Van with a volume of 8 metres cubed - Home moving - Road diesel	2,80 cubic metres	0,160 ℓ / km - Road diesel
Straight truck with a volume of 45 metres cubed - Home moving - Road diesel	15,80 cubic metres	0,270 ℓ / km - Road diesel
Semi-trailer truck with a volume of 90 metres cubed - Home moving - Road diesel	31,50 cubic metres	0,342 ℓ / km - Road diesel

Table 18: level 1 values - freight by road

## 4.5.1.3. Level 1 aggregate data

Description (according to the nature of the vehicle and the type of transport provided indicating the energy source[s] used)	CO <sub>2</sub>
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (mail, courier services) - Road diesel	1,889 g CO <sub>2</sub> / t.km
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (parcels) - Road diesel	1,068 g CO <sub>2</sub> / t.km
Straight truck with a GVW of 19 tonnes - Express - Road diesel	332 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery - Road diesel	175 g CO <sub>2</sub> / t.km
Straight truck with a GVW of 19 tonnes - Parcel delivery - Road diesel	332 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	178 g CO <sub>2</sub> / t.km
Straight truck with a GVW of 19 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	302 g CO <sub>2</sub> / t.km
Straight truck with a GVW of 7,5 tonnes - Miscellaneous goods - Road diesel fuel	750 g CO <sub>2</sub> / t.km
Straight truck with a GVW of 12 tonnes - Miscellaneous goods - Road diesel fuel	409 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 26 tonnes - Large volumes - Road diesel	156 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 35 tonnes - Car carrier - Road diesel	189 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/long-distance - Road diesel	84,0 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/regional - Road diesel	83,0 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Large volumes - Road diesel	93,1 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - With refrigerated unit - Road diesel/non-road diesel	98,7 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Public works truck - Road diesel	105 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Grain truck - Road diesel	99,5 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Container truck - Road diesel	91,6 g CO <sub>2</sub> / t.km
Semi-trailer truck with a GCW of 40 tonnes - Tanker- Road diesel	86,7 g CO <sub>2</sub> / t.km
Van with a volume of 8 metres cubed - Home moving - Road diesel	175 g CO <sub>2</sub> / m <sup>3</sup> .km
Straight truck with a volume of 45 metres cubed - Home moving - Road diesel	52,5 g CO <sub>2</sub> / m <sup>3</sup> .km
Semi-trailer truck with a volume of 90 metres cubed - Home moving - Road diesel	33,3 g CO <sub>2</sub> / m <sup>3</sup> .km

Table 19: level 1 aggregate data - freight by road



## Fact sheet No. 10

### Freight by road - full load consignments

#### 10.1. Activities concerned

Road transport service providers carrying out activities known as full load consignments perform freight services on behalf of a single customer.

#### 10.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses unladen distance and the level 1 value for the consumption rate.

#### 10.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data from table 19, in the line corresponding to the category of the vehicle used for the service.
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

**N.B.:** Potential unladen journeys are taken into account in this formula in the "number of units in the means of transport", by producing level 1 values for the number of units.



#### Example

Service shipping a full load consignment comprising 15 tonnes of goods from Paris to Lille in a semi-trailer truck with a GCW of 40 tonnes

1. The service provider notes the corresponding level 1 aggregate data from table 19: 84,0 g CO<sub>2</sub> / t.km is the CO<sub>2</sub> emission rate per unit transported and per km corresponding to the vehicle category "semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/long-distance".
2. It obtains the distance travelled either via an on-board computer system or using a distance calculator: 221 km.
3. The service provider then applies the formula:

**CO<sub>2</sub> information = 84,0 g CO<sub>2</sub> / t.km x 15 t x 221 km = 278 kg CO<sub>2</sub>**

## Fact sheet No. 10

### 10.4. Calculation method using unladen distance and the level 1 value for the consumption rate

This is an alternative to the aforementioned method, which assumes that the service provider has identified the unladen distance to be taken into account in the calculation. This may, for example, relate to the approach journey performed without load and before loading the goods subject to this service.

For further information regarding the integration of unladen journeys into the calculations, see chapter 2.3.

In this example, the calculation does not use the number of units transported.

1. The service provider notes the level 1 value corresponding to the nature and capacity of the means of transport used from table 18 ("level 1 values - freight by road").
2. It notes the energy source emission factor from table 19, i.e. in this example 3,07 kg CO<sub>2</sub> per litre.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the distance travelled for the service with load;
  - ▶ the distance allocated to the service without load.
4. The service provider thus obtains the total distance travelled by the ship to perform the service, represented by "total distance (service)".
5. For each service, calculation formula No. 3 must be applied:

$$\text{CO}_2 \text{ information} = \text{energy source consumption rate} \times \text{total distance (service)} \times \text{emission factor}$$



CO<sub>2</sub> Info

### 10.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ when using level 2 or 3 values, the period used to constitute the representative data sample to produce the level 2 or 3 data.

Methods for calculating distances and for taking into account unladen journeys



## Fact sheet No. 11

# Freight by road - partial load consignments

### 11.1. Activities concerned

Service providers whose activities involve partial load consignments perform combined transport services for several customers. This may involve a transporter's only activity or make up one component of the company's activities. For this type of activity, the service provider often groups together consignments for freight by collecting the goods from multiple locations.

### 11.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses combined level 3 values.

### 11.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data from table 19, in the line corresponding to the category of the vehicle used for the service.
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

#### Example

A service provider shipping goods by road is looking to calculate its CO<sub>2</sub> information for the partial load consignment services that it carries out, using level 1 values.

1. The service provider identifies:
  - ▶ the type of vehicle used for these services from the list provided in table 19 (in this case, this is a semi-trailer truck with a GCW of 40 t);
  - ▶ the corresponding level 1 aggregate data from table 19 is: 83,0 g CO<sub>2</sub> / t.km
2. Application to a transport service shipping 5 pallets representing 2,5 tonnes for a journey from Caen - Etampes in a semi-trailer truck with a GCW of 40 t.
  - ▶ The service provider collects the distance of the service performed using a road-based distance calculator: 286 km.
  - ▶ Then, the service provider applies the following formula:

**CO<sub>2</sub> information = 83,0 g CO<sub>2</sub> / t.km x 2,5 t x 286 km = 59,3 kg CO<sub>2</sub>**



## Fact sheet No. 11

### 11.4. Calculation method using level 3 values

Reminder: general information on level 3 values is provided in chapter 2.3.

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer, etc.), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport. To achieve this, the service provider collects the total quantity of fuel consumed during the period considered for this activity. These values, divided by the total distance travelled by all of the vehicles for each segment of activity, are used to produce the energy source consumption rate for the means of transport;
- ▶ the number of units transported by the means of transport.

In this example, the service provider can create the corresponding level 2 aggregate data using formula No. 5:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
- ▶ the distance travelled by these units, represented by "distance (service)".

3. The calculation formula to apply to each service is as follows:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$



#### Example

A carrier owns a fleet of 50 vehicles with a GVW of 7,5 and 12 tonnes, transporting partial load consignments on a regular basis. The carrier is looking to draw up level 3 values to calculate the CO<sub>2</sub> information for its services.

1. The company chooses to segment its activities per type of vehicle (7,5 and 12 t). It then collects the following data for its 12 t vehicle fleet over a 3-month period, which it deems will provide a representative sample of its activity:
  - ▶ 3 500 ℓ of diesel consumed;
  - ▶ 11 900 km travelled (with or without load);
  - ▶ 38 080 t.km performed (see chapter 2.3 to calculate the number of units transported).
2. It notes the energy source emission factor for "Non-road diesel": 3,07 kg CO<sub>2</sub> / ℓ.
3. It therefore draws up the corresponding level 3 values:
  - ▶ energy source consumption rate: 3 500 ℓ / 11 900 km = 0,294 ℓ / km;
  - ▶ number of units transported by the means of transport: 38 080 t.km / 11 900 km = 3,2 t (see chapter 2.3: this result incorporates unladen journeys).
4. The service provider then calculates the aggregate data using the aforementioned formula:
 
$$\text{Aggregate data (partial load consignment - 12 t)} = [0,294 \text{ ℓ / km} / 3,2 \text{ t}] \times 3,07 \text{ kg CO}_2 / \text{ℓ} = 282 \text{ g CO}_2 / \text{t.km}$$
5. Application to a given service: freight of 1,7 t over 150 km in a vehicle with a GVW of 12 t:
 
$$\text{CO}_2 \text{ information} = 282 \text{ g CO}_2 / \text{t.km} \times 1,7 \text{ t} \times 150 \text{ km} = 71,9 \text{ kg CO}_2$$

## Fact sheet No. 11

A small icon of a white card with a paperclip, containing the text "CO<sub>2</sub> Info".

CO<sub>2</sub> Info

### 11.5. *How must this information be transmitted to the beneficiary?*

Reminder: general information regarding this issue is provided in chapter 2.6.

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ when using level 2 or 3 values, the period used to constitute the representative data sample to produce the level 2 or 3 data.

Methods for calculating distances and for taking into account unladen journeys



## Fact sheet No. 12

### Freight by road - parcel delivery

#### 12.1. Activities concerned

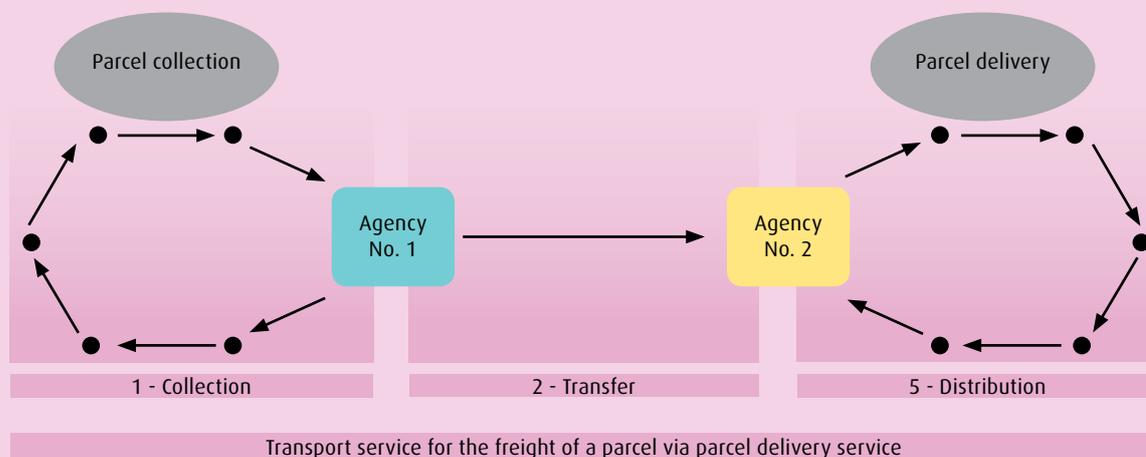
Parcel delivery activities consist in transporting parcels generally weighing less than 3 tonnes, essentially by road from the point of collection (the sender) to the end recipient.

#### 12.2. The calculation methods presented in this sheet

A transport service delivering parcels can be schematically described by the succession of three legs:

1. parcel collection and transport to a first agency; this agency is in principle a local goods collection and distribution point (for example on a regional scale); this form of vehicle use is known as "pick up" or "collection";
2. parcel transport between the 1<sup>st</sup> agency and a 2<sup>nd</sup> agency; this 2<sup>nd</sup> agency is located near to the delivery address and has the same function as the 1<sup>st</sup> agency, however in another geographic sector; this form of vehicle use is often called inter-agency "transfer";
3. parcel transport from the 2<sup>nd</sup> agency to the delivery address; this form of vehicle use is known as "distribution" or "delivery".

The outline below illustrates these three operations.



As stipulated in article 4 of the decree, the CO<sub>2</sub> information calculation consists in assessing the emissions of each leg, then in adding together the corresponding three values obtained.

However, when using level 1 values, the service provider may not know the agencies that were used to perform the service. It therefore isn't aware of the legs comprising the service.

## Fact sheet No. 12

Consequently, this fact sheet presents three different calculation methods:

- the 1<sup>st</sup> uses level 1 values - where the agencies used are known to the service provider;
- the 2<sup>nd</sup> uses level 1 values - where the agencies used are not known to the service provider;
- the 3<sup>rd</sup> uses level 3 values.

In practice, the service provider may be required to use different value levels in addition to different allocation methods for each leg comprising the service.

### 12.3. Calculation method using level 1 values - where the agencies used are known to the service provider

This more particularly applies to the case where the service provider is the parcel delivery company.

In principle, it is systematically aware of the agencies through which the parcels transit after their origin and destination.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner: **Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**, where the consumption rate and number of units transported are both level 1 values in this example.

#### 1. CO<sub>2</sub> information for the 1<sup>st</sup> leg (collection):

- ▶ for collection, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Parcel delivery - Road diesel";
- ▶ the service provider notes the corresponding level 1 aggregate data from table 19: 332 g CO<sub>2</sub>/t.km;
- ▶ to calculate the CO<sub>2</sub> information corresponding to a given collection leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ for each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (1}^{\text{st}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

#### 2. CO<sub>2</sub> information for the 2<sup>nd</sup> leg (transfer):

- ▶ for transfer, the vehicle category and type of transport operation are "Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery - Road diesel";
- ▶ the service provider notes the corresponding level 1 aggregate data from table 19: 175 g CO<sub>2</sub> / t.km;
- ▶ to calculate the CO<sub>2</sub> information corresponding to a given transfer leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ for each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (2}^{\text{nd}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

#### 3. CO<sub>2</sub> information for the 3<sup>rd</sup> leg (distribution):

- ▶ for distribution, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Parcel delivery - Road diesel";
- ▶ the service provider notes the corresponding level 1 aggregate data from table 19: 332 g CO<sub>2</sub> / t.km;
- ▶ to calculate the CO<sub>2</sub> information corresponding to a given distribution leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ for each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (3}^{\text{rd}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

## Fact sheet No. 12

4. CO<sub>2</sub> information for the service:

$$\text{CO}_2 \text{ information (service)} = \text{CO}_2 \text{ information (1st leg)} + \text{CO}_2 \text{ information (2nd leg)} + \text{CO}_2 \text{ information (3rd leg)}$$

**N.B. 1:** The method is the same for the "collection" and "distribution" leg.

**N.B. 2:** The distance travelled by the goods during the collection and distribution phases is not generally equal to that provided by a road-based distance calculator due to the round made by the vehicle. This distance is however permitted in this method, in the absence of level 1 values adapted to suit to the problems faced when calculating distances to be allocated to the service for collection and distribution rounds.



### EXAMPLE

A parcel delivery service provider is looking to calculate its CO<sub>2</sub> information for the services that it carries out, using level 1 values.

1. It collects the level 1 aggregate data for the three legs comprising each service, as described above:
  - ▶ collection: 332 g CO<sub>2</sub> / t.km;
  - ▶ transfer: 175 g CO<sub>2</sub> / t.km;
  - ▶ distribution: 332 g CO<sub>2</sub> / t.km.
2. Application to a given service: example of a parcel being carried from Etampes (91) to Marignane (13)
  - ▶ **1<sup>st</sup> leg (collection)**
    - ▶ The service provider identifies the agency making the collection: this is the Evry agency (91).
    - ▶ It assesses the distance to be travelled between Etampes and the Evry agency using a road-based distance calculator: 36 km.
    - ▶ It collects the weight of the parcel: 50 kg, i.e. 0,05 t.
    - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (1<sup>st</sup> leg) = 332 g CO<sub>2</sub> / t.km x 0,05 t x 36 km = 0,598 kg CO<sub>2</sub>
  - ▶ **2<sup>nd</sup> leg (transfer)**
    - ▶ The service provider identifies the agency making the delivery: this is the Marseilles agency (13).
    - ▶ It assesses the distance between the two agencies (Evry and Marseilles) using a road-based distance calculator: 745 km.
    - ▶ It uses the weight of the parcel: 50 kg, i.e. 0,05 t.
    - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (2<sup>nd</sup> leg) = 175 g CO<sub>2</sub> / t.km x 0,05 t x 745 km = 6,52 kg CO<sub>2</sub>
  - ▶ **3<sup>rd</sup> leg (distribution)**
    - ▶ The service provider assesses the distance that must be travelled between the Marseilles agency and the delivery address in Marignane using a road-based distance calculator: 25 km.
    - ▶ It uses the weight of the parcel: 50 kg, i.e. 0,05 t.
    - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (3<sup>rd</sup> leg) = 332 g CO<sub>2</sub> / t.km x 0,05 t x 25 km = 0,415 kg CO<sub>2</sub>
  - ▶ Finally, it adds together the three results:  
**CO<sub>2</sub> information (service) = 0,598 + 6,52 + 0,415 = 7,533 kg CO<sub>2</sub>**

### 12.4. Calculation method using level 1 values - where the agencies used are not known to the service provider

The service provider, when this is not the parcel delivery company, may not necessarily know the location of the collection and distribution agencies. In this event, the level 1 values defined in the order of 10 April 2012 do not allow for the incorporation of the emissions generated during collection and distribution rounds.

## Fact sheet No. 12

The method therefore consists in assessing the emissions in a similar manner using the type of vehicle used for the transfer service and the distance between the loading point and final destination. This produces a result that underestimates the CO<sub>2</sub> emissions produced. This practice must therefore be reserved to the sole situations where information is not available regarding the location of the different agencies.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The selected vehicle category and type of transport operation are "Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery - Road diesel";
2. The service provider notes the corresponding level 1 aggregate data from table 19: 175 g CO<sub>2</sub>/t.km;
3. To calculate the CO<sub>2</sub> information corresponding to a given parcel delivery service, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)"; as previously stated, this method contents itself with the distance between the collection point and the delivery point;
  - ▶ For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data item x weight (service) x distance (service)**

**N.B.:** In order to solve the problems encountered when assessing the emissions generated during collection and distribution rounds, level 1 values could be modified to take into account these emissions in a simple and systematic manner, even when the agencies used are not known.



### Example

A service provider is looking to calculate its CO<sub>2</sub> information for the parcel delivery services that it subcontracts to other service providers, using level 1 values.

1. It collects the level 1 aggregate data as previously described: 175 g CO<sub>2</sub>/t.km;
2. Application to a given service: a parcel being carried from Etampes (91) to Marignane (13)
  - ▶ It assesses the distance between the two points using a road-based distance calculator: 738 km.
  - ▶ It collects the weight of the parcel: 50 kg, i.e. 0,05 t.
  - ▶ It applies the following calculation formula:

**CO<sub>2</sub> information (service) = 175 g CO<sub>2</sub> / t.km x 0,05 t x 738 km = 6,46 kg CO<sub>2</sub>**

**N.B.:** By comparing this result with the example used in the previous method (§ 12.3.), it can be seen that, due to a lack of information regarding the collection and distribution circuits) the emissions generated by the service are underestimated.

## 12.5. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

The service provider looking to use level 3 values for its parcel delivery activities must firstly define a system for breaking down its activities into subgroups, then draw up the values corresponding to each subgroup.

This example covers the case of a service provider using the following breakdown:

- ▶ inter-agency transfer activities, all links combined;
- ▶ agency activities (collection and distribution), for each agency.

## Fact sheet No. 12

### 1. Method used for collection and distribution rounds

The method described below complies with that recommended by the European standard EN 16258.

- a. With regard to the distance calculation, the service provider chooses either the direct distance (shortest possible distance, as provided by any road-based distance calculator), or the orthodromic distance (which may also be obtained using a calculator and based on location coordinates or post codes); the service provider then applies this choice in a systematic manner.
- b. The service provider then collects the following information during the representative sampling period chosen by the latter and for each agency:
  - ▶ the quantity of source energy consumed by all of the agency's vehicles;
  - ▶ the sum of the tonne-kilometres corresponding to all of the goods collected or distributed, where:
    - ▶ the weight in tonnes is that of each consignment collected or distributed;
    - ▶ the distance in kilometres is the direct distance or the orthodromic distance (see point a) between the collection or distribution point of the consignment and the agency.
- c. The service provider therefore calculates the corresponding level 3 value, which is a consumption rate per tonne-kilometre, using the following formula:  
**Level 3 value (agency) = agency consumption / sum of tonne-kilometres**
- d. The service provider uses the energy source emission factor and obtains level 3 aggregate data, expressed in g CO<sub>2</sub> / t.km:  
**Level 3 aggregate data (agency) = level 3 value x emission factor**
- e. To calculate the CO<sub>2</sub> information relating to a given service, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the direct or orthodromic distance (see point a) corresponding to the collection or delivery point of these units, represented by "distance (service)";
  - ▶ for each service, calculation formula No. 6 must be applied:  
**CO<sub>2</sub> information (leg) = aggregate data (agency) x weight (service) x distance (service)**



### Example

A service provider is looking to calculate its CO<sub>2</sub> information for the parcel delivery services that it carries out, using level 3 values for its collection and distribution rounds.

1. By applying the previous method, it obtains level 3 aggregate data for each agency; it is assumed that it obtained the value of 155 g CO<sub>2</sub> / t.km for the Evry agency (91).
2. Application to a given service: a parcel is carried from Etampes (91) to Marignane (13) for the collection round between Etampes and the agency.
  - ▶ It identifies the agency that covers the collection point (in Etampes): in this case this is the Evry agency (91).
  - ▶ It uses the level 1 aggregate data for the Evry agency: 155 g CO<sub>2</sub>/t.km.
  - ▶ It collects the direct distance between the two points using a road-based distance calculator: 36 km.
  - ▶ It collects the weight of the parcel: 50 kg, i.e. 0,05 t.
  - ▶ It applies the following calculation formula:  
**CO<sub>2</sub> information (service) = 155 g CO<sub>2</sub>/ t.km x 0,05 t x 36 km = 0,279 kg CO<sub>2</sub>**

## Fact sheet No. 12

### 2. Method for transfer legs

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### a. Drawing up level 3 values

The service provider draws up level 3 values for its inter-agency transfer activities, all links combined, for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport;
- ▶ the number of units transported by the means of transport.

The service provider can therefore draw up the corresponding level 3 aggregate data item using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

#### b. Application to the CO<sub>2</sub> information calculation for a transfer leg of a given service

The service provider requires the following information:

- ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
- ▶ the distance travelled by these units, represented by "distance (service)";

c. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**



### 12.6. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this question is covered in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information must at least be given for the entire service corresponding for example to all operations performed as part of a contract.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ to produce level 3 values, the units used as a reference to calculate the reference values must be specified, in addition to the method applied to break down the activity into segments.
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the methods used to attribute values to the emissions generated during goods collection and delivery operations, and in particular the methods applied (orthodromic distance or direct distance) to allocate CO<sub>2</sub> emissions to these operations;
- ▶ the methods used to calculate distances and to allocate unladen journeys;
- ▶ the service provider can also, if so desired, provide further information, such as a detailed breakdown on the emissions generated for each shipping order making up the full service.



## Fact sheet No. 13

# Freight by road - temperature-controlled parcel delivery service

### 13.1. Activities concerned

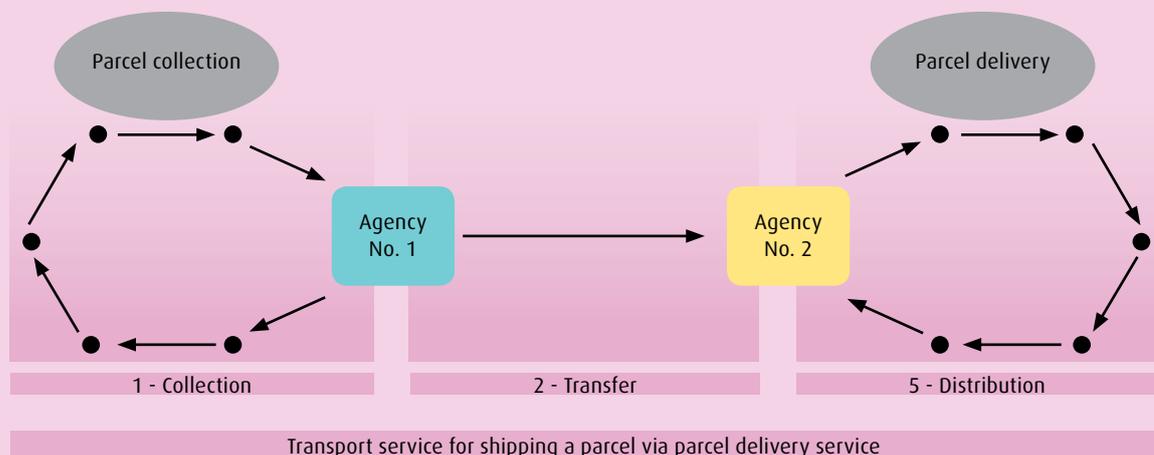
Temperature-controlled parcel delivery activities form a very specific category of parcel delivery services. This involves transporting parcels generally weighing less than 3 tonnes essentially by road from the collection point (from the sender) to the end recipient, while maintaining these parcels at the required temperature.

### 13.2. The calculation methods presented in this sheet

A transport service delivering parcels in a temperature-controlled environment can be schematically described by the succession of three legs:

1. parcel collection and transport in a temperature-controlled environment to a first agency; this agency is in principle a collection and distribution point for local goods (on a regional scale for example); this form of vehicle use is known as "pick up" or "collection";
2. parcel transport in a temperature-controlled environment between the 1<sup>st</sup> agency and a 2<sup>nd</sup> agency; this 2<sup>nd</sup> agency is located near to the delivery address and has the same function as the 1<sup>st</sup> agency, however in another geographic sector; this form of vehicle use is often called inter-agency "transfer";
3. parcel transport in a temperature-controlled environment from the 2<sup>nd</sup> agency to the delivery address; this form of vehicle use is known as "distribution" or "delivery".

The outline below illustrates these three operations.



As stipulated in article 4 of the decree, the CO<sub>2</sub> information calculation consists in assessing the emissions of each leg, then in adding together the corresponding three values obtained.

However, when using level 1 values, the service provider may not know the agencies that were used to perform the service. It therefore isn't aware of the legs comprising the service.

This sheet highlights the specific features of transport in a temperature-controlled environment in relation to the principles and examples of fact sheet No. 12 ("Freight by road - parcel delivery").

## Fact sheet No. 13

This uses the two calculation methods presented in fact sheet No. 12 with level 1 values, incorporating elements specific to the activity of "Parcel delivery in a temperature-controlled environment":

- the 1<sup>st</sup> method uses level 1 values - where the agencies used are known to the service provider;
- the 2<sup>nd</sup> method uses level 1 values - where the agencies used are not known to the service provider.

In practice, the service provider may be required to use different value levels in addition to different allocation methods for each leg comprising the service.

### 13.3. Calculation method using level 1 values - where the agencies used are known to the service provider

The method is similar to that described in chapter 12.3; this takes into account the additional emissions generated by the consumption of non-road diesel by the refrigeration unit.

This more particularly applies to the case where the service provider is the parcel delivery company.

In principle, it is systematically aware of the agencies through which the parcels transit after their origin and destination.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

#### 1. CO<sub>2</sub> information for the 1<sup>st</sup> leg (collection)

- ▶ For collection, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Parcel delivery (refrigerated) - Road/non-road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 302 g CO<sub>2</sub> / t.km.
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given collection leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (1<sup>st</sup> leg) = aggregate data x weight (service) x distance (service)**

#### 2. CO<sub>2</sub> information for the 2<sup>nd</sup> leg (transfer)

- ▶ For transfer, the vehicle category and type of transport operation are "Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery (refrigerated) - Road/non-road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 178 g CO<sub>2</sub> / t.km.
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given transfer leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (2<sup>nd</sup> leg) = aggregate data x weight (service) x distance (service)**

#### 3. CO<sub>2</sub> information for the 3<sup>rd</sup> leg (distribution):

- ▶ For distribution, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Parcel delivery (refrigerated) - Road/non-road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 302 g CO<sub>2</sub> / t.km.

## Fact sheet No. 13

- ▶ To calculate the CO<sub>2</sub> information corresponding to a given distribution leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:
 
$$\text{CO}_2 \text{ information (3rd leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

4. CO<sub>2</sub> information for the service:

$$\text{CO}_2 \text{ information (service)} = \text{CO}_2 \text{ information (1st leg)} + \text{CO}_2 \text{ information (2nd leg)} + \text{CO}_2 \text{ leg}$$

**N.B. 1:** The method is the same for the "collection" and "distribution" legs.

**N.B. 2:** The distance travelled by the goods during the collection and distribution phases is not generally equal to that provided by a road-based distance calculator due to the round made by the vehicle. This distance is however permitted in this method, in the absence of level 1 values adapted to suit to the problems faced when calculating distances to be allocated to the service for collection and distribution rounds.



### Example

A service provider delivering parcels in a temperature-controlled environment is looking to calculate its CO<sub>2</sub> information for the services that it carries out, using level 1 values.

1. It collects the level 1 aggregate data for the three legs comprising each service, as described above:
  - ▶ collection: 302 g CO<sub>2</sub> / t.km;
  - ▶ transfer: 178 g CO<sub>2</sub> / t.km;
  - ▶ distribution: 302 g CO<sub>2</sub> / t.km
2. Application to a given service: example of a parcel being carried from Etampes (91) to Marignane (13)
  - ▶ **1<sup>st</sup> leg (collection)**
    - ▶ The service provider identifies the agency making the collection: this is the Evry agency (91).
    - ▶ It assesses the distance to be travelled between Etampes and the Evry agency using a road-based distance calculator: 36 km.
    - ▶ It collects the weight of the parcel: 50 kg, i.e. 0,05 t.
    - ▶ It applies the following calculation formula:
 
$$\text{CO}_2 \text{ information (1st leg)} = 302 \text{ g CO}_2 / \text{t.km} \times 0,05 \text{ t} \times 36 \text{ km} = 0,544 \text{ kg CO}_2$$
  - ▶ **2<sup>nd</sup> leg (transfer)**
    - ▶ The service provider identifies the agency making the delivery: this is the Marseilles agency (13).
    - ▶ It assesses the distance between the two agencies (Evry and Marseilles) using a road-based distance calculator: 745 km.
    - ▶ It uses the weight of the parcel: 50 kg, i.e. 0,05 t.
    - ▶ It applies the following calculation formula:
 
$$\text{CO}_2 \text{ information (2nd leg)} = 178 \text{ g CO}_2 / \text{t.km} \times 0,05 \text{ t} \times 745 \text{ km} = 6,63 \text{ kg CO}_2$$
  - ▶ **3<sup>rd</sup> leg (distribution)**
    - ▶ The service provider assesses the distance that must be travelled between the Marseilles agency and the delivery address in Marignane using a road-based distance calculator: 25 km.
    - ▶ It uses the weight of the parcel: 50 kg, i.e. 0.05 t.
    - ▶ It applies the following calculation formula:
 
$$\text{CO}_2 \text{ information (3rd leg)} = 302 \text{ g CO}_2 / \text{t.km} \times 0,05 \text{ t} \times 25 \text{ km} = 0,378 \text{ kg CO}_2$$
  - ▶ Finally, it adds together the three results:
 
$$\text{CO}_2 \text{ information (service)} = 0,544 + 6,63 + 0,378 = 7,552 \text{ kg CO}_2$$

## Fact sheet No. 13

### 13.4. Calculation method using level 1 values - where the agencies used are not known to the service provider

The method is similar to that described in chapter 12.4. This takes into account the additional emissions generated by the consumption of non-road diesel by the refrigeration unit.

The service provider, when this is not the parcel delivery company, may not necessarily know the location of the collection and distribution agencies. In this event, the level 1 values defined in the order of 10 April 2012 do not allow for the incorporation of the emissions generated during collection and distribution rounds.

The method therefore consists in assessing the emissions in a similar manner using the type of vehicle used for the transfer service and the distance between the loading point and final destination. This produces a result that underestimates the CO<sub>2</sub> emissions produced. This practice must therefore be reserved to the sole situations where information is not available regarding the location of the different agencies.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The vehicle category and type of transport operation selected are "Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery (refrigerated) - Road/non-road diesel".
  - ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 178 g CO<sub>2</sub>/t.km
  - ▶ To calculate the CO<sub>2</sub> information corresponding to a given parcel delivery service, the service provider requires the following information:
2. the weight (number of units transported) of the service being assessed, represented by "weight (service)";
3. the distance travelled by these units, represented by "distance (service)"; as previously stated, this method contents itself with the distance between the collection point and the delivery point.
4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data item x weight (service) x distance (service)**

**N.B.:** In order to solve the problems encountered when assessing the emissions generated during collection and distribution rounds, level 1 values could be modified to take into account these emissions in a simple and systematic manner, even when the agencies used are not known.

#### Example

A service provider is looking to calculate its CO<sub>2</sub> information for the parcel delivery services performed in a temperature-controlled environment that it subcontracts to other service providers, using level 1 values.

1. It collects the level 1 aggregate data as previously described: 178 g CO<sub>2</sub> / t.km
2. Application to a given service: example of a parcel being carried from Etampes (91) to Marignane (13)
  - ▶ It assesses the distance between the two points using a road-based distance calculator: 738 km.
  - ▶ It collects the weight of the parcel: 50 kg, i.e. 0,05 t.
  - ▶ It applies the following calculation formula:

**CO<sub>2</sub> information (service) = 178 g CO<sub>2</sub>/ t.km x 0,05 t x 738 km = 6,57 kg CO<sub>2</sub>**

**N.B.:** By comparing this result with the example used in the previous method (§ 13.3.), it can be seen that, due to a lack of information regarding the collection and distribution circuits) the emissions generated by the service are underestimated.



## Fact sheet No. 13



### 13.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this question is covered in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must at least be given for the entire service corresponding for example to all operations performed as part of a contract.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ to produce level 3 values, the units used as a reference to calculate the reference values must be specified, in addition to the method applied to break down the activity into segments.
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the methods used to attribute values to the emissions generated during goods collection and delivery operations, and in particular the methods applied (orthodromic distance or direct distance) to allocate CO<sub>2</sub> emissions to these operations;
- ▶ the methods used to calculate distances and to allocate unladen journeys.

The service provider can also, if so desired, provide further information, such as a detailed breakdown on the emissions generated for each shipping order making up the full service.



## Freight by road - courier services

### Fact sheet No. 14

#### 14.1. Activities concerned

For "courier"-type transport services, the parcel is often shipped in a single vehicle between two points in the same urban and/or peri-urban zone.

#### 14.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 1<sup>st</sup> uses level 2 values.

#### 14.3. Calculation method using level 1 values

Unlike parcel delivery activities, no intra-modal transfer occurs during the distribution process. The mail is collected from the sender and directly transported to the recipient.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities covered by this fact sheet, the reference vehicle to be used is the "Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (mail, courier services)".
2. The service provider notes the level 1 aggregate data from table 19, in the line corresponding to the reference vehicle. The value is 1 889 g CO<sub>2</sub> / t.km.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

#### Example

A service provider is looking to calculate its CO<sub>2</sub> information for the courier services that it performs, using level 1 values.

1. It notes the aggregate data value in table 19: 1 889 g CO<sub>2</sub> / t.km;
2. Application to a given service: mail collected at Puteaux (92) and addressed to Vincennes (94):
  - ▶ The service provider notes the weight of the mail: 1,3 kg.
  - ▶ It calculates the distance travelled for the service using a distance calculator: 22 km.
  - ▶ It applies formula No. 6:

**CO<sub>2</sub> information = 1 889 g CO<sub>2</sub> / t.km x 0,0013 t x 22 km = 54,0 g CO<sub>2</sub>**



## Fact sheet No. 14

### 14.4. Calculation method using level 2 values

*Reminder: general information on level 2 values is provided in chapter 2.3.*

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate mean values for all of its activity.

This chapter covers an example where the service provider has produced level 2 values for each of the following two parameters:

- ▶ energy source consumption rate for the means of transport; here, the service provider can use the fuel purchases made or the quantity of fuel consumed collected for all of its vehicles, in addition to the distances travelled by its vehicles; the ratio between the two values is used to produce the consumption rate per kilometre for its entire transport fleet;
- ▶ the number of units transported by the means of transport; here, the service provider can use the parcel as a reference and not the weight: this solution is well suited to "courier" activities; refer to chapter 2.3 for this calculation.

In this example, the service provider can create the corresponding level 2 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)"; i.e. the "parcel" reference is used;
- ▶ the distance travelled by these units, represented by "distance (service)"; this may be the direct distance (provided by a distance calculator) or even an orthodromic distance if the service provider used this type of distance to draw up the level 2 value of the number of units transported by the means of transport.

3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

#### **Alternative method**

*The company may choose a very simplified methodology where the emissions are broken down and divided between the parcels (without taking into account weight or distance).*

*It thus draws up the level 2 values for each period using only the following information:*

- ▶ *the quantity of fuel consumed by all of its vehicles;*
- ▶ *the total number of parcels shipped.*

*In this case, the service provider uses the possibility stipulated in the second chapter of article 7 of the French decree No. 2011-1336, which authorises the company to implement a specific reference if this better suits its activities. In compliance with article 11 of this decree, it must therefore specify that a "specific" method has been used when transmitting the information.*

## Fact sheet No. 14



### Example

A transport service provider providing a courier service is looking to draw up level 2 values to calculate the CO<sub>2</sub> information to be transmitted to its customers.

1. Over a one-year period, the service provider collects the following information:
  - ▶ the quantity of fuel consumed by all of its vehicles: 45 000 ℓ of diesel;
  - ▶ the total distance travelled by the vehicles: 300 000 km;
  - ▶ 2 352 440 parcels.km performed (calculated using the direct distance for each parcel delivered).
2. It draws up the corresponding level 2 values:
  - ▶ energy source consumption rate:  $45\,000\ \ell / 300\,000\ \text{km} = 0,15\ \ell / \text{km}$ ;
  - ▶ number of units transported by the means of transport:  $2\,352\,440\ \text{parcels.km} / 300\,000\ \text{km} = 7,84\ \text{parcels}$ .
3. It notes the energy source emission factor (road diesel): 3,07 kg CO<sub>2</sub> / ℓ.
4. It can thus calculate the corresponding aggregate data:
 

**Aggregate data =  $[0,15\ \ell / \text{km} / 7,84\ \text{parcels}] \times 3,07\ \text{kg CO}_2 / \ell = 58,7\ \text{g CO}_2 / \text{parcels.km}$**
5. Application to a given service: a parcel being carried from Puteaux (92) to Vincennes (94)
  - ▶ The service provider notes the distance between the two points using a distance calculator: 22 km.
  - ▶ It applies formula No. 6:
 

**CO<sub>2</sub> information =  $58,7\ \text{g CO}_2 / \text{parcels.km} \times 1\ \text{parcel} \times 22\ \text{km} = 1,29\ \text{kg CO}_2$**



### 14.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

The method applied to inform the sender of the CO<sub>2</sub> generated by the service may vary according to the relationship between the carrier and the beneficiary. If this is an isolated order not forming part of a framework agreement and performed on behalf of a small company or individual, the information may in theory be presented at the time of order placement or when invoicing the courier service performed.

For a business connection forming part of a framework agreement, the quantity of CO<sub>2</sub> emitted may be transmitted to the customer in the form of a summary of all courier services performed within the scope of a contract (the service therefore corresponds to the entire contract).

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ to produce level 2 or 3 values, the units used as a reference to calculate these values must be specified, in addition to the period used to produce the representative data sample;
- ▶ the methods used to calculate distances (orthodromic distance, direct distance) and to allocate unladen journeys.



## Multi-modal freight - freight forwarders

### Fact sheet No. 15

#### 15.1. Activities concerned

freight forwarders are the stakeholders organising freight activities on behalf of their customers. Their expertise is founded on their capacity to manage any type of transport flow with numerous different modes and types of activity. They may own their own fleet of vehicles, however this generally only concerns a small part of the services organised, which are often subcontracted to shipping partners.

#### 15.2. The calculation methods presented in this sheet

This fact sheet presents three different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> reuses the subcontractor's information to draw up mean values;
- the 3<sup>rd</sup> involves producing a model.

#### 15.3. Calculation method using level 1 values

Until the 1<sup>st</sup> of July 2016, the freight forwarder can use level 1 values for all of its services (subcontracted and non-sub-contracted services), regardless of how many employees it has.

The use of level 1 values by a freight forwarder is no different from that of another transport service provider. The implementation of level 1 values therefore consists in:

1. Identifying the transport legs of the services being assessed.
2. Identifying for each leg:
  - ▶ the corresponding means of transport, to be selected from the level 1 values list; this may involve information transmitted by the subcontractor or a choice made by the freight forwarder according to the information available or type of activity;
  - ▶ the distance travelled by the goods.

Refer to the fact sheets containing examples of level 1 calculations for the different professions.

#### 15.4. Calculation method reusing the subcontractor's information to draw up mean values

The freight forwarder may choose to apply a method enabling it to render an account of the emissions provided by its subcontractors. One of the main difficulties is that the number of subcontractors can reach several hundred or thousand, and that each subcontractor processes numerous shipping orders.

Collecting CO<sub>2</sub> information from subcontractors for each transport order, then integrating this information directly into the calculation may therefore prove impossible with current information systems.

However, the freight forwarder may take into account subcontracted services by producing values from a former period incorporating subcontracted services. This requires specific processing as the information provided by the subcontractor involves the quantity of CO<sub>2</sub> emitted (and not a consumption rate and number of units transported or an emissions ratio per tonne.km). The freight forwarder must therefore keep a record of the subcontracted services by noting, for each service, the quantities of goods involved and their corresponding distances, in addition to the emissions declared by the subcontractor. If the subcontractor's information is not available or clearly erroneous, this information is reproduced using level 1 values.

## Fact sheet No. 15

When breaking down its activities, the freight forwarder may differentiate between the different modes of transport (sea, air, road, rail and river) or the different activities.

1. It therefore collects the following data over a one-year period for all services carried out and for each of its activities:

- ▶ the CO<sub>2</sub> quantities transmitted by the subcontractors;
- ▶ the corresponding number of tonne-kilometres (t.km).

2. It can then draw up a mean value for each activity, expressed in grams of CO<sub>2</sub> per tonne-kilometre, by comparing the sums of these two values.

3. These mean values can then be used to assess all subcontracted services for the corresponding activity, using the number of tonne-kilometres calculated for the service.

**N.B.:** This number of tonne-kilometres must be generated in the same manner when calculating the mean values and for the calculations performed for each service. The freight forwarder then uses this collated data to assess the services that it performs on behalf of its customers.

The frequency of the collation and update activities performed for these mean values is not fixed, meaning that the freight forwarder is free to define this frequency. However, these values must be updated so as to remain representative of the subcontractor's activities with regard to the freight forwarder.



### Example

For a given activity:

Transport subcontractor	Service	Activity	Tonne-kilometres	kg CO <sub>2</sub>
Carrier A	Service 1	Activity 1	10 t x 150 km	133 kg
Carrier A	Service 2	Activity 1	6 t x 120 km	64,8 kg
Carrier B	Service 3	Activity 1	8 t x 100 km	68,3 kg
...			...	...
...			...	...
<b>Total</b>			<b>458 640 t.km</b>	<b>57 330 kg CO<sub>2</sub></b>

For all services selected for activity 1, and based on the information provided by subcontractors, the freight forwarder can draw up a mean value for its activity 1 expressed in g CO<sub>2</sub> / t.km =  $\frac{\sum (\text{kg CO}_2) \times 1000}{\sum (\text{t.km})}$ .

Using this example, it produces the value of 125 g CO<sub>2</sub> / t.km. It then uses this mean value to assess all subcontracted services making up part of this activity 1, by multiplying the tonne-kilometres for each subcontracted consignment by 125 g CO<sub>2</sub> / t.km.

## 15.5. Calculation method involving producing a model

A model can also be developed for the CO<sub>2</sub> emissions generated by subcontracted activities<sup>1</sup>.

In order to achieve this, the service provider could use in-depth information obtained from its subcontractors to help choose the decisive criteria and configure the model's parameters. One condition that must be complied with is that the model must take into account all emissions generated by the activity<sup>2</sup>.

The service provider must therefore assess its overall emissions and take into account the emissions generated by its own vehicles and by those of its subcontractors, either by collecting the information transmitted when available and correct, or when this is not the case, by reproducing this information using level 1 values.

<sup>1</sup> Within the scope of level 3 methodologies, modelling is one possibility for breaking down activities.

<sup>2</sup> The definition of level 3 values provided in article 8-I of the French decree No. 2011-1336 clearly states that any breakdown must be comprehensive.

## Fact sheet No. 15

The service provider must then compare its overall emissions thus calculated with the total emissions obtained via the model during the reference period used. In the event of discrepancies, the service provider must adjust the model's parameters so that the two results are identical.

A small icon of a white card with a paperclip, containing the text "CO<sub>2</sub> Info".

CO<sub>2</sub> Info

### 15.6. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must at least be given for the entire service corresponding for example to all shipping orders drawn up as part of a contract.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information and the methods for reusing information transmitted by subcontractors;
- ▶ the method used to segment the activities when assessing data for the vehicle fleet and the method for assessing the calculation units including, where applicable, the conditions for sampling activity data.



## Fact sheet No. 16

### Multi-modal freight - express delivery

#### 16.1. Activities concerned

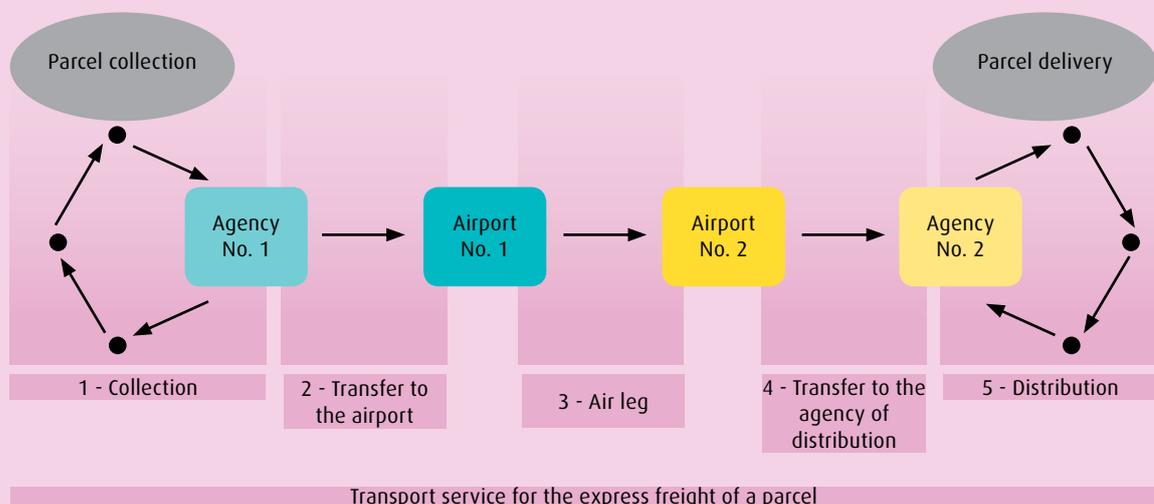
Express transport activities follow the same mode of operation as that of parcel delivery services. The difference here involves the deadlines. Whereas parcel delivery services involve delivery deadlines ranging from 24 to 72 hours, Express services offer shortened deadlines and guarantees.

Express transport activities also incorporate combinations of multi-modal transport (in particular using air transport), which may generate additional legs within the service.

#### 16.2. The calculation methods presented in this sheet

For simplification purposes, an express transport service shipping a parcel can be schematically described by a succession of five legs, as illustrated in the diagram below:

1. collection of the parcel and transport by road to a collection agency;
2. transport by road between the agency and its corresponding airport;
3. transport by air to the airport corresponding to the delivery destination;
4. transport by road to the distribution agency;
5. distribution of the parcel by road to its delivery address.



## Fact sheet No. 16

This fact sheet presents a calculation method using level 1 values, based on this five-leg description.

In practice, the leg attributed in this example to air transport may be performed using other modes of transport, and variations of this are possible.

For information on using values of higher levels (in particular level 2 or 3 values), refer to the corresponding fact sheets.

At each leg of the transport service, different data levels and different allocation methods may be implemented.

### 16.3. Calculation method using level 1 values

As stipulated in article 4 of the decree, the CO<sub>2</sub> information calculation consists in assessing the emissions of each leg, then in adding together the corresponding five values obtained.

This example more particularly concerns that of a service provider that is aware of the agencies and airports through which the parcels travel according to their origin and destination.

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. Reminder: this aggregate data is available for air transport in table 5 ("level 1 aggregate data - freight by air in a combi plane - links not known by the calculator") and table 7 ("level 1 aggregate data - freight by air in a cargo plane") and for road transport in table 19 ("level 1 aggregate data - freight by road"), and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

#### 1. CO<sub>2</sub> information for the 1<sup>st</sup> leg (collection)

- ▶ For collection, the vehicle category and type of transport operation are "Lightweight commercial vehicle with a GVW of 3,5 tonnes - Express (parcels) - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 1,068 g CO<sub>2</sub> / t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given collection leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:
 

**CO<sub>2</sub> information (1<sup>st</sup> leg) = aggregate data x weight (service) x distance (service)**

#### 2. CO<sub>2</sub> information for the 2<sup>nd</sup> leg (transfer to the airport)

- ▶ For this leg, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Express - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 332 g CO<sub>2</sub> / t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given transfer leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:
 

**CO<sub>2</sub> information (2<sup>nd</sup> leg) = aggregate data x weight (service) x distance (service)**

## Fact sheet No. 16

### 3. CO<sub>2</sub> information for the 3<sup>rd</sup> leg (air leg)

- ▶ Refer to fact sheet No. 1 for more comprehensive explanations.
- ▶ The service provider must know the type of flight made: combination flight (passengers and goods) or cargo-only flight.
- ▶ If this is a combination flight, it must consult the CO<sub>2</sub> aviation emissions calculator <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>:
  - ▶ if the link is known by the calculator, it notes the value provided (total emissions in kg of CO<sub>2</sub> / passenger), which it then converts into kg of CO<sub>2</sub> per kg or tonne of freight using the rule: "the standard weight of one passenger is 100 kg"; it thus obtains the aggregate data for the goods and for this link;
  - ▶ if the link is not known by the calculator, it must know the aircraft category (capacity in number of seats) and the flight distance; it then notes the corresponding level 1 aggregate data item from table 5.
- ▶ If this is a cargo-only flight, it must know the aircraft's "Maximum Take-Off Weight" (MTOW); it then notes the corresponding level 1 aggregate data item from table 7.
- ▶ The service provider must also use the weight (number of units transported) of the service being assessed, represented by "weight (service)".
- ▶ The calculation formula to be applied is formula No. 6:
  - ▶ For a link known by the calculator:

**CO<sub>2</sub> information (3<sup>rd</sup> leg) = aggregate data (link) x weight (service) x number of flights**

*The number of flights in this case is 1.*

- ▶ In the other two cases (combination flight - link unknown by the calculator or flight by cargo plane):

**CO<sub>2</sub> information (3<sup>rd</sup> leg) = aggregate data x weight (service) x distance (service)**

### 4. CO<sub>2</sub> information for the 4<sup>th</sup> leg (transfer to the distribution agency)

- ▶ For this leg, the vehicle category and type of transport operation are "Straight truck with a GVW of 19 tonnes - Express - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 332 g CO<sub>2</sub> / t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given transfer leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ The calculation formula to apply to each service is as follows:

**CO<sub>2</sub> information (4<sup>th</sup> leg) = aggregate data x weight (service) x distance (service)**

### 5. CO<sub>2</sub> information for the 5<sup>th</sup> leg (distribution):

- ▶ For distribution, the vehicle category and type of transport operation are "Lightweight commercial vehicle with a GVW of 3,5 tonnes - Express (parcels) - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 1 068 g CO<sub>2</sub>/t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given distribution leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) of the service being assessed, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:

## Fact sheet No. 16



### Example

An express transport service provider is looking to calculate its CO<sub>2</sub> information for the services that it carries out, using level 1 values.

1. It collects the level 1 aggregate data for each of the five potential legs comprising a service, as described above:
    - ▶ collection: 1 068 g CO<sub>2</sub> / t.km;
    - ▶ transfer: 332 g CO<sub>2</sub> / t.km;
    - ▶ distribution: 1 068 g CO<sub>2</sub> / t.km;
    - ▶ leg by air: as per the link.
  2. Application to a given service: example of the express freight of a parcel from Etampes (91) to Yokohama (Japan).
    - ▶ **1<sup>st</sup> leg (collection)**
      - ▶ The service provider identifies the agency making the collection: this is the Evry agency (91).
      - ▶ It assesses the distance to be travelled between Etampes and the Evry agency using a road-based distance calculator: 36 km.
      - ▶ It collects the weight of the parcel: 5 kg, i.e. 0,005 t.
      - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (1<sup>st</sup> leg) = 1 068 g CO<sub>2</sub> / t.km x 0,005 t x 36 km = 0,192 kg CO<sub>2</sub>
    - ▶ **2<sup>nd</sup> leg (transfer to the airport)**
      - ▶ The service provider identifies the departure airport: in this case this is Paris-CDG;
      - ▶ It assesses the distance between the Evry agency and the airport using a road-based distance calculator: 64 km.
      - ▶ It uses the weight of the parcel: 5 kg, i.e. 0,005 t.
      - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (2<sup>nd</sup> leg) = 332 g CO<sub>2</sub> / t.km x 0,005 t x 64 km = 0,106 kg CO<sub>2</sub>
    - ▶ **3<sup>rd</sup> leg (air transport)**
      - ▶ The service provider identifies the arrival airport: in this case this is Tokyo-Narita.
      - ▶ It identifies the type of flight: this is a combined passenger - goods flight.
      - ▶ The service provider consults the CO<sub>2</sub> aviation emissions calculator (<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>): the link between Paris-CDG and Tokyo-Narita is known.
      - ▶ It notes the value provided by the calculator (total emissions in kg of CO<sub>2</sub> / passenger): 1 071 kg of CO<sub>2</sub> per passenger.
      - ▶ It then converts this value using the rule where "the standard weight of one passenger is 100 kg"; it thus obtains the aggregate data for the goods and for this link: 10,7 kg of CO<sub>2</sub> per kg and per flight.
      - ▶ It applies calculation formula No. 6 (where the distance here is expressed in number of flights and in this example is equal to 1):  
CO<sub>2</sub> information (3<sup>rd</sup> leg) = 10,7 kg CO<sub>2</sub> / kg / flight x 5 kg + 1 flight = 53,5 kg CO<sub>2</sub>
    - ▶ **4<sup>th</sup> leg (transfer to the distribution agency)**
      - ▶ The service provider defines the corresponding distribution agency at the destination point: this is also located in Yokohama.
      - ▶ The service provider assesses the distance that must be travelled between the Tokyo-Narita airport and the Yokohama agency using a road-based distance calculator: 105 km.
      - ▶ It uses the weight of the parcel: 5 kg, i.e. 0,005 t.
      - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (4<sup>th</sup> leg) = 332 g CO<sub>2</sub> / t.km x 0,005 t x 105 km = 0,174 kg CO<sub>2</sub>
    - ▶ **5<sup>th</sup> leg (distribution)**
      - ▶ The service provider assesses the distance that must be travelled between the Yokohama agency and the delivery address in Yokohama using a road-based distance calculator: 8 km.
      - ▶ It uses the weight of the parcel: 5 kg, i.e. 0,005 t.
      - ▶ It applies the following calculation formula:  
CO<sub>2</sub> information (5<sup>th</sup> leg) = 1 068 g CO<sub>2</sub> / t.km x 0,005 t x 8 km = 0,043 kg CO<sub>2</sub>
- ▶ Finally, it adds together the five results:  
**CO<sub>2</sub> information (service) = 0,192 + 0,106 + 53,5 + 0,174 + 0,043 = 54,0 kg CO<sub>2</sub>**

## Fact sheet No. 16



CO<sub>2</sub> Info

**CO<sub>2</sub> information (5<sup>th</sup> leg) = aggregate data x weight (service) x distance (service)**

6. CO<sub>2</sub> information for the service:

**CO<sub>2</sub> information (service) = CO<sub>2</sub> information (1<sup>st</sup> leg) + CO<sub>2</sub> information (2<sup>nd</sup> leg) + CO<sub>2</sub> information (3<sup>rd</sup> leg) + CO<sub>2</sub> information (4<sup>th</sup> leg) + CO<sub>2</sub> information (5<sup>th</sup> leg)**

**N.B. 1:** The method is the same for the "collection" leg No. 1 and "distribution" leg No. 5.

**N.B. 2:** The distance travelled by the goods during the collection and distribution phases is not generally equal to that provided by a road-based distance calculator due to the round made by the vehicle. This distance is however permitted in this method, in the absence of level 1 values adapted to suit to the problems faced when calculating distances to be allocated to the service for collection and distribution rounds.

### 16.4. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must at least be given for the entire service corresponding for example to all shipping orders drawn up as part of a contract.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the methods applied for the goods collection and delivery operations (allocation);
- ▶ the methods used to calculate distances;
- ▶ the type of flight: combined or cargo-only.



## Fact sheet No. 17

# Multi-modal freight - unaccompanied combined rail-road freight

### 17.1. Activities concerned

A combined rail-road transport service (CRRT) can be broken down into both road and rail legs and occurs without swapping containers; this type of container is known as an Intermodal Transport Unit (ITU). It is generally proposed by a road-based transport service provider or transport operator.

The classic CRRT (covered in this sheet) is differentiated from the rolling highway (see fact sheet No. 19).

In a **classic CRRT** service, the goods, initially loaded from the factories or warehouses in containers, swap bodies or semi-trailers (ITUs) are transported by road to a rail terminal fitted with transshipment equipment. These ITUs are transferred and transported by train to the destination terminal. After having been transferred again onto a road-based vehicle, they are delivered to the recipient.



A **rolling highway** (also known as a rolling road) belongs to the combined rail-road transport category. It can be differentiated by the lack of transshipment operation: the road vehicle is positioned on the train via a "roll-on/roll-off" system and is located on carriages with lowered floors. Two possible configurations exist:

- ▶ accompanied mode (drivers, tractors and trailers all travel on the train);
- ▶ unaccompanied mode (only the tractors and/or trailers are loaded onto the carriages without their drivers).



In a classic CRRT service, combined rail-road transport operators perform the ITU transshipment operations and commercially run the rail leg, which is subcontracted to a rail operator.

The combined rail-road transport service corresponds to all of the following services:

- ▶ a pre-transport leg shipping the ITU by road from the sender's address to the operator's closest terminal;
- ▶ a rail transport leg shipping the ITU to the operator's terminal the closest to the destination;
- ▶ a post-transport leg shipping the ITU by road from the destination terminal to the ITU's delivery address.

### 17.2. The calculation methods presented in this sheet

This fact sheet presents the calculation method using level 1 values alone.

## Fact sheet No. 17

### 17.3. Calculation method using level 1 values

Reminder: general information on level 1 values is provided in chapter 2.3.

The following description presents the use of the level 1 **aggregate data**. Reminder: this aggregate data is available in table 10 ("level 1 aggregate data - freight by rail") and table 19 ("level 1 aggregate data - freight by road"), and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

It is assumed that the service provider knows the combined transport terminals used for the services offered.

#### 1. CO<sub>2</sub> information for the 1<sup>st</sup> leg (pre-transport)

- ▶ The vehicle category and type of transport operation are "Semi-trailer truck with a GCW of 40 tonnes - Regional/ miscellaneous goods - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 83,0 g CO<sub>2</sub> / t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given leg, the service provider requires the following information:
  - ▶ the weight (number of units transported) for the service being assessed, represented by "weight (service)"; in this example, this is the weight of the ITUs subject to the service;
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:
 
$$\text{CO}_2 \text{ information (1}^{\text{st}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

#### 2. CO<sub>2</sub> information for the 2<sup>nd</sup> leg (rail transport)

- ▶ The service provider notes the level 1 aggregate data from table 10 (3 values are provided in this table according to the density of the goods being shipped and the energy source used, which corresponds to the transfer mode used).
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given leg, the service provider requires the following information:
  - ▶ the weight of the ITUs subject to this service, represented by "weight (service)";
  - ▶ the volume of the ITUs;
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ The service provider must therefore calculate the density of the goods shipped by dividing the weight of the ITU by the volume of the ITU.
- ▶ It therefore selects the aggregate data corresponding to the density of the goods from the 3 values provided.
- ▶ For each service, calculation formula No. 6 must be applied:
 
$$\text{CO}_2 \text{ information (2}^{\text{nd}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

#### 3. CO<sub>2</sub> information for the 3<sup>rd</sup> leg (post-transport):

- ▶ The vehicle category and type of transport operation are "Semi-trailer truck with a GCW of 40 tonnes - Regional/ miscellaneous goods - Road diesel".
- ▶ The service provider notes the corresponding level 1 aggregate data from table 19: 83,0 g CO<sub>2</sub> / t.km
- ▶ To calculate the CO<sub>2</sub> information corresponding to a given segment, the service provider requires the following information:
  - ▶ the weight of the ITUs subject to this service, represented by "weight (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
- ▶ For each service, calculation formula No. 6 must be applied:
 
$$\text{CO}_2 \text{ information (1}^{\text{st}} \text{ leg)} = \text{aggregate data} \times \text{weight (service)} \times \text{distance (service)}$$

#### 4. CO<sub>2</sub> information for the full service:

$$\text{CO}_2 \text{ information (service)} = \text{CO}_2 \text{ information (1}^{\text{st}} \text{ leg)} + \text{CO}_2 \text{ information (2}^{\text{nd}} \text{ leg)} + \text{CO}_2 \text{ information (3}^{\text{rd}} \text{ leg)}$$

## Fact sheet No. 17



### 17.4. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used to calculate the information and in particular the potential use of an objective value;
- ▶ the energy sources used in addition to the energy source emission factors used in the calculation, above all if the service travels to or from a foreign country;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;

The methods and hypotheses used to calculate the density of the units transported.



## Fact sheet No. 18

# Multi-modal freight - rolling highway

### 18.1. Activities concerned

The rolling highway is one component of a combined rail-road freight service.

Its principle involves enabling the transport of heavy goods vehicles by rail in order to free up road traffic.

A rolling highway has the particular advantage of high frequencies, which makes this service more attractive.

### 18.2. The calculation methods presented in this sheet

This fact sheet presents two calculation methods relating to the rail leg of this service alone:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses objective values.

Level 1 values can be used, for example by transport operators when they have not received the required information from their subcontractors. More generally, these values may prove useful to companies resorting to the use of a rolling highway within the scope of a more global service.

Furthermore, rolling highways make up part of mass transport services, for which objective values can be used for a period of 3 years from their commissioning.

Refer to fact sheet No. 18 ("Freight - Unaccompanied combined rail-road freight") for pre-transport and post-transport legs.

### 18.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 10 ("level 1 aggregate data - freight by rail") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities covered by this fact sheet, the category of the vehicle and type of transport operation performed are represented by one of the twelve cases listed in table 10. When selecting these elements, the service provider must therefore:

- ▶ **calculate the density of the goods shipped.** This is represented by a ratio in kg/m<sup>3</sup> which compares the gross weight of the load and its gross volume;
- ▶ **identify the energy source used** for this rolling highway service. This can be one of four types: electricity consumed in France, electricity consumed in Europe, non-road diesel or mixed (electricity consumed in France / non-road diesel).

2. The service provider notes the level 1 aggregate data from table 10 corresponding to the density of the goods and the type of power used.

3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)"; in this example, this is the tonnage shipped by default (comprising the road vehicles and their loads);
- ▶ the distance travelled by these units, represented by "distance (service)"; this is the distance between the loading point and the unloading point of the heavy goods vehicle(s).

4. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 18



### Example

A service provider provides a rolling highway link over 900 km of an electrified route to transport semi-trailers.

1. The service provider collects the following general information:
  - ▶ the density value of the goods. It is assumed that the service provider knows the weight and volume of each vehicle transported. The corresponding statistics are used to draw up the sum of the weights and volumes shipped over a given period (for example 1 year). By dividing the sum of the weights by the sum of the volumes, the service provider obtains the mean density. Let's assume that the density thus obtained is 200 kg /m<sup>3</sup>;
  - ▶ the energy source used for the service is electricity consumed in France.
2. The level 1 data item corresponding to the aforementioned elements is noted from table 10. This is 2,2 g CO<sub>2</sub>/ t.km (goods density less than or equal to 249 kg / m<sup>3</sup>).
3. Application to a specific service
  - ▶ This example involves a transport service shipping a semi-trailer over this link.
  - ▶ It is assumed that the weight of the semi-trailer with load is 30 tonnes.
  - ▶ The distance travelled is 900 km.
  - ▶ The CO<sub>2</sub> information for this service is calculated as follows:  
**CO<sub>2</sub> information (service) = 2,2 g CO<sub>2</sub> / t.km x 30 t x 900 km = 59,4 kg CO<sub>2</sub>**

### 18.4. Calculation method using level 1 values and objective values

The French order of 10 April 2012 specifies that new mass rail-based transport services (including rolling highways) can use a fixed train fill rate of 50% for a maximum period of 3 years.

This takes into account the rise in power phase for new services by enabling the company to calculate its CO<sub>2</sub> emissions per service based on a fill rate objective that does not correspond to real fill rates.

The CO<sub>2</sub> information calculation formula used is formula No. 6, in which the objective value is the number of units transported by the means of transport:

$$\text{CO}_2 \text{ Information} = \text{Energy source consumption rate} \times \text{distance} \times \text{emission factor} \\ \times [\text{number of units transported for the service} / \text{objective value}]$$

## Fact sheet No. 18



### Example

A service provider provides a rolling highway service over 1 050 km of electrified route in France. It is looking to calculate its CO<sub>2</sub> information using the objective value.

1. The general information required for this calculation is as follows:
  - ▶ the service provider must use the train's maximum carrying capacity, expressed in tonnes. As per the order of 10 April 2012, the objective value for the number of units is 50 % of this capacity. Therefore, for a train with a maximum carrying capacity of 1 300 tonnes, the number of units is set to 650 tonnes;
  - ▶ in the absence of any information regarding the density of the goods being shipped, it may consider this to be between 250 and 399 kg/m<sup>3</sup> (this parameter has very little impact on the result of this calculation);
  - ▶ the energy source used for the service is electricity consumed in France.
2. Application to the CO<sub>2</sub> information calculation for shipping a semi-trailer weighing 30 tonnes
  - ▶ The service provider notes the energy source consumption rate of the means of transport corresponding to the electrical energy used and for a goods density of between 250 and 399 kg/m<sup>3</sup> from table 9 ("level 1 values - freight by rail"): 16,74 kWh / km.
  - ▶ It notes the electricity emission factor from table 8 ("energy source emission factors - rail transport"): 0,053 kg CO<sub>2</sub> / kWh.
  - ▶ The distance travelled by this service is: 1 050 km.
  - ▶ The calculation is made using the following formula:  
**CO<sub>2</sub> information = 16,74 kWh / km x 1 050 km x 0,053 kg CO<sub>2</sub> / kWh x [30 t / 650 t] = 43,0 kg CO<sub>2</sub>**



### 18.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this question is provided in chapter 2.6 of this guide.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used to calculate the information and in particular the potential use of an objective value;
- ▶ the energy sources used in addition to the energy source emission factors used in the calculation;
- ▶ the distance calculation methods used and where applicable, the reference distance calculator used;
- ▶ the methods and hypotheses used to calculate the density of the units transported.



## Multi-modal freight - moving home

### Fact sheet No. 19

#### 19.1. Activities concerned

The home moving sector falls under the regulations provided for the freight by road. This activity can take place on behalf of individuals or businesses.

Further to the mere transport of goods by road, which may involve full load consignments or grouped consignments, home moving companies can use various means of transport on behalf of their customers: combined rail-road, air transport or sea transport.

#### 19.2. The calculation methods presented in this sheet

This fact sheet presents the example of road transport, which corresponds to most home moving services, and provides two possible calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

#### 19.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 19 ("level 1 aggregate data - freight by road") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

1. For the activities covered by this fact sheet, the category of the vehicle used and type of transport operation performed depend on the case:
  - a. "van with a volume of 8 metres cubed - home moving - road diesel";
  - b. "van with a volume of 45 metres cubed - home moving - road diesel";
  - c. "semi-trailer truck with a volume of 90 metres cubed - Home moving - Road diesel".
2. The service provider must note the level 1 aggregate data from table 19, in the line corresponding to the category of the vehicle used.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)" expressed in volume and in m<sup>3</sup>;
  - ▶ the distance travelled by these units, represented by "distance (service)" in kilometres.
4. For each service, calculation formula No. 6 must be applied:
 
$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

## Fact sheet No. 19



### Example

A service provider is looking to calculate its CO<sub>2</sub> information for the home moving services that it performs, using level 1 values.

It uses vehicles such as a "semi-trailer truck with a volume of 90 metres squared".

1. It notes the level 1 aggregate data from table 19, in the line corresponding to the category of the vehicle used: 33,3 g CO<sub>2</sub> / m<sup>3</sup>.km
2. Application to a given service: example of a home moving service for a partial load consignment from Paris to Berlin
  - ▶ The service provider collects the number of units: 15 m<sup>3</sup>.
  - ▶ It notes the distance to be travelled using a distance calculator: 1 054 km.
  - ▶ It applies formula No. 6:  
**CO<sub>2</sub> information = 33,3 g CO<sub>2</sub> / m<sup>3</sup>.km x 15 m<sup>3</sup> x 1 054 km = 526 kg CO<sub>2</sub>**

### 19.4. Calculation method using level 2 values

*Reminder: general information on level 2 values is provided in chapter 2.3.*

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate mean values for all of its activity.

This chapter covers an example where the service provider has produced level 2 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport;
- ▶ the number of units transported by the means of transport.

In this example, the service provider can create the corresponding level 2 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)";
  - ▶ the distance travelled by these units, represented by "distance (service)".
3. For each service, calculation formula No. 6 must be applied:  
**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**



### Example

A home moving company uses a fleet of vehicles with a volume of 45m<sup>3</sup> for its activities.

1. Over a one-year period, the service provider collects the following information:
  - ▶ fuel consumption: 15 700 litres of diesel;
  - ▶ 74 300 km travelled (including unladen journeys);
  - ▶ 1 263 100 m<sup>3</sup>.km performed.
2. It therefore draws up the corresponding level 2 values:
  - ▶ energy source consumption rate: 15 700 ℓ / 74 300 km = 0,211 ℓ / km;
  - ▶ number of units transported by the means of transport: 1 263 100 m<sup>3</sup>.km / 74 300 km = 16,9 m<sup>3</sup>.
3. It notes the energy source emission factor for "Road diesel": 3,07 kg CO<sub>2</sub> / ℓ.
4. It can then calculate the level 2 aggregate data item in the following manner:  
**Aggregate data = [0,211 ℓ / km / 16,9 m<sup>3</sup>] x 3,07 kg CO<sub>2</sub> / ℓ = 38,3 g CO<sub>2</sub> / m<sup>3</sup>.km**
5. Application to a given service

The CO<sub>2</sub> information for a customer moving from Puteaux (92) to Emerainville (77) (distance of 41 km), for a volume of 15 m<sup>3</sup> is:

**CO<sub>2</sub> information = 38,3 g CO<sub>2</sub> / m<sup>3</sup>.km x 15 m<sup>3</sup> x 41 km = 23,6 kg CO<sub>2</sub>**

## Fact sheet No. 19

A small icon of a white rectangular tag with a paperclip at the top left corner. The tag contains the text "CO<sub>2</sub> Info" in a bold, sans-serif font.

### 19.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in gram, kilogram or tonne of CO<sub>2</sub> corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

#### 2) Further information

The beneficiaries may more particularly be informed of the following elements:

- ▶ the value levels used when calculating the information;
- ▶ for level 3 values, the segmentation method used;
- ▶ the type of fuel used;

# Chapter 5

## 5.1. Air passenger transport

5.1.1. Reference data

Fact sheet No. 20: Air passenger transport

## 5.2. Railway passenger transport

5.2.1. Reference data

Fact sheet No. 21: Railway passenger transport

## 5.3. River passenger transport

5.3.1. Reference data

Fact sheet No. 22: River passenger transport - cruises

## 5.4. Sea passenger transport

5.4.1. Reference data

Fact sheet No. 23: Combined sea transport (passengers and goods)

Fact sheet No. 24: Sea passenger transport - to and from islands

## 5.5. Individual passenger transport by road

5.5.1. Reference data

Fact sheet No. 25: Individual passenger transport - taxi drivers

Fact sheet No. 26: Individual passenger transport - taxi companies

Fact sheet No. 27: Individual passenger transport - car transport service provided by a driver (VTC)

Fact sheet No. 28: Individual passenger transport - Private passenger car with driver (VPR)

Fact sheet No. 29: Passenger transport by 2 or 3 wheelers

## 5.6. Passenger public transport by road

5.6.1. Reference data

Fact sheet No. 30: Passenger public transport - combustion engine-powered

Fact sheet No. 31: Passenger public transport - school transport services

## 5.7. Guided passenger transport

5.7.1. Reference data

Fact sheet No. 32: Passenger public transport - electricity-powered

Fact sheet No. 33: Passenger public transport - cable cars

## 5.8. Travel agent and tour operator activities

Fact sheet No. 34: Travel agent and tour operator activities

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# Application to passenger transport



## 5.1. Air passenger transport

### 5.1.1. Reference data

#### 5.1.1.1. The energy source emission factors used

The energy source emission factors required for air transport, provided by annex I of the French order of 10 April 2012, have been copied into the table below. The values are updated in the CO<sub>2</sub> aviation emissions calculator available at the following address: <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/decret.php>.

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Aviation fuel	Wide-cut jet fuel (jet B)	Litre (l)	0,488	2,480	2,968
	Aviation fuel (AvGas)	Litre (l)	0,488	2,480	2,968
	Kerosene (Jet A1 or Jet A)	Litre (l)	0,480	2,520	3,000

Table 20: energy source emission factors - air passenger transport

#### 5.1.1.1. Level 1 values and level 1 aggregate data

The French Civil Aviation Authority (DGAC) provides a CO<sub>2</sub> aviation emissions calculator, which is available at the following address: <http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>. Fact sheet No.s 1 and 20 describe how to use this calculator for air transport.

Two types of level 1 values exist:

1. the values relating to a link between two given airports; annex 2 provides information on drawing up these values. The calculator thus contains values for approximately 1 000 links;
2. the values relating to other links<sup>1</sup> that are not identified by the calculator (very few in number) are presented in table 21: ("data for air transport in a combi aircraft - links not identified by the calculator").

<sup>1</sup> Links with a frequency not exceeding two flights per week leaving France.

Consumption of kerosene in litres per kilometre per passenger, broken down into distance segments and aircraft category (capacity in number of seats)					
Distance (km)	0 to 50 seats	50 to 100 seats	100 to 180 seats	180 to 250 seats	More than 250 seats
0 - 1 000	0,1225	0,08125	0,05625	0,0525	
1 000 - 2 000	0,163	0,05625	0,04625	0,03875	
2 000 - 3 000	0,215	0,038	0,0425	0,038	
3 000 - 4 000			0,04125	0,04125	0,045
4 000 - 5 000			0,0525	0,055	0,04625
5 000 - 6 000			0,05125	0,04125	0,04
6 000 - 7 000				0,04	0,038
7 000 - 8 000				0,03625	0,038
8 000 - 9 000				0,04	0,041
9 000 - 10 000				0,03875	0,040
10 000 - 11 000					0,039
More than 11 000 km					0,040

Table 21: data for air transport in a combi aircraft - links not identified by the calculator

Source: CO<sub>2</sub> aviation emissions calculator, known values in September 2012



## Fact sheet No. 20

# Air passenger transport

## 20.1. Activities concerned

This application sheet mainly concerns airlines or structures organising or selling transport services by air.

The services subject to this information framework include all journeys departing from or travelling to a location in France. This information disclosure requirement is not compulsory when the aircraft travels between two airports located outside of France. See § 2.2.4 for more information.

## 20.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

Distances are assessed with the same rules as those in effect within the scope of the European Union Emissions Trading System (EU ETS) as per the provisions of articles L. 229-5 to L. 229-19 and R. 229-37 of the French environmental code.

One assessment method based on level 3 information can be drawn up in order to produce data according to different levels of activity: for example short, medium and long-distance journeys (other systems can be used to break down activities).

## 20.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use the CO<sub>2</sub> aviation emissions calculator provided by the DGAC (<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>).

1. The CO<sub>2</sub> calculator allows for estimating the quantity of CO<sub>2</sub> emitted during an air transport service for the main inland links and direct international flights departing from or travelling to a location in France.

### Example

For a one-way flight from Lyon St-Exupéry - Madrid Barajas, the calculator provides the following information:

- the flight distance (911 km);
- the total CO<sub>2</sub> emissions per passenger (209 kg CO<sub>2</sub>);
- the total emissions breakdown between the emissions generated during the upstream phase (34 kg CO<sub>2</sub>) and those generated during the operating phase (175 kg CO<sub>2</sub>);
- the energy consumption rate per passenger = 7,6 ℓ of kerosene per 100 km.

**The information that must be provided to the beneficiary in this case is 209 kg CO<sub>2</sub>.**



## Fact sheet No. 20

2. In the case of links for which the calculator does not provide direct information, level 1 values can be obtained using the "Decree of 24/10/2011" tab within the calculator, by providing:

- ▶ the distance of the flight in km and the distance between two airports, which can be estimated using websites such as <http://www.world-airport-codes.com/www.world-airport-codes.com>;
- ▶ the capacity of the aircraft in number of passenger seats. This information can be assessed according to the type of aircraft concerned.

The calculator provides the quantity of kerosene consumed per passenger per 100 km and the mean number of passengers transported on this type of flight. CO<sub>2</sub> information can thus be calculated using these level 1 values, the distance of the flight and the kerosene emission factor.



### Example

An airline operates a link between Nantes (France) and Bursa (Turkey) in a B737-800 aircraft. It is looking to calculate its CO<sub>2</sub> information for a one-way flight using level 1 values.

1. It must collect the following data:
  - ▶ the distance calculated between the airports is 2 560 km. This is obtained using a distance calculator for air travel;
  - ▶ the B737-800 has a seating capacity of 155 and therefore belongs to the aircraft category containing between 100 and 180 seats;
  - ▶ the level 1 values provided by the DGAC calculator are as follows:
    - ▶ the aircraft consumption rate per kilometre: 636 ℓ / 100 km i.e. 6,36 ℓ / km;
    - ▶ the average number of passengers per flight: 150.
2. It notes the kerosene emission factor from table 20 ("energy source emission factors - air transport"), of 3,00 kg CO<sub>2</sub> / ℓ.
3. Application to the service:
 

**CO<sub>2</sub> information = [(6,36 ℓ / km x 2 560 km) / 150 passengers] x 3,00 kg CO<sub>2</sub> / ℓ = 325,63 kg CO<sub>2</sub>.**

## 20.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer), then produce the corresponding values for each subgroup. In this example, possible segmentation systems are: the notion of a short/medium/long-distance journey, geographic areas of service, types of rotation (shuttles, regular lines, charters).

This chapter covers an example where the service provider has produced level 3 values by differentiating between each link for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport. The quantity of fuel consumed can be collected in an overall manner and divided by the number of flights made to obtain a mean consumption rate for each link. These production data are theoretically recorded;
- ▶ the number of units transported by the means of transport. The number of passengers and the quantity of freight must be assessed so as to draw up an average number of passengers and freight tonnage transported, weighted according to the distance travelled. The average number of load units (in kg or in tonnes) can thus be determined for the category considered.

In this example, the service provider can create the corresponding level 3 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

## Fact sheet No. 20

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these units, represented by "distance (service)" hereinafter.
3. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

### Example

An airline is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 3 values.

1. It chooses to break down its activities according to the type of regular line managed.
2. On the Paris-Stockholm (Sweden) link, the airline records the following data over a one-year period:
  - ▶ an annual fuel consumption of 1 309 540 litres of kerosene for 120 flights (return journeys).
  - ▶ an estimated average number of 160 passengers.
3. The airline notes the kerosene emission factor from table 20 ("energy source emission factors - air transport"): 3,00 kg CO<sub>2</sub> / ℓ.
4. It determines the energy source consumption rate per flight: 1 309 540 ℓ / 120 = 10 912,8 ℓ per flight.
5. The airline can thus calculate aggregate data for the Paris-Stockholm link:  
Aggregate data = [10 912,8 ℓ / 160 passengers] × 3,00 kg CO<sub>2</sub> / ℓ = 204,6 kg CO<sub>2</sub> / passenger.
6. Application to a given service.

Therefore, for one passenger on a flight from Paris to Stockholm using this airline, the quantity of CO<sub>2</sub> emitted is:

$$\text{CO}_2 \text{ information} = 204,6 \text{ kg CO}_2$$

For further information, the airline may provide the emissions from the upstream and operating phases. It can use the corresponding emission factors, which for kerosene are 0,48 kg CO<sub>2</sub> / ℓ for the upstream phase and 2,52 kg CO<sub>2</sub> / ℓ for the operating phase:

- ▶ the CO<sub>2</sub> emissions generated during the "upstream" phase for the means of transport are:  
[204,61 kg CO<sub>2</sub> / 3 × 0,48] = 32,73 kg CO<sub>2</sub>;
- ▶ the CO<sub>2</sub> emissions generated during the "operating" phase for the means of transport are:  
[204,61 kg CO<sub>2</sub> / 3 × 2,52] = 171,87 kg CO<sub>2</sub>.



CO<sub>2</sub> Info

## 20.5. How must this information be transmitted to the beneficiaries?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in kg or tonnes of CO<sub>2</sub> for the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

The beneficiary of this information may be one of two types:

- ▶ this may be the person directly benefiting from the service. In this case, the airline issuing the tickets or transport documents can display the CO<sub>2</sub> values on these documents;
- ▶ this may be an intermediary agent (travel agency, etc.), re-selling the service to a customer. In this case, the airline can provide this information within its booking system so that the travel agency provides this information in its commercial offer.

## Fact sheet No. 20

Particularly subject to competition and comparisons with international stakeholders, airlines can use information that differentiates between the "upstream phase" and the "operating phase".

### 2) Further information

Specific elements connected to the transmission of CO<sub>2</sub> information, and which may be brought to the attention of the beneficiaries are as follows:

- ▶ the value levels used to calculate the information (in the example provided in 20-4, these are the level 3 values for the aircraft consumption rate and the number of passengers transported);
- ▶ when drawing up level 3 values, the segmentation methods used to break down the activities must be specified;
- ▶ the methods used to calculate distances;
- ▶ the period used to collect the sample of representative data to produce level 2 or 3 data;
- ▶ the method used to assess the consumption rates (consumption per flight) and the number of passengers transported (counting fuel consumption and the number of passengers transported in one year).

## 5.2. Railway passenger transport

### 5.2.1. Reference data

#### 5.2.1.1. The energy source emission factors used

The energy source emission factors to be used for rail transport are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of the energy source	Emission factor (kg of CO <sub>2</sub> 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 Corsica	Kilowatt-hour	0,583	0,000	0,583
	Consumed in Europe (excluding France)	Kilowatt-hour	0,420	0,000	0,420
Diesel	Pumped non-road diesel	Litre (l)	0,58	2,49	3,070

Table 22: energy source emission factors - Railway passenger transport

#### 5.2.1.2. Level 1 values

The table hereinbelow presents the level 1 values for the railway passenger transport.

Description (according to the nature of the means of transport 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 the energy source per kilometre)
TGV high-speed train - Electricity	285 passengers	20,0 kWh/km
Mainline train - Electricity	188 passengers	20,0 kWh/km
Local express train - Electricity	80 passengers	13,5 kWh/km
Local express train - Non-road diesel	68 passengers	1,7 l/km

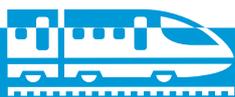
Table 23: level 1 values - railway passenger transport

### 5.2.1.3. Level 1 aggregate data

Level 1 aggregate data is defined by combining the level 1 values with the energy source emission factors.

Description (according to the nature of the means of transport and the energy source used)	CO <sub>2</sub> emissions rate per unit transported and per km
TGV high-speed train - Electricity	3,71 g CO <sub>2</sub> / passenger.km
Mainline train - Electricity	5,63 g CO <sub>2</sub> / passenger.km
Local express train - Electricity	8,94 g CO <sub>2</sub> / passenger.km
Local express train - Non-road diesel	76,8 g CO <sub>2</sub> / passenger.km

Table 24: level 1 aggregate data - railway passenger transport



## Railway passenger transport

### Fact sheet No. 21

#### 21.1. Activities concerned

Passenger rail transport operators provide means of transport as part of a public service enabling people to travel to or from a location in France.

#### 21.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

#### 21.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 24 ("level 1 aggregate data - Railway passenger transport") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data from table 24 corresponding to the type of train used from the list defined in the order (High-speed TGV train, Mainline train, Regional Express TER Train).
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of passengers transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these passengers, represented by "distance (service)" hereinafter. A distance calculator must be used to assess the distance travelled.
3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 21



### Example

A train operator providing a transport service between Paris and Roanne with a connection in Lyon, is looking to calculate the CO<sub>2</sub> information for its transport services using level 1 values.

1. The service provider identifies:
  - ▶ the type of train(s) used for these services, from the list provided in table 24 ("level 1 aggregate data - Railway passenger transport"); in this example, this is a High-Speed TGV Train for the journey from Paris to Lyon and a Regional Express TER Train for the journey from Lyon to Roanne;
  - ▶ level 1 aggregate data corresponding to the "High-Speed TGV Train" and "Regional Express TER Train" in table 24: 3,71 g CO<sub>2</sub> / passenger.km and 8,94 g CO<sub>2</sub> / passenger.km.
2. Application to a transport service for one passenger travelling from Paris to Roanne with a connection in Lyon.
  - ▶ The service provider collects the distance of the service performed. The service provider uses a distance calculator and obtains the distance from Paris - Lyon: 455 km and from Lyon - Roanne: 82 km.
  - ▶ Then, the service provider applies the following formula:
    - ▶ CO<sub>2</sub> information (emitted during the journey from Paris to Lyon) = 3,71 g CO<sub>2</sub> / passenger.km x 1 x 455 km = 1,69 kg CO<sub>2</sub>
    - ▶ CO<sub>2</sub> information (emitted during the journey from Lyon to Roanne) = 8,94 g CO<sub>2</sub> / passenger.km x 1 x 82 km = 733 g CO<sub>2</sub>

**CO<sub>2</sub> information (for the passenger making the journey from Paris to Roanne) = 1,69 kg CO<sub>2</sub> + 0,73 kg CO<sub>2</sub> = 2,42 kg CO<sub>2</sub>**

### 21.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values per type of train must firstly break down its activities into subgroups (type of service, type of train, links, etc.), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider has produced level 3 values for each of the following two parameters:

- ▶ the rate of consumption of the energy source used by the means of transport. The service provider collects the energy consumption values using all of the energy purchases made according to a breakdown per type of train. The quantity of energy consumed must cover the different empty journeys or relocation journeys made by the trains;
- ▶ the number of units transported by the means of transport. For each type of train, the service provider performs occupancy studies or analyses information on the services sold (tickets, bookings, passes). The operator produces an occupancy rate in passenger-kilometres.

In this example, the service provider can create the corresponding level 3 aggregate data for each type of train using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:
  - ▶ the number of passengers transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these units, represented by "distance (service)" hereinafter.
3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 21



### Example

A rail transport company is looking to calculate its CO<sub>2</sub> information for the transport services that it provides via a "mainline" train in mainland France (excluding Corsica), using level 3 values.

1. It decides to break down its activities according to the type of train used (TGV, mainline train, regional train, etc.) and per line.
2. Based on this breakdown system, it collects the following data over a one-year period:
  - ▶ a consumption of 850 000 kWh corresponding to 100 journeys and a distance of 45 500 km (the total length of the line being 455 kilometres);
  - ▶ a number of passenger-kilometres, estimated based on the number of tickets sold and number of subscriptions equal to 13 650 000 passenger-kilometres. (This figure corresponds to the sum of all kilometres travelled by all passengers having used the line.)
3. It notes the energy source emission factor for "electricity consumed in mainland France (excluding Corsica)" from table 22 ("energy source emission factors - Railway passenger transport"): 0,053 kg CO<sub>2</sub> / kWh.
4. It therefore draws up the corresponding level 3 values:
  - ▶ energy source consumption rate: 850 000 kWh / 455 km = 18,7 kWh / km;
  - ▶ number of passengers transported by the means of transport: 13 650 000 passenger-kilometres / 45 500 km = 300 passengers.
5. It can then calculate the aggregate data in the following manner:  
 Aggregate data = [18,7 kWh / km / 300 passengers] x 0,053 kg CO<sub>2</sub> / kWh = 3,30 g CO<sub>2</sub> / passenger.km
6. Application to a transport service for a family of 4 people travelling a distance of 150 km:  
**CO<sub>2</sub> information = 3,30 g CO<sub>2</sub> X 4 passengers x 150 km = 1,89 kg CO<sub>2</sub>**



### 21.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in kg or tonnes of CO<sub>2</sub> for the service. This information can be communicated in the quote (ex-ante) or after completion of the service. Information can be communicated in several different forms according to the method used to sell the service:

- ▶ for ticket sales for a given journey, including or not a specific booking (for example open tickets), this information is a value (in CO<sub>2</sub> emissions) corresponding to the specific journey and to the number of passengers. This customised information can be provided by the service provider upon ticket ordering and by any available means, for example a notice on the ticket sales website or a display panel at the ticket office to inform passengers of these emissions according to the place of departure and destination;
- ▶ for subscriptions or passes, this information can also be transmitted, as provided for by article 12 of the French decree No. 2011-1336, by displaying the quantity of CO<sub>2</sub> emitted per kilometre. This information can be made available for example by email or by a display panel located on-board the train.

## Fact sheet No. 21

### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used.

For the aforementioned example (21.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: railway passenger transport;
- ▶ the value levels used: level 3 for the quantity of energy consumed and the number of passengers transported;
- ▶ the method used or the emissions breakdown system implemented: breakdown and distribution between the passengers according to the number of passengers and distance travelled;
- ▶ the method used to calculate the consumption rate: taking into account the total amount of energy consumed over a 1-year period, including empty journeys, then calculating the quantity consumed per journey made with passengers;
- ▶ the energy sources (electricity) and the emission factors used.

## 5.3. River passenger transport

### 5.3.1. Reference data

#### 5.3.1.1. The energy source emission factors used

The energy source emission factors to be used for river transport are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of the energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Pumped non-road diesel	Litre (ℓ)	0,58	2,49	3,07

Table 25: fuel emission factors - river passenger transport

#### 5.3.1.2. Level 1 values

The table below presents the level 1 values for the river passenger transport.

Description	Number of units transported by the means of transport (taking into account empty journeys)	Rate of consumption of the energy source by the means of transport (in units of measurement of the quantity of the energy source per kilometre)
Passenger transport Non-road diesel	296 passengers	6,0 ℓ / km

Table 26: level 1 values - river passenger transport

#### 5.3.1.3. Level 1 aggregate data

Level 1 aggregate data is defined by combining the level 1 values with the energy source emission factors.

DESCRIPTION	CO <sub>2</sub> emissions rate per unit transported and per km
Passenger transport Non-road diesel	62,2 g CO <sub>2</sub> / passenger.km

Table 27: level 1 aggregate data - river passenger transport



## Fact sheet No. 22

# River passenger transport - cruises

## 22.1. Activities concerned

This activity concerns river cruises such as tourist cruises in major cities. A cruise is defined as a tourist trip on-board a boat. The cruise has a set distance with the boat generally travelling in circles. A cruise may include multiple boarding and disembarkation points.

## 22.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

## 22.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 27 ("level 1 aggregate data - river passenger transport") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the type of transport from table 27.
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:
  - ▶ the number of passengers transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these passengers, represented by "distance (service)" hereinafter. A distance calculator must be used to assess the distance travelled.
3. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$



### Example

A river transport operator is looking to use level 1 values to calculate the CO<sub>2</sub> information that it must issue to its customers.

1. The service provider identifies:
  - ▶ the level 1 aggregate data corresponding to this boat in table 27 ("level 1 aggregate data - river passenger transport"): 62,2 g CO<sub>2</sub> / passenger.km.

Application to the transport service for one passenger:

2. The service provider notes the distance of the service performed. The service provider uses a distance calculator and obtains the distance of 7 km.
3. Then, the service provider applies the following formula:

$$\text{CO}_2 \text{ information} = 62,2 \text{ g CO}_2 / \text{passenger.km} \times 1 \times 7 \text{ km} = 0,43 \text{ kg CO}_2$$

## Fact sheet No. 22

### 22.4. Calculation method using level 3 values

Reminder: general information on level 3 values is provided in chapter 2.3.

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of route, type of ship, etc.), then produce the corresponding values for each subgroup.

This chapter covers an example where the service provider produces level 3 values for each of the following two parameters:

- ▶ **the rate of consumption of the energy source used by the means of transport.** The service provider collects the quantity of fuel consumed over a given period (for example one year) for the different routes that it travels (if it has chosen this breakdown method). These consumption quantities can be collected using instruments installed on the boats. It notes the number of journeys made over the same period. By dividing the quantity of fuel consumed by the number of journeys made, the service provider obtains a consumption rate per journey for each of the routes in question;
- ▶ **the number of units transported by the means of transport.** Over a given period of time (for example one year), the service provider records, using the number of tickets sold or by counting the number of boardings, the mean number of passengers transported for each of the routes in question.

In this example, the service provider can create the corresponding level 3 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

#### 2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:

- ▶ the number of passengers transported for the service being assessed, represented by "number of units (service)" hereinafter;
- ▶ the distance travelled by these units, represented by "distance (service)" hereinafter.

#### 3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

#### Example

A river cruise operator is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 3 values.

1. It decides to break down its activities according to the routes travelled by its boats.
2. For one of its routes, it collects the following data over a one-year period:
  - ▶ the consumption of 4 640 litres of non-road diesel for a total number of 90 journeys;
  - ▶ the ships transported 23 840 passengers during this period.
3. It notes the energy source emission factor for "non-road diesel": 3,07 kg CO<sub>2</sub> /ℓ.
4. It therefore draws up the corresponding level 3 values:
  - ▶ the energy source consumption rate per journey: 4 640 ℓ / 90 journeys = 51,6 ℓ /km;
  - ▶ the number of passengers transported by the means of transport: 23 840 passenger-kilometres. / 90 journeys = 265 passengers per journey.
5. The operator can then calculate the aggregate data in the following manner:  
 Aggregate data = [51,6 ℓ /km / 265 passengers per journey] x 3,07 kg CO<sub>2</sub> /ℓ = 0,598 kg CO<sub>2</sub>/passenger (value for one journey)

Application to a given service for 2 passengers travelling a distance of 10 km:

**CO<sub>2</sub> information = 0,598 kg CO<sub>2</sub> x 2 passengers = 1,20 kg CO<sub>2</sub>**



## Fact sheet No. 22

A small icon of a white card with a paperclip, containing the text 'CO<sub>2</sub> Info'.

### 22.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in kg or tonnes of CO<sub>2</sub> for the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must be provided for the service as a whole. This customised information must be available either before or at the time of purchasing the tickets. The customer/beneficiary of this information can be either the future passenger purchasing the ticket or the travel agency or distributor selling the service. In either case, the provided information is the same.

This information can be provided by:

- ▶ a notice on the ticket sales website;
- ▶ a display panel at the point of sale (ticket office) specifying the quantity of CO<sub>2</sub> emitted for the different services on offer.

This information can also appear on the ticket issued to the customer (assuming that the ticket production system has been adapted to suit this method).

In the event of one ticket being issued for multiple passengers, this information can be provided for the service as a whole (for all passengers).

#### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (22.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: transport of passengers by tourist river cruise;
- ▶ the value levels used: level 3 for the quantity of energy consumed and the number of passengers transported;
- ▶ the method used or the emissions breakdown system implemented: breakdown and distribution between the passengers according to the number of passengers and distance travelled;
- ▶ the method used to calculate the consumption rate: taking into account the total amount of energy consumed over a 1-month period, including empty journeys, then calculating the quantity consumed per journey made with passengers;
- ▶ the energy sources used: non-road diesel, and the emission factors used.

The transport operator can, if so desired, provide further information such as the breakdown system implemented to divide emissions between the upstream and operating phases.

## 5.4. Sea passenger transport

### 5.4.1. Reference data

#### 5.4.1.1. The energy source emission factors used

The energy source emission factors to be used for sea transport are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Fuel oil	Heavy fuel oil ISO 8217 Classes RME to RMK	Kilogram	0,46	3,12	3,58
Diesel	Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,61	3,15	3,76

Table 28: fuel emission factors - combined sea transport (passengers and goods)

#### 5.4.1.2. Level 1 values

The table hereinbelow presents the level 1 values for the combined sea transport (passengers and goods).

For certain types of ship, two different fuels are provided. In this event, the mass of carbon dioxide emitted per kilometre is calculated by multiplying the rate of consumption of each energy source by the corresponding emission factor and then adding together the two numbers thus obtained. (see the example presented in fact sheet No. 24- paragraph 24.3.)

Description (according to the nature of the vessel and the type of transport provided)	Number of units transported by the means of transport (taking into account empty journeys)	Rate of consumption of the energy source by the means of transport (in units of measurement of the quantity of the energy source per kilometre)
Night ferry	418 passengers	Heavy fuel oil: 35,59 kg/km Marine diesel oil: 23,22 kg/km
	157 cars	Heavy fuel oil: 11,86 kg/km Marine diesel oil: 7,74 kg/km
	1 290 tonnes	Heavy fuel oil: 18,45 kg/km Marine diesel oil: 12,04 kg/km
Day ferry	304 passengers	Heavy fuel oil: 64,64 kg/km Marine diesel oil: 8,26 kg/km
	301 cars	Heavy fuel oil: 21,55 kg/km Marine diesel oil: 2,76 kg/km
	2 350 tonnes	Heavy fuel oil: 33,51 kg/km Marine diesel oil: 4,28 kg/km
Ro-Pax	483 passengers	Heavy fuel oil: 62,10 kg/km Marine diesel oil (1)
	224 cars	Heavy fuel oil: 20,70 kg/km Marine diesel oil (1)
	1 730 tonnes	Heavy fuel oil: 32,20 kg/km Marine diesel oil (1)

(1) Low indeterminate value, to be considered a null value.

Table 29: level 1 values - combined sea transport (passengers and goods)

### 5.4.1.3. Level 1 aggregate data

Level 1 aggregate data is defined by combining the level 1 values with the energy source emission factors.

Description (according to the nature of the vessel and the type of transport provided)	CO <sub>2</sub> emissions rate per unit transported and per km
Night ferry	514 g CO <sub>2</sub> / passenger.km
	456 g CO <sub>2</sub> / car.km
Day ferry	863 g CO <sub>2</sub> / passenger.km
	291 g CO <sub>2</sub> / car.km
Ro-Pax	460 g CO <sub>2</sub> / passenger.km
	331 g CO <sub>2</sub> / car.km

Table 30: level 1 aggregate data - combined sea transport (passengers and goods)



## Fact sheet No. 23

# Combined sea transport (passengers and goods)

## 23.1. Activities concerned

Sea passenger transport are mostly performed by ships transporting both passengers and goods.

By way of illustration, the sea links between France and England fall within this category.

## 23.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

The French decree No. 2011-1336 stipulates that the goods (including vehicles) - passenger breakdown must take place according to the number of decks. Energy consumption can therefore be allocated to passengers, vehicles and goods according to several different methods.

## 23.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 30 ("level 1 aggregate data - combined transport of passengers and goods by sea") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

1. The reference ships used for the activities covered in this fact sheet are the ferry or Ro-Pax<sup>1</sup> in table 30.
2. The service provider notes the level 1 aggregate data from this table in the line corresponding to the vehicle whose type and period (day or night) match the service provided.
3. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:
  - ▶ the number of passengers transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ The distance travelled by these units, represented by "distance (service)" hereinafter. This can take place using a marine distance calculator.
4. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

<sup>1</sup> A combined ship or Ro-pax ship, derived from the English acronym Roll-On-Roll-Off-Passenger-ship, is a roll on/roll off ship also capable of transporting passengers. This is therefore called a combined transport ship, designed to perform transport services similar to that of a cargo ship carrying containers, lorries and goods, and to that of a ferry, transporting passengers and their vehicles.

## Fact sheet No. 23



### Example

A shipping company operating a crossing using a fleet of ferry ships that operate during the day, is looking to calculate the CO<sub>2</sub> information for its transport services using level 1 values.

1. The company identifies:
  - ▶ the category of ship corresponding to its operations from those provided in table 30.
  - ▶ It is assumed that this is a day ferry. The level 1 aggregate data corresponding to the "day ferry" ships from table 30 is:
    - ▶ Per passenger = 863 g CO<sub>2</sub> / km;
    - ▶ Per car = 291 g CO<sub>2</sub> / km.
2. Application to the transport service for a crossing travelling a distance of 450 km for 4 passengers and their car:
  - ▶ The shipping company uses the following formula to calculate its CO<sub>2</sub> information:
    - ▶ CO<sub>2</sub> information for all 4 passengers = 863,38 g CO<sub>2</sub> / km x 4 x 450 km = 1,55 t CO<sub>2</sub>
    - ▶ CO<sub>2</sub> information for the vehicle = 290,78 g CO<sub>2</sub> / km x 1 x 450 km = 130,85 kg CO<sub>2</sub>

**CO<sub>2</sub> information (for a crossing travelling a distance of 450 km for all four passengers and their vehicle)**  
 = 1,55 t CO<sub>2</sub> + 0,13 t CO<sub>2</sub> = 1,68 t CO<sub>2</sub>

### 23.4. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, type of customer), then produce the corresponding values for each subgroup. In this example, the activities can be broken down according to the different lines operated by the company.

This chapter covers an example where the service provider has produced level 3 values per line for each of the following two parameters:

- ▶ **the rate of consumption of the energy source used by the means of transport.** The service provider collects its Heavy Fuel Oil and Marine Diesel Oil consumptions over a given period (for example one year) for the link concerned. These consumption quantities can be collected using instruments installed on the ships. It calculates the number of journeys made over the same period. By dividing the quantity of fuel consumed by the number of journeys made, the service provider obtains a consumption rate per journey:
  - ▶ the service provider identifies the number of passenger decks and the number of goods decks on each ship travelling along this line. The quantities of fuel consumed must be divided between the passengers and goods according to the number of respective decks.
  - ▶ if the goods decks are used both for heavy goods vehicles and lightweight vehicles (cars, caravans, camping cars or motorcycles owned by the passengers), the quantity of fuel consumed for the goods decks can be broken down according to the respective surface area used for the heavy goods vehicles on the one hand and for the lightweight vehicles on the other.
- ▶ **the number of units transported by the means of transport.** The number of passengers and lightweight vehicles transported and the quantity of freight shipped must be assessed so as to draw up the average number of passengers, lightweight vehicles and freight tonnage transported for each line, weighted according to the distance travelled.

In this case, the service provider may generate the corresponding level 3 aggregate data using formula No. 5:

**Aggregate data = [Consumption rate / number of units transported by the means of transport] x emission factor**

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:

- ▶ the number of units transported for the service being assessed, represented by "number of units (service)" hereinafter;
- ▶ the distance travelled by these units, represented by "distance (service)" hereinafter.

3. For each service, calculation formula No. 6 must be applied:

**CO<sub>2</sub> information (service) = aggregate data x number of units (service) x distance (service)**

## Fact sheet No. 23



### Example

A shipping company is looking to calculate its CO<sub>2</sub> information for the transport services that it provides for a given sea link using level 3 values.

1. It decides to break down its transport activities per ship and per link.
2. Based on this segmentation, for a Ropax ship operating a given link and having 3 passenger decks and 2 decks reserved for lightweight vehicles (cars, caravans, camping cars, motorcycles, etc.) and heavy goods vehicles, it collects the following data over a 1-month period:
  - ▶ 40 journeys are made, travelling a distance of 150 km;
  - ▶ the quantity of Heavy Fuel Oil (HFO) consumed is 480 000 kg and the quantity of Marine Diesel Oil (MDO) consumed is 54 000 kg;
  - ▶ according to operating statistics, the ship transported:
    - ▶ 12 000 passengers, i.e. an average 300 passengers per journey;
    - ▶ 12 000 lightweight vehicles, i.e. an average 300 lightweight vehicles per journey, occupying a mean surface area of 8,8 m<sup>2</sup> per lightweight vehicle;
    - ▶ 6 000 heavy goods vehicles, i.e. an average 150 heavy goods vehicles per journey, occupying a mean surface area of 44,2 m<sup>2</sup> per heavy goods vehicle.
3. The shipping company notes the HFO emission factor (3,58 kg CO<sub>2</sub> / kg) and MDO emission factor (3,76 kg CO<sub>2</sub> / kg) from table 28 ("fuel emission factors - combined transport of passengers and goods by sea"),
4. It draws up the level 3 values corresponding to this link:
  - ▶ **energy source consumption rate per journey:**
    - ▶ 480 000 kg of HFO / 40 journeys = 12 000 kg of HFO / journey;
    - ▶ 54 000 kg of MDO / 40 journeys = 1 350 kg of MDO / journey.
  - ▶ **the ship's consumption must then be divided between the 3 passenger decks and the 2 vehicle decks:**
    - ▶ HFO consumption allocated to the 3 passenger decks: 12 000 kg x 3 / 5 = 7 200 kg;
    - ▶ HFO consumption allocated to the 2 vehicle decks: 12 000 kg x 2 / 5 = 4 800 kg;
    - ▶ MDO consumption allocated to the 3 passenger decks: 1 350 kg x 3 / 5 = 810 kg;
    - ▶ MDO consumption allocated to the 2 vehicle decks: 1 350 kg x 2 / 5 = 540 kg.
  - ▶ **The consumption allocated to the decks must then be broken down as follows:**
    - ▶ per passenger for the passenger decks: (7 200 kg / 300) = 24 kg of HFO per passenger and (810 kg / 300) = 2,7 kg MDO per passenger.
    - ▶ per occupied surface area for the vehicle decks:
      - for lightweight vehicles: (4 800 kg x 8,8 m<sup>2</sup>) / [(300 x 8,8 m<sup>2</sup>) + (150 x 44,2 m<sup>2</sup>)] = 4,56 kg of HFO per lightweight vehicle and (540 kg x 8,8 m<sup>2</sup>) / [(300 x 8,8 m<sup>2</sup>) + (150 x 44,2 m<sup>2</sup>)] = 0,51 kg of MDO per lightweight vehicle;
      - for heavy goods vehicles: (4 800 kg x 44,2 m<sup>2</sup>) / [(300 x 8,8 m<sup>2</sup>) + (150 x 44,2 m<sup>2</sup>)] = 22,89 kg of HFO per heavy goods vehicle and (540 kg x 44,2 m<sup>2</sup>) / [(300 x 8,8 m<sup>2</sup>) + (150 x 44,2 m<sup>2</sup>)] = 2,57 kg of MDO per heavy goods vehicle.
5. The aggregate data for one link and per passenger, lightweight vehicle and heavy goods vehicle, is calculated in the following manner:
  - ▶ CO<sub>2</sub> information (1 passenger) = [24 kg x 3,58 kg CO<sub>2</sub> / kg] + (2,7 kg x 3,76 kg CO<sub>2</sub> / kg) = 96,07 kg CO<sub>2</sub>;
  - ▶ CO<sub>2</sub> information (1 lightweight vehicle) = [4,56 kg x 3,58 kg CO<sub>2</sub> / kg] + (0,51 kg x 3,76 kg CO<sub>2</sub> / kg) = 18,24 kg CO<sub>2</sub>;
  - ▶ CO<sub>2</sub> information (1 heavy goods vehicle) = [22,89 kg x 3,58 kg CO<sub>2</sub> / kg] + (2,57 kg x 3,76 kg CO<sub>2</sub> / kg) = 91,61 kg CO<sub>2</sub>.
6. Application to a service corresponding to an outward-return crossing for 2 passengers and one lightweight vehicle.
 

**CO<sub>2</sub> information = (2 passengers x 2 x 96,07 kg of CO<sub>2</sub>) + (1 lightweight vehicle x 2 x 18,24 kg of CO<sub>2</sub>) = 402,5 kg of CO<sub>2</sub>**

## Fact sheet No. 23



CO<sub>2</sub> Info  
2

### 23.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in kg or tonne of CO<sub>2</sub> corresponding to the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must be provided for the service as a whole. This customised information must be available either before or at the time of purchasing the tickets. The customer/beneficiary of this information can be either the future passenger purchasing the ticket or the travel agency or distributor selling the service. In either case, the information to be provided is the same.

This information can be provided by:

- ▶ a notice on the ticket sales website;
- ▶ a display panel at the point of sale (ticket office) specifying the quantity of CO<sub>2</sub> emitted for the different services (transport of a heavy goods vehicle accompanied or not by its driver, transport of passengers with or without a vehicle, by listing the different possibilities according to the number of passengers, etc.).

This information can also appear on the ticket issued to the customer (assuming that the ticket production system has been adapted to suit this method).

In the event of one ticket being issued for multiple passengers, this information can be provided for the service as a whole (for all passengers and, where applicable, for the vehicle).

#### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used.

For the aforementioned example (21.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: combined transport of passengers and goods by roll on/roll off ship;
- ▶ the value levels used: level 3 for the quantity of fuel consumed and the number of passengers transported;
- ▶ segmentation per activity: activity break down per regular line managed by the operator;
- ▶ the method used or emission break down system implemented: distributing emissions between the vehicles and passengers according to the number of decks then according to the vehicle surface area and number of passengers;
- ▶ the method used to calculate the consumption rate: taking into account the total amount of fuel consumed, including empty journeys, then calculating the quantity consumed per journey made with goods and passengers;
- ▶ the method used to calculate the number of vehicles and passengers transported: mean values calculated using operating data;
- ▶ the fuels used: Heavy fuel oil and Marine diesel oil, specifying the emission factors used.

The transport operator can, if so desired, provide further information such as the breakdown system implemented to divide emissions between the upstream and operating phases.



## Fact sheet No. 24

# Sea passenger transport - to and from islands

## 24.1. Activities concerned

The services travelling to and from islands involve passenger transport, with sea links between the continent and the islands or inter-island links.

One example of this type of service are the sea links to and from the islands off of the coast of Brittany (Ouessant, Molène, etc.).

## 24.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 3 values.

**Note:** The level 1 values were drawn up based on ferry ships, generally larger in size and with a greater capacity than the ships used for island services<sup>1</sup>. The results obtained from these level 1 values are in theory more advantageous than this sector's real average emission levels. These values shall be improved during level 1 value update operations, however it should be noted that their capacity to represent activities travelling "to and from islands" is not optimal.

This is why shipping companies providing services to and from islands are asked to privilege information calculated using level 2, 3 or 4 values.

## 24.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 30 ("level 1 aggregate data - combined transport of passengers and goods by sea") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the type of ferry from table 30. It must therefore identify whether this involves day transport (day ferry) or night transport (night ferry) according to the transport period;
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following information:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these units, represented by "distance (service)" hereinafter. A specific distance calculator must be used to assess distance, integrating seaways such as <http://www.portworld.com/map/>, which can be used to calculate the distance between two ports.
3. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

<sup>1</sup> For illustration purposes, the level 1 values incorporate ferries for transporting passengers, vehicles and goods, whereas some ships travelling to and from islands do not transport vehicles and have a maximum capacity of 200 passengers.

## Fact sheet No. 24



### Example

A shipping company performs a transport service making crossings between the continent and an island using a ferry ship operating during the day. It is looking to calculate the CO<sub>2</sub> information for the transport services that it carries out using level 1 values.

1. The company identifies:
  - ▶ the category of ship corresponding to its operations from those provided in table 30. In this example, this is a day ferry;
  - ▶ the level 1 aggregate data corresponding to the "day ferry" in table 30: for one passenger = 863 g CO<sub>2</sub> / km.
2. Application to the transport service for a family of 4 on a crossing from the continent to the island, located 30 km away.
  - ▶ The shipping company applies formula No. 6:

$$\text{CO}_2 \text{ information} = 863 \text{ g CO}_2 / \text{km} \times 4 \times 30 \text{ km} = 104 \text{ kg CO}_2$$

### 24.4. Calculation method using level 2 values

*Reminder: general information on level 2 values is provided in chapter 2.3.*

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate average values for all of its activity.

This chapter covers an example where the service provider has produced level 2 values for each of the following two parameters:

- ▶ **the rate of consumption of the energy source used by the means of transport.** The service provider collects its Heavy Fuel Oil and Marine Diesel Oil consumptions over a given period (for example one year) for the link concerned. These consumption quantities can be collected using instruments installed on the ships. It calculates the number of journeys made over the same period. By dividing the quantity of fuel consumed by the number of journeys made, the service provider obtains a consumption rate per journey:
  - ▶ for a ship comprising multiple decks, the service provider identifies the number of passenger decks and the number of goods decks on each ship operating this line. The quantities of fuel consumed must be divided between the passengers and goods according to the number of respective decks;
  - ▶ if the goods decks are used both for heavy goods vehicles and lightweight vehicles (cars, caravans, camping cars or motorcycles owned by the passengers), the quantity of fuel consumed for the goods decks can be broken down according to the respective surface area used for the heavy goods vehicles on the one hand and for the lightweight vehicles on the other.
- ▶ **the number of units transported by the means of transport.** The service provider identifies the total gross weight of its load (vehicles + cargo) using transport statistics and the overall weight of the passengers transported using the tickets sold or via an occupancy study. It thus produces an average weight and an average number of passengers transported per journey.

In this case, the service provider may generate the corresponding level 2 aggregate data using the following formula:

$$\text{Aggregate data} = [\text{Consumption rate} / \text{number of units transported by the means of transport}] \times \text{emission factor}$$

2. To calculate the CO<sub>2</sub> information corresponding to a given service, the service provider requires the following data:
  - ▶ the number of units transported for the service being assessed, represented by "number of units (service)" hereinafter;
  - ▶ the distance travelled by these units, represented by "distance (service)" hereinafter.
3. For each service, calculation formula No. 6 must be applied:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

## Fact sheet No. 24



### Example

A shipping company is looking to calculate its CO<sub>2</sub> information for the sea transport services that it provides to and from 3 islands using level 2 values. The services are carried out via sea links in the form of a 150 km circle connected the continent to the 3 islands. The distance to the first island is 30 km. The 2<sup>nd</sup> island is 40 km from the first and the 3<sup>rd</sup> island is 50 km from the second. The distance from the 3<sup>rd</sup> island back to the continent is 30 km.

1. The shipping company collects the following data over a 1-year period, i.e. 480 round trips:
  - ▶ Heavy Fuel Oil consumption: 1 080 000 kg;
  - ▶ Marine Diesel Oil consumption: 129 600 kg;
  - ▶ 86 400 passengers transported between the continent and island A;
  - ▶ 72 000 passengers transported between island A and island B;
  - ▶ 57 600 passengers transported between island B and island C;
  - ▶ 76 800 passengers transported between island C and the continent;
2. The company notes the energy source emission factors from table 28: HFO: 3,58 kg CO<sub>2</sub>/ kg; MDO: 3,76 kg CO<sub>2</sub>/ kg.
3. The shipping company can calculate the following level 2 values:
  - ▶ total distance travelled over one year: 150 km x 480 round trips = 72 000 km;
  - ▶ HFO consumption rate per kilometre: 1 080 000 kg / 72 000 km = 15 kg HFO / km;
  - ▶ MDO consumption rate per kilometre: 129 600 kg / 72 000 km = 1,8 kg MDO / km;
  - ▶ calculating the number of passenger-kilometres transported by the means of transport.  
During the 480 round trips made, the ships transported a total of:  
 $86\,400 \times 30 + 72\,000 \times 40 + 57\,600 \times 50 + 76\,800 \times 30 = 10\,656\,000$  passenger.km;
  - ▶ calculating the number of tonne-kilometres transported by the means of transport. During the 480 round trips made, the ships transported 48 000 tonnes between the continent and island A, 33 600 tonnes between island A and island B, 24 000 tonnes between island B and island C and 14 400 tonnes between island C and the continent, i.e. a total of:  
 $48\,000 \times 30 + 33\,600 \times 40 + 24\,000 \times 50 + 14\,400 \times 30 = 4\,416\,000$  t.km.

Given that a break down per number of decks is not applicable to this type of ship, a solution must be found to divide the emissions between passengers and goods.

The hypothesis of an average weight of 100 kg per passenger (including luggage) is used to perform a break down according to weight (this standard weight of 100 kg is that used for air travel and in the absence of specific data for the sea link in question).

- ▶ The total number of tonne-kilometres transported during the 480 round trips is therefore assessed to equal:  
 $10\,656\,000 \times 0,1 \times 4\,416\,000 = 5\,481\,600$  t.km *i.e. a mean number of tonnes transported per round trip of  $5\,481\,600 / (480 \times 150) = 76,13$  t.*
4. Drawing up the level 2 aggregate data
    - ▶ The shipping company applies formula No. 5.
    - ▶ Aggregate data =  $[15 \text{ kg / km} / 76,13 \text{ t}] \times 3,58 \text{ kg CO}_2 / \text{kg} + [1,8 \text{ kg / km} / 76,13 \text{ t}] \times 3,76 \text{ kg CO}_2 / \text{kg} = 0,794 \text{ kg CO}_2 / \text{t.km}$ .
  5. Application to the given transport service for one passenger travelling from island A to island B, the shipping company uses the following formula, with the rule of 100 kg per passenger:
    - ▶ CO<sub>2</sub> information =  $0,794 \text{ kg CO}_2 / \text{t.km} \times (1 \times 100 \text{ kg}) \times 40 \text{ km} = 3,18 \text{ kg CO}_2$ .
  6. When shipping goods weighting a total of 8 tonnes from island A to island B, the CO<sub>2</sub> information is:
 

**CO<sub>2</sub> information = 0,794 kg CO<sub>2</sub> / t.km x 8 t x 40 km = 254 kg CO<sub>2</sub>**

## Fact sheet No. 24

A small icon consisting of a white rectangular box with a paperclip at the top left corner. Inside the box, the text "CO<sub>2</sub> Info" is written in a bold, sans-serif font. The "2" is a subscript.

### 24.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

CO<sub>2</sub> information is an absolute result in kg or tonne of CO<sub>2</sub> corresponding to the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

CO<sub>2</sub> information must be provided for the service as a whole. This customised information must be available either before or at the time of purchasing the tickets. The customer/beneficiary of this information can be either the future passenger purchasing the ticket or the travel agency or distributor selling the service. In either case, the information to be provided is the same.

This information can be provided by:

- ▶ a notice on the ticket sales website;
- ▶ a display panel at the point of sale (ticket office) specifying the quantity of CO<sub>2</sub> emitted for the different services on offer (by listing the different possibilities according to the number of passengers, etc.).

This information can also appear on the ticket issued to the customer (assuming that the ticket production system has been adapted to suit this method).

In the event of one ticket being issued for multiple passengers, this information can be provided for the service as a whole (for all passengers).

#### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used.

For the aforementioned example (23.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: combined transport of passengers and goods;
- ▶ the value levels used: level 2 for the quantity of fuel consumed and the number of passengers transported;
- ▶ the method used or emission break down system implemented: distributing emissions between the vehicles and passengers according to the vehicle weight and number of passengers, using an average passenger weight of 100 kg;
- ▶ the method used to calculate the consumption rate: taking into account the total amount of fuel consumed over a 1-year period, including empty journeys, then calculating the quantity consumed per journey made with goods and passengers;
- ▶ the method used to calculate the number of vehicles and passengers transported: average values calculated over a one year period using operating data;
- ▶ the fuels used: Heavy fuel oil and Marine diesel oil, specifying the emission factors used.

The transport operator can, if so desired, provide further information such as the breakdown system implemented to divide emissions between the upstream and operating phases.

## 5.5. Individual passenger transport by road

This section covers taxi activities (individual taxi drivers or taxi companies), private passenger car with driver and two-wheelers passenger transport activities.

### 5.5.1. Reference data

#### 5.5.1.1. The energy source emission factors used

The energy source emission factors to be used for the passenger transport by road are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Petrol	Pumped fuel (RON 95 - RON 98)	Litre (ℓ)	0,47	2,24	2,71
	E 10	Litre (ℓ)	0,49	2,18	2,67
	E 85	Litre (ℓ)	0,87	0,36	1,23
Diesel	Pumped road diesel	Litre (ℓ)	0,58	2,49	3,07
Liquefied petroleum gas (LPG)	LPG for road vehicles	Litre (ℓ)	0,19	1,58	1,77

Table 31: energy source emission factors - Individual passenger transport by road

#### 5.5.1.2. Level 1 values

The table below presents the level 1 values for the individual passenger transport by road by car and two-wheelers

Description (according to the nature of the vehicle)	Journey or distance (article 12 paragraph 4 of French decree No. 2011-1336 of 24 October 2011)	Rate of consumption of the energy source by the means of transport (in units of measurement of the quantity of the energy source per kilometre)
Taxi, car transport service provided by a driver, private car hire	The quantity of carbon dioxide emitted for a transport service in relation to the travel or distance is obtained by multiplying the level 1 values in the right-hand column by 2 to take account of empty journeys.	The level 1 values for the energy source consumption rate per kilometre for taxis, car transport service provided by a driver and private hire cars are those provided by the most recent version of the ADEME's official guide "Véhicules particuliers vendus en France - Consommations conventionnelles de carburant et émissions de CO <sub>2</sub> - Guide officiel" at the time of drawing up this information, for the relevant zone of activity defined hereinbelow, increased by 20% to take into account vehicle performance under real traffic conditions.
Motorcycle with a piston displacement greater than or equal to 750 cm <sup>3</sup> Petrol		0,070 ℓ / km
Motorcycle or motorised scooter with a piston displacement less than 750 cm <sup>3</sup> Petrol		0,060 ℓ / km

Table 32: level 1 values - Individual passenger transport by road

vehicle.

The relevant zone of activity is:

- ▶ "urban", "mixed" or "extra-urban" for taxis and car transport service provided by a driver, depending on their dominant activity;
- ▶ "extra-urban" for private hire vehicles.

The guide on the conventional consumption rates for private vehicles sold in France can be viewed and downloaded free of charge at the Environment and Energy Management Agency's (ADEME) website at this address: <http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=52820&p1=028&p2=12&ref=17597> or from ADEME (20, avenue du Grésillé, BP 90406, 49004 Angers Cedex 11, France).

### 5.5.1.3. Level 1 aggregate data

To help the implementation of the calculation using level 1 values, aggregate data is provided below for motorcycles and motorised scooters. This data incorporates the 100 % increase in energy consumption provided by the order of April the 10<sup>th</sup>, to take into account empty journeys, thereby doubling the emission rate.

The aggregate data can be used in a direct manner to provide information per kilometre or be multiplied by the distance of the journey made to provide information for a specific service.

Therefore, for a motorcycle with a piston displacement of 750 cm<sup>3</sup>, the aggregate data is:  
 $0,070 \text{ l/km} \times 2 \times 2,71 \text{ kg CO}_2 / \text{l} = 0,379 \text{ kg CO}_2 / \text{km}$ .

Description	CO <sub>2</sub> emission rate per km
Motorcycle with a piston displacement greater than or equal to 750 cm <sup>3</sup> Petrol (RON 95 - RON 98)	0,379 kg CO <sub>2</sub> / km
Motorcycle or motorised scooter with a piston displacement less than 750 cm <sup>3</sup> Petrol (RON 95 - RON 98)	0,325 kg CO <sub>2</sub> / km

Table 33: level 1 aggregate data - Individual passenger transport by road by motorcycle and motorised scooter



## Fact sheet No. 25

# Individual passenger transport by road – taxi drivers

## 25.1. Activities concerned

Taxi activities are performed by companies of varying natures, which may be individual businesses or commercial companies owning or not their own vehicle fleet. This activity is governed by the French Home Office. This sheet describes how to implement CO<sub>2</sub> information for an individual taxi driver. Taxis have the specific characteristic of being able to pick up passengers from public roads. In this example, the destination is not known at the time of pick up. Taxis can also perform pre-booked transport services.

## 25.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

Regardless of whether this involves a pick-up from the public roads or a pre-booked transport service, no ticket is issued for taxi services. The French decree No. 2011-1336 therefore stipulates that the information can be provided according to the distance travelled (i.e. by indicating the average quantity of emissions generated per kilometre) via an on-board display. The calculation methodologies presented therefore aim at determining a CO<sub>2</sub> emission rate per kilometre.

## 25.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

1. For the activities covered in this sheet, individual taxi drivers use data derived from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011". The current version of this guide (vehicles registered during the current year) and its previous versions are available from the ADEME website<sup>1</sup>.

2. The taxi driver notes the conventional consumption rate per kilometre for its vehicle from this guide, according to the make of vehicle, type of fuel used (petrol or diesel), model and version. The "Code National d'Identification du type" (CNIT - vehicle model identification code) is also provided (this information appears on the vehicle's registration documents) and can also be used. The service provider chooses the consumption rate per kilometre from the three provided ("urban", "combined" or "extra-urban") that best corresponds to its activity.

3. Finally, the taxi driver notes the aggregate data from the table below, where the coefficient provided for each fuel incorporates the 20 % and 100 % increases stipulated in the order and the fuel emission factor (the 20 % and 100 % increases incorporate the vehicle's performances under real operating conditions and the empty journeys made respectively).

Nature of the energy source	CO <sub>2</sub> emissions rate per litre of fuel to be applied to the conventional fuel consumption rate
Petrol - Pumped fuel (RON 95 - RON 98)	6,54 kg CO <sub>2</sub> / ℓ
Petrol - E10	6,41 kg CO <sub>2</sub> / ℓ
Petrol - E85	2,95 kg CO <sub>2</sub> / ℓ
Pumped road diesel	7,37 kg CO <sub>2</sub> / ℓ

Table 34: level 1 aggregate data - Individual passenger transport by road - taxi drivers

<sup>1</sup> <http://www2.ademe.fr/servlet/getDoc?id=52820&ref=&nocache=yes&p1=111>. Note: The CO<sub>2</sub> g/km value provided in the table of this document should not be used. The data to be used in this calculation is the energy consumption value in l/100km for the category of journey in question.

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4. The CO<sub>2</sub> information is then drawn up using the following formula:

**CO<sub>2</sub> information (passenger-kilometre) = aggregate data x conventional consumption rate**

### Example

A taxi driver uses a diesel vehicle manufactured by Passat, the precise model is: PASSAT 2,0 16S TDI CR (143 ch) FAP Blue TDI (CNIT= M10VWGV0044219). It operates in a zone corresponding to combined consumption modes (urban and interurban journeys).

1. It notes the conventional consumption rate per kilometre from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011" corresponding to its vehicle for use in a combined consumption mode.

Marques Modèle, Version	CNIT Code National d'Identification du Type	Puissance		BV	Consommation			CO <sub>2</sub> g/km	Carburant
		Admin. CV	Max kW		Urb.	Exurb.	Mixte		
VOLKSWAGEN - Véhicules Diesel (suite)									
PASSAT SW 1.6 TDI (105ch) CR FAP BlueMotion	M10VWGV0043193	5	77	M5	5,5	3,9	4,5	119	GO
PASSAT SW 2.0 16S TDI (110ch) CR FAP	M10VWGV0044233	6	81	M5	7,1	4,7	5,6	146	GO
PASSAT SW 2.0 16S TDI CR (140ch) FAP	M10VWGV0044237	8	103	M6	7,3	4,7	5,7	146	GO
PASSAT SW 2.0 16S TDI CR (140ch) FAP 4MOTION	M10VWGV0044213	8	103	M6	7,7	5,1	6,1	159	GO
PASSAT SW 2.0 16S TDI CR (140ch) FAP BlueMotion	M10VWGV0044210	7	103	M6	6,1	4,2	4,8	127	GO
PASSAT SW 2.0 16S TDI CR (140ch) FAP DSG	M10VWGV0044204	8	103	A6	7,9	5,0	6,1	159	GO
PASSAT SW 2.0 16S TDI CR (143ch) FAP Blue TDI	M10VWGV0044219	8	105	M6	7,0	4,8	5,5	144	GO
PASSAT SW 2.0 16S TDI CR (143ch) FAP DSG Blue TDI	M10VWGV0044216	8	105	A6	7,6	4,9	5,7	155	GO
PASSAT SW 2.0 16S TDI CR (170ch) FAP	M10VWGV0044225	10	125	M6	7,4	4,7	5,7	149	GO
PASSAT SW 2.0 16S TDI CR (170ch) FAP DSG	M10VWGV0044222	10	125	A6	8,0	5,2	6,2	163	GO
PASSAT SW 2.0 16S TDI CR (170ch) FAP DSG 4MOTION	M10VWGV0044228	10	125	A6	8,1	5,5	6,4	169	GO
PASSAT CC 2.0 16S TDI CR (140ch) FAP	M10VWGV0050611	8	103	M6	7,2	4,6	5,6	146	GO
PASSAT CC 2.0 16S TDI CR (140ch) FAP 4MOTION	M10VWGV0050619	8	103	M6	7,9	4,9	6,0	158	GO
PASSAT CC 2.0 16S TDI CR (140ch) FAP BlueMotion	M10VWGV0050615	7	103	M6	6,2	4,2	4,9	126	GO
PASSAT CC 2.0 16S TDI CR (140ch) FAP DSG	M10VWGV0050607	8	103	A6	7,8	5,0	6,0	158	GO
PASSAT CC 2.0 16S TDI CR (170ch) FAP	M10VWGV0050635	9	125	M6	7,4	4,6	5,8	146	GO
PASSAT CC 2.0 16S TDI CR (170ch) FAP DSG	M10VWGV0050631	10	125	A6	7,8	5,1	6,1	159	GO
PASSAT CC 2.0 16S TDI CR (170ch) FAP DSG 4MOTION	M10VWGV0050639	10	125	A6	8,0	5,5	6,4	166	GO
PHAEOTON VS TDI 4MOTION 5FL	M10VWGV0167096	15	175	A6	11,6	6,7	8,5	224	GO
Neoville POLO 1.2 TDI (75ch)	M10VWGV0122087	4	55	M5	4,6	3,3	3,8	99	GO

Table 35: extract from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011"

The table below provides the rate of 5,5 l / 100 km, i.e. 0,055 l / km.

- It then uses the aggregate data corresponding to the CO<sub>2</sub> emission rate per litre of fuel from table 34 ("level 1 aggregate data - individual passenger transport by road by road (car)"). The value for diesel is therefore 7,37 kg CO<sub>2</sub> / l.
- It then uses the following calculation formula to draw up its CO<sub>2</sub> information:

**CO<sub>2</sub> information (passenger-kilometre) = 7,37 kg CO<sub>2</sub> / l x 0,055 l = 405 g CO<sub>2</sub> / km**

## 25.4. Calculation method combining the use of level 1 and level 2 values

Level 1 values are based on the average emissions calculated by the car manufacturers. Real consumption values more particularly depend on the type of route taken, driving habits and vehicle maintenance. A taxi driver may wish to replace these level 1 values with values specific to its activity and that better reflect its CO<sub>2</sub> emissions.

Reminder: general information on level 2 values is provided in chapter 2.3.

1. Drawing up level 2 values

A taxi driver looking to use level 2 values must calculate average figures for all of its activity. This paragraph covers the example where the service provider has drawn up level 2 values for its consumption rate per kilometre. In order to take into account empty journeys, the taxi driver uses the factor of 2 provided for level 1 values.

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- The taxi driver must collect his annual fuel consumption based on the records that he has made during the previous year (for example) with his vehicle, and divide this by the number of kilometres travelled (with or without passenger).
- The CO<sub>2</sub> information is then drawn up using the following formula:

$$\text{CO}_2 \text{ information (passenger-kilometre)} = \text{Consumption rate} \times \text{emission factor}$$

### Example

A taxi driver is looking to calculate his CO<sub>2</sub> information for all of its activities, i.e. for all services performed with his vehicle.

In order to do this:

- He collects the quantity of fuel consumed when in operation: 3 800 ℓ of diesel in the year (this includes journeys with and without passengers) and the number of kilometres travelled when in operation: 64 000 km.
- Using this data, he determines the consumption rate per kilometre of his vehicle, which is 3 800 ℓ / 64 000 km = 0,0593 ℓ / km.
- He notes the emission factor for the fuel used, which in this case is road diesel.
- To take into account empty journeys, he uses the factor of 2 provided for the level 1 values.

The CO<sub>2</sub> information is therefore calculated in the following manner:

$$\text{CO}_2 \text{ information (passenger-kilometre)} = (0,0593 \times 2) \times 3,07 \text{ kg CO}_2 / \ell = 365 \text{ g CO}_2 / \text{km}$$

In this case, the taxi driver's emissions are 10 % less than the average emissions for this type of vehicle, as calculated using level 1 values.



### 25.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

This information can be disclosed to the passenger in a simple manner using a display installed within the vehicle, specifying the value in kg CO<sub>2</sub> / km charged. Using the aforementioned examples, the value that must be displayed is:

- ▶ 405 g CO<sub>2</sub> / km of journey when using level 1 values;
- ▶ 365 g CO<sub>2</sub> / km of journey when combining the use of level 1 and level 2 values.

This information differs significantly from the 144 g CO<sub>2</sub> / km value provided in the guide for new vehicles and displayed by car dealers. This is due to the incorporation of real traffic and empty journeys. If the taxi driver so desires, he can provide both pieces of information on his display so as to enable his customer to connect these two pieces of information, which are calculated separately.

The display may for example be drawn up as follows:

"When using this taxi, the quantity of CO<sub>2</sub> emitted per kilometre of journey<sup>2</sup> is: 342 g CO<sub>2</sub> / km".

*For information purposes, the quantity of CO<sub>2</sub> emitted by this vehicle, calculated as per the directive<sup>3</sup> 1999/94/EC on the CO<sub>2</sub> emitted by new vehicles, is 144 g CO<sub>2</sub> / km.*

<sup>2</sup> Value calculated as per article 1431-3 of the French transport code.

<sup>3</sup> The value to be displayed corresponds to that of the vehicle transporting the passenger.

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### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (25.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: individual passenger transport by road;
- ▶ the value levels used: level 1 to take into account empty journeys and level 2 for energy consumption;
- ▶ the method used to calculate the consumption rate: taking into account the total energy consumed over a 1-year period;
- ▶ the energy source used: road diesel, with the emission factor used.

The distance travelled with passengers on behalf of the customer may also be communicated. This would enable the customer to calculate its CO<sub>2</sub> information for the journey made, based on this distance with passengers and the information per kilometre of journey.



## Fact sheet No. 26

# Individual passenger transport by road – taxi companies

## 26.1. Activities concerned

Taxi activities are performed by companies of varying natures, which may be individual businesses or commercial companies owning or not their own vehicle fleet.

This activity is governed by the French Home Office. This sheet describes how to implement CO<sub>2</sub> information for a taxi company.

## 26.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

The methods implemented are similar to those described in sheet No. 25 "Individual passenger transport by road - taxi drivers".

## 26.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

**1.** For the activities described in this sheet, the taxi company uses data for each type of vehicle, derived from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011". The current version of this guide (vehicles registered during the current year) and its previous versions are available from the ADEME website<sup>1</sup>.

**2.** The taxi company notes the conventional consumption rate per kilometre for its vehicle from this guide, according to the make of vehicle, type of fuel used (petrol or diesel), model and version. The "Code National d'Identification du type" (CNIT - vehicle model identification code) is also provided (this information appears on the vehicle's registration documents) and can also be used. The service provider chooses the consumption rate per kilometre from the three provided ("urban", "combined" or "extra-urban") that best corresponds to its activity.

**3.** Finally, the taxi company notes the aggregate data from the table below, where the coefficient provided for each fuel incorporates the 20 % and 100 % increases stipulated in the order and the fuel emission factor (the 20 % and 100 % increases incorporate the vehicle's performances under real operating conditions and the empty journeys made respectively).

Nature of the energy source	CO <sub>2</sub> emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Petrol - Pumped fuel (RON 95 - RON 98)	6,54 kg CO <sub>2</sub> / ℓ
Petrol - E10	6,41 kg CO <sub>2</sub> / ℓ
Petrol - E85	2,95 kg CO <sub>2</sub> / ℓ
Pumped road diesel	7,37 kg CO <sub>2</sub> / ℓ

Table 36: level 1 aggregate data - individual passenger transport by road (car)

<sup>1</sup> <http://www2.ademe.fr/servlet/getDoc?id=52820&ref=&nocache=yes&p1=111>. Note: The CO<sub>2</sub> g/km value provided in the table of this document should not be used. The data to be used in this calculation is the energy consumption value in l/100km for the category of journey in question.

## Fact sheet No. 26

### 26.4. Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

#### 1. Drawing up level 2 values

The taxi company looking to use level 2 values must calculate average values for all of its activity.

This example covers the event where the taxi company is looking to use a consumption rate per kilometre of distance travelled, incorporating both the vehicle's consumption rate per kilometre and empty journeys.

2. For this purpose, the taxi company must collect its annual fuel consumption based on the records that it has taken during the previous year (for example) with its entire fleet of vehicles, and divide this by the number of kilometres travelled with passengers. The different journeys conducted with passengers are those declared with pick-up and drop-off locations. The distance travelled for each journey can be assessed using a road-based distance calculator.

3. The CO<sub>2</sub> information can be drawn up using the following formula:

**CO<sub>2</sub> information (per kilometre travelled) = Consumption rate x emission factor**

#### Example

A taxi company is looking to implement a level 2 value for the energy source consumption rate when drawing up its CO<sub>2</sub> information for its users.

1. It collects a total fuel consumption of 225 000 ℓ of road diesel over a 1-year period for a total distance of 1 800 000 km travelled with passengers by its entire vehicle fleet.
2. The total distance travelled is 3 200 000 km, however this information is not used in this calculation.
3. The consumption rate per kilometre is therefore calculated to equal  $(225\,000\ \ell / 1\,800\,000\ \text{km}) = 0,125\ \ell / \text{km}$  travelled.
4. It notes the energy source emission factor for road diesel from table 31 ("energy source emission factors - passenger transport by road"): 3,07 kg CO<sub>2</sub> / ℓ.
5. The CO<sub>2</sub> information to be displayed in the vehicles is:

**CO<sub>2</sub> information (per kilometre travelled) =  $(0,125\ \ell / \text{km} \times 3,07\ \text{kg CO}_2 / \ell) = 384\ \text{g CO}_2 / \text{km}$  travelled.**

### 26.5. How must this information be transmitted to the beneficiary?

Reminder: general information regarding this issue is provided in § 2.6.

#### 1) Quantity of CO<sub>2</sub> emitted

This information is disclosed to the passenger in a simple manner using a display installed within the vehicle, specifying the value in **kg CO<sub>2</sub> / km charged**. In the aforementioned example, the value to be displayed is 384 g CO<sub>2</sub> / km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO<sub>2</sub> / km in the guide for new vehicles and displayed by car dealers. This is due to the incorporation of real traffic and empty journeys. If the taxi company so desires, it can provide both pieces of information in its display so as to enable its customer to connect these two pieces of information, which do not apply to the same scope of calculation.



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The display may for example be drawn up as follows:

"When using this taxi, the quantity of CO<sub>2</sub> emitted per kilometre of journey<sup>2</sup> is: 384 g CO<sub>2</sub> / km".

*For the purpose of illustration, the quantity of CO<sub>2</sub> emitted by this vehicle, calculated as per the directive<sup>3</sup> 1999/94/EC on the CO<sub>2</sub> emitted by new vehicles, is 144 g CO<sub>2</sub> / km.*

### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (26.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: individual passenger transport by road;
- ▶ the value levels used: level 2 for the quantity of energy consumed;
- ▶ the method used to calculate the consumption rate: taking into account the total energy consumed over a 1-year period;
- ▶ the energy source used: road diesel, with the emission factor used.

<sup>2</sup> Value calculated as per article 1431-3 of the French transport code.

<sup>3</sup> The value to be displayed corresponds to that of the vehicle transporting the passenger.



## Fact sheet No. 27

### Individual passenger transport by road - car transport service provided by a driver (VTC)

#### 27.1. Activities concerned

The regulations with regard to commercial chauffeur-driven car hire (VTC) fall under the authority of the sub-directorate for tourism of the French Ministry of Trade, Commerce and Tourism. The companies are registered with the economic interest group "Atout France" and drivers request a professional card from the prefecture nearest their place of residence.

#### 27.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

The methods implemented are similar to those described in sheet No. 25 "Individual passenger transport by road - taxi drivers".

#### 27.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

1) For the activities described in this sheet, the VTC company uses data derived from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011". The current version of this guide (vehicles registered during the current year), in addition to its previous versions, are available on the ADEME website<sup>1</sup>.

2) The VTC company employs the conventional consumption rate per kilometre for its vehicles from this guide, according to the make of vehicle, type of fuel used (petrol or diesel). The "Code National d'Identification du type" (CNIT - vehicle model identification code) is also provided (this information appears on the vehicle's registration documents) and can also be used. The company chooses the consumption rate per kilometre from the three provided ("urban", "combined" or "extra-urban") that best corresponds to its activity.

3) Finally, the VTC company notes the aggregate data from the table below, where the coefficient provided for each fuel incorporates the 20 % and 100 % increases stipulated in the order and the fuel emission factor (the 20 % and 100 % rises incorporate the vehicle's performance under real operating conditions and the empty journeys made respectively).

Nature of the energy source	CO <sub>2</sub> emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Petrol - Pumped fuel (RON 95 - RON 98)	6,54 kg CO <sub>2</sub> / ℓ
Petrol - E10	6,41 kg CO <sub>2</sub> / ℓ
Petrol - E85	2,95 kg CO <sub>2</sub> / ℓ
Pumped road diesel	7,37 kg CO <sub>2</sub> / ℓ

Table 37: level 1 aggregate data - Individual passenger transport by road

4) CO<sub>2</sub> information is then drawn up using the following formula:

$$\text{CO}_2 \text{ information (passenger-kilometre)} = \text{aggregate data} \times \text{conventional consumption rate}$$

<sup>1</sup> <http://www2.ademe.fr/servlet/getDoc?id=52820&ref=&nocache=yes&p1=111>. Note: The CO<sub>2</sub> g/km value provided in the table of this document should not be used. The data to be used in this calculation is the energy consumption value in l/100km for the category of journey in question.

## Fact sheet No. 27



### Example

A VTC company hires diesel vehicles manufactured by Renault, the precise model is GRAND ESPACE dCi (150ch) FAP Euro5. It operates in a zone corresponding to combined consumption modes (urban and interurban journeys).

1. It notes the conventional consumption rate per kilometre from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011" corresponding to this vehicle for use in combined mode.

Marques Modèle, Version	CNIT Code National d'Identification du Type	Puissance		BV	Consommation			CO <sub>2</sub> g/km	Carburant
		Adm. CV	Max kW		Urb.	[Ex-urb.]	Mixte L/100 km		
<b>RENAULT - Véhicules essence (zule)</b>									
WIND 1.6 16V (133ch) Euro5	M10RENVP0020026	8	96	M5	9.1	5.7	6.9	160	ES
WIND Tce (100ch)	M10RENVP001F514	6	74	M5	8.0	5.3	6.3	145	ES
<b>RENAULT - Véhicules Diesel</b>									
CLIO Campus Evolution 3P dCi (65ch) eco2	M10RENVP001E319	4	47	M5	5.4	3.8	4.4	115	GO
CLIO Campus Evolution 5P dCi (65ch) eco2	M10RENVP0010305	4	47	M5	5.4	3.8	4.4	115	GO
CLIO Campus Evolution 5P dCi (65ch) eco2	M10RENVP0011306	4	62	M5	4.9	3.8	4.2	111	GO
CLIO Estate dCi (105ch) eco2 Euro5	M10RENVP0010923	6	81	M6	5.5	4.0	4.5	119	GO
CLIO Estate dCi (70ch) Eco2	M10RENVP001Y181	4	50	M5	5.2	3.9	4.3	115	GO
CLIO Estate dCi (75ch) eco2 Euro5	M10RENVP002B387	4	55	M5	4.9	3.5	4.0	106	GO
CLIO Estate dCi (90ch) eco2 Euro5	M10RENVP002P360	5	65	M5	4.9	3.5	4.0	106	GO
CLIO Estate dCi (90ch) Euro5	M10RENVP002P365	5	65	M5	4.9	3.5	4.0	106	GO
CLIO III 3P dCi (112ch) eco2 Euro5	M10RENVP0010300	6	78	M6	5.5	4.0	4.5	119	GO
CLIO III 3P dCi (90ch) eco2 Euro5	M10RENVP0023379	5	65	M5	4.9	3.5	4.0	106	GO
CLIO III 5p dCi (75ch) eco2 Euro5	M10RENVP002J366	4	55	M5	4.9	3.5	4.0	106	GO
CLIO III 5p dCi (90ch) eco2 Euro5	M10RENVP002E354	5	65	M5	4.9	3.5	4.0	106	GO
CLIO III dCi (105ch) eco2 Euro5	M10RENVP001T916	6	78	M6	5.5	4.0	4.5	119	GO
CLIO III dCi (90ch) eco2 Euro5	M10RENVP002P364	5	65	M5	4.9	3.5	4.0	106	GO
CLIO III Société 3P dCi (75ch) eco2 Euro5	M10RENVP002C373	6	55	M5	5.0	3.7	4.3	110	GO
CLIO III Société 3P dCi (90ch) eco2 Euro5	M10RENVP002T369	6	65	M5	5.0	3.7	4.3	110	GO
ESPACE dCi (130ch) FAP Euro5	M10RENVP003F803	8	96	M6	8.2	5.7	6.5	170	GO
ESPACE dCi (150ch) BV46 FAP Euro5	M10RENVP003J806	9	110	A6	9.3	6.1	7.2	189	GO
ESPACE dCi (150ch) FAP Euro5	M10RENVP003H805	9	110	M6	8.2	5.7	6.5	170	GO
ESPACE dCi (175ch) BV46 FAP Euro5	M10RENVP003L809	11	127	A6	9.3	6.1	7.2	189	GO
GRAND ESPACE dCi (130ch) FAP Euro5	M10RENVP003G604	8	96	M6	8.2	5.7	6.5	170	GO
GRAND ESPACE dCi (150ch) BV46 FAP Euro5	M10RENVP003K808	9	110	A6	9.3	6.1	7.2	189	GO
GRAND ESPACE dCi (150ch) FAP Euro5	M10RENVP003J807	9	110	M6	8.2	5.7	6.5	170	GO
GRAND ESPACE dCi (175ch) BV46 FAP Euro5	M10RENVP003M810	11	127	A6	9.3	6.1	7.2	189	GO
FLUENCE dCi (110ch) FAP eco2 Euro5	M10RENVP0012752	6	81	M6	5.6	4.0	4.5	120	GO
FLUENCE dCi (110ch) FAP EDC eco2 Euro5	M10RENVP0036636	6	81	A6	5.2	4.0	4.4	114	GO
FLUENCE dCi (90ch) FAP eco2 Euro5	M10RENVP0015795	5	66	M5	5.3	4.0	4.4	115	GO
KANGOO BE BOP dCi (110ch) FAP Euro5	M10RENVP001A697	6	81	M6	6.4	5.0	5.5	144	GO
KANGOO BE BOP dCi (90ch) FAP Euro5	M10RENVP001V203	5	66	M5	6.0	4.9	5.3	140	GO
KANGOO dCi (110ch) FAP Euro5	M10RENVP0017894	6	81	M6	6.2	4.8	5.3	140	GO
KANGOO dCi (110ch) FAP Euro5	M10RENVP0018895	6	81	M6	6.4	5.0	5.5	144	GO
KANGOO dCi (70ch) eco2	M10RENVP0001537	4	50	M5	5.6	4.8	5.1	135	GO
KANGOO dCi (75ch) eco2 FAP Euro5	M10RENVP003H127 / M10RENVP0045075	5	55	M5	5.9	4.8	5.2	137	GO
KANGOO dCi (90ch) eco2 FAP Euro5	M10RENVP001S200	5	66	M5	6.0	4.8	5.2	137	GO
KANGOO dCi (90ch) FAP Euro5	M10RENVP001T281	5	66	M5	6.0	4.9	5.2	137	GO
KANGOO dCi (135ch) FAP Euro5	M10RENVP003C966	8	110	A6	9.7	6.4	7.4	164	GO

Table 38: extract from the document "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011"

The table below provides the rate of 6,5 l / 100 km, i.e. 0,065 l / km.

2. It then uses the aggregate data for the CO<sub>2</sub> emission rate per litre of fuel from table 37, which is 7,37 kg CO<sub>2</sub> / l.
3. It then uses the following calculation formula to draw up its CO<sub>2</sub> information:

$$\text{CO}_2 \text{ information (passenger-kilometre)} = 7,37 \text{ kg CO}_2 / \text{l} \times 0,065 \text{ l} = 479 \text{ g CO}_2 / \text{km}$$

### 27.4. Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

1. Drawing up level 2 values

The VTC company looking to use level 2 values must calculate average values for all of its activity.

This example covers the event where the company is looking to draw up level 2 values for the parameter: energy source consumption rate of the means of transport.

2. For this purpose, the VTC company must collect its annual fuel consumption based on the records made during the previous year (for example) with its entire fleet of vehicles, and divide this by the number of kilometres travelled with passengers. The different journeys conducted with passengers are those declared with pick-up and drop-off locations. The distance travelled for each journey can be assessed using a road-based distance calculator.

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3. The CO<sub>2</sub> information can be calculated using the following formula:

**CO<sub>2</sub> information (per kilometre travelled) = Consumption rate x emission factor**

### Example

The car transport service provided by a driver recorded a total distance travelled of 480 000 km during the previous year for its entire fleet of diesel vehicles. This total distance recorded includes the distance travelled without passengers.

1. It uses a coefficient of 2 to incorporate empty journeys (see order of April the 10<sup>th</sup>) into the calculation for its consumption rate per kilometre.
2. It has recorded the purchase of 45 000 litres of diesel. The consumption rate per kilometre travelled is therefore:  $[45\ 000 / 480\ 000\ \text{km}] \times 2 = 0,187\ \ell / \text{km}$  travelled.
3. It identifies the diesel energy source emission factor: 3,07 kg CO<sub>2</sub> / ℓ.
4. The CO<sub>2</sub> information to be displayed in the vehicles is:

**CO<sub>2</sub> information (per kilometre travelled) = 0,187 ℓ / km x 3,07 kg CO<sub>2</sub> / ℓ = 576 g CO<sub>2</sub> / km travelled.**



## 27.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

### 1) Quantity of CO<sub>2</sub> emitted

This information is disclosed to the passenger in a simple manner using a display installed within the vehicle, specifying the value in kg CO<sub>2</sub> / km charged. In the aforementioned example, the value to be displayed is 576 g CO<sub>2</sub> / km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO<sub>2</sub> / km in the guide for new vehicles and displayed by car dealers. This is due to the incorporation of real traffic and empty journeys. If the company so desires, it can provide both pieces of information in its display so as to enable its customer to connect these two pieces of information, which do not apply to the same scope of calculation.

The display may for example be drawn up as follows:

"When using this car, the quantity of CO<sub>2</sub> emitted per kilometre of journey<sup>2</sup> is: 576 g CO<sub>2</sub> / km".

*For information purposes, the quantity of CO<sub>2</sub> emitted by this vehicle, calculated as per the directive<sup>3</sup> 1999/94/EC on the CO<sub>2</sub> emitted by new vehicles, is 170 g CO<sub>2</sub> / km.*

### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (27.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: Individual passenger transport by road - car transport service provided by a driver;
- ▶ the value levels used: level 2 for the quantity of energy consumed;
- ▶ the method used to calculate the consumption rate: taking into account the total energy consumed over a 1-year period;
- ▶ the energy source used: road diesel, with the emission factor used.

<sup>2</sup> Value calculated as per article 1431-3 of the French transport code.

<sup>3</sup> The value to be displayed corresponds to that of the vehicle transporting the passenger.



## Fact sheet No. 28

# Individual passenger transport by road - private passenger car with driver (VPR)

## 28.1. Activities concerned

A private passenger car with driver car made available to a customer base in exchange for payment, mainly in rural areas with little or no taxi services. This activity is particularly governed by the French law No. 77-6 of January the 3<sup>rd</sup> 1977 on the operation of vehicles known as "petite remise" (private hire vehicles). This activity requires a prefectorial order. However, unlike taxis, private hire vehicles are not authorised to drive or park on public roads awaiting customers. They must be pre-booked for a given journey.

## 28.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

## 28.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

1. For the activities described in this sheet, the VPR operator uses data derived from the ADEME guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 201". The current version of this guide (vehicles registered during the current year), in addition to its previous versions, are available on the ADEME website<sup>1</sup>.
2. The VPR operator employs the conventional consumption rate per kilometre for its vehicles from this guide, according to the make of vehicle, type of fuel used (petrol or diesel), model and version. The "Code National d'Identification du type" (CNIT - vehicle model identification code) is also provided (this information appears on the vehicle's registration documents) and can also be used. The VPR operator notes the consumption rate per kilometre corresponding to the "extra-urban" zone.
3. Finally, the VPR operator notes the aggregate data from the table below, where the coefficient provided for each fuel incorporates the 20 % and 100 % increases stipulated in the order and the fuel emission factor (the 20 % and 100 % rises incorporate the vehicle performance under real operating conditions and the empty journeys made respectively).

Nature of the energy source	CO <sub>2</sub> emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Petrol - Pumped fuel (RON 95 - RON 98)	6,54 kg CO <sub>2</sub> / ℓ
Petrol - E10	6,41 kg CO <sub>2</sub> / ℓ
Petrol - E85	2,95 kg CO <sub>2</sub> / ℓ
Pumped road diesel	7,37 kg CO <sub>2</sub> / ℓ

Table 39: level 1 aggregate data - Individual passenger transport by road (car)

4. The CO<sub>2</sub> information is then drawn up using the following formula:

$$\text{CO}_2 \text{ information (per kilometre travelled)} = \text{aggregate data} \times \text{conventional consumption rate}$$

<sup>1</sup> <http://www2.ademe.fr/servlet/getDoc?id=52820&ref=&nocache=yes&p1=111>. Note: The CO<sub>2</sub> g/km value provided in the table of this document should not be used. The data to be used in this calculation is the energy consumption value in l/100km for the category of journey in question.

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## Example

A private passenger car with driver operator uses a diesel vehicle manufactured by Citroën, the full make and model of which is C4 PICASSO 5PL HDI (150ch) FAP BMP6.

1. It notes the conventional consumption rate per kilometre from the ADEME guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011" corresponding to its vehicle for use in extra-urban mode.

Marques	CNIT	Admin. CV	Max kW	BV	Urb. Litres au 100 km	Exurb. Litres au 100 km	Mote Litres au 100 km	CO <sub>2</sub> g/km	Carburant
C-CROSSER 7PL HDI (180ch) FAP DC8	M1OCTRV0008737	10	115	A6	9.3	6.0	7.2	189	GO
C3 Classic AirDream HDI (70ch)	M1OCTRV0008349	4	53	M6	5.3	3.8	4.4	115	GO
Nouvelle C3 e-HDI (90ch) AirDream	M1OCTRV0002725	5	66	M5	4.4	3.3	3.7	90	GO
Nouvelle C3 HDI (110ch) FAP BVMS	M1OCTRV0005391	6	82	M6	5.6	3.9	4.5	118	GO
Nouvelle C3 HDI (70ch)	M1OCTRV0000720	4	50	M5	4.7	3.8	4.1	107	GO
Nouvelle C3 HDI FAP (90ch)	M1OCTRV0000387	5	66	M5	4.9	3.6	4.1	107	GO
Nouvelle C3 HDI FAP (90ch) AirDream	M1OCTRV0000388	5	66	M5	4.9	3.4	4.0	104	GO
C3 PICASSO HDI (90ch) FAP	M1OCTRV0000556	5	66	M5	5.7	4.0	4.7	123	GO
C3 PICASSO HDI 110 FAP BVMS	M1OCTRV0000952	6	82	M6	6.2	4.2	4.9	127	GO
C3 FLURIEL AirDream HDI (70ch)	M1OCTRV0005404	4	50	M5	5.7	4.2	4.7	125	GO
C4 5P HDI (110ch) FAP BMP6 AirDream	M1OCTRV0000218	6	80	A6	5.8	3.7	4.4	118	GO
C4 5P HDI (90ch) AirDream	M1OCTRV0000214	5	66	M5	5.6	3.7	4.4	115	GO
C4 COUPE HDI (90ch) AirDream	M1OCTRV0000292	5	66	M5	5.5	3.7	4.3	114	GO
Nouvelle C4 e-HDI (110ch) AirDream BMP6	M1OCTRV0000679	6	82	A6	5.3	4.0	4.5	117	GO
Nouvelle C4 HDI (110ch) FAP BVMS	M1OCTRV0000287	6	82	M6	5.9	4.0	4.7	122	GO
Nouvelle C4 HDI (150ch) FAP BVMS	M1OCTRV0000475	8	110	M6	6.6	4.1	5.0	130	GO
Nouvelle C4 HDI (90ch) FAP	M1OCTRV0000673	5	66	M5	5.3	3.8	4.3	113	GO
C4 PICASSO 5PL e-HDI (110ch) AirDream BMP6	M1OCTRV0000931	6	82	A6	5.2	4.6	4.8	120	GO
C4 PICASSO 5PL HDI (110ch) FAP BMP6	M1OCTRV0000934	6	82	A6	6.0	4.8	5.2	137	GO
C4 PICASSO 5PL HDI (110ch) FAP BVMS	M1OCTRV0000928	6	82	M6	6.5	4.6	5.3	139	GO
C4 PICASSO 5PL HDI (150ch) FAP BMP6	M1OCTRV0000979	8	110	A6	6.5	4.4	5.2	135	GO
C4 PICASSO 5PL HDI (150ch) FAP BVMS	M1OCTRV0000299	8	110	M6	6.8	4.5	5.3	137	GO
C4 PICASSO 5PL HDI (150ch) FAP BVMS	M1OCTRV0000302	8	110	M6	7.3	4.8	5.7	149	GO
C4 PICASSO 5PL HDI (150ch) FAP BVMS	M1OCTRV0000304	8	110	M6	7.5	4.0	5.9	154	GO
C4 PICASSO 5PL HDI (180ch) FAP BVMS	M1OCTRV00004308	10	120	A6	8.7	5.7	6.8	177	GO
GRAND C4 PICASSO 5PL HDI (110ch) FAP BMP6	M1OCTRV0000938	6	82	A6	6.0	4.8	5.2	137	GO
GRAND C4 PICASSO 5PL HDI (110ch) FAP BMP6	M1OCTRV0000942	6	82	A6	6.1	4.9	5.3	139	GO
GRAND C4 PICASSO 5PL HDI (110ch) FAP BVMS	M1OCTRV0000937	6	82	M6	6.5	4.6	5.3	139	GO
GRAND C4 PICASSO 5PL HDI (110ch) FAP BVMS	M1OCTRV0000936	6	82	M6	6.6	4.7	5.4	142	GO
GRAND C4 PICASSO 7PL e-HDI (110ch) AirDream BMP6	M1OCTRV0000323	6	82	A6	5.3	4.7	5.0	130	GO
GRAND C4 PICASSO 7PL HDI (110ch) FAP BMP6	M1OCTRV0000926	6	82	A6	6.1	4.9	5.3	139	GO
GRAND C4 PICASSO 7PL HDI (110ch) FAP BVMS	M1OCTRV0000920	6	82	M6	6.6	4.7	5.4	142	GO
GRAND C4 PICASSO 7PL HDI (150ch) FAP BMP6	M1OCTRV0000977	8	110	A6	6.5	4.4	5.2	135	GO
GRAND C4 PICASSO 7PL HDI (150ch) FAP BVMS	M1OCTRV0000978	8	110	A6	6.6	4.5	5.3	137	GO
GRAND C4 PICASSO 7PL HDI (150ch) FAP BVMS	M1OCTRV00004281	8	110	M6	7.3	4.8	5.7	149	GO
GRAND C4 PICASSO 7PL HDI (150ch) FAP BVMS	M1OCTRV00003280	8	110	M6	7.5	4.9	5.9	154	GO
GRAND C4 PICASSO 7PL HDI (180ch) FAP BVMS	M1OCTRV0000922	10	120	A6	8.7	5.7	6.8	177	GO
CS 2.0 HDI (143ch) FAP BVMS	M1OCTRV0000353	8	103	M6	7.4	4.7	5.7	149	GO
CS 2.0 HDI (163ch) FAP BVMS	M1OCTRV00004051	10	120	A6	8.9	5.6	6.8	179	GO
CS 2.0 HDI (163ch) FAP BVMS	M1OCTRV0000295	9	120	M6	6.8	4.4	5.3	139	GO
CS 3.0 HDI V8 (240ch) BVMS	M1OCTRV0000906	15	177	A6	10.2	5.8	7.4	195	GO
C5 e-HDI (110ch) FAP BMP6 STT	M1OCTRV0004888	6	82	A6	5.5	4.1	4.6	120	GO

Table 40: extract from the ADEME guide "Consommations conventionnelles de carburant et émissions de CO<sub>2</sub> - Véhicules particuliers neufs vendus en France en 2011"

The table below provides the rate of 4,5 l / 100 km, i.e. 0,045 l / km.

2. It then uses the aggregate data for the CO<sub>2</sub> emission rate per litre of fuel from table 39. The value for diesel is therefore 7,37 kg CO<sub>2</sub> / l.
3. It then uses the following calculation formula to draw up its CO<sub>2</sub> information:

$$\text{CO}_2 \text{ information (per kilometre travelled)} = 7,37 \text{ kg CO}_2 / \text{l} \times 0,045 \text{ l} = 332 \text{ g CO}_2 / \text{km}$$

## 28-4 Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

1. Drawing up level 2 values

The VPR operator looking to use level 2 values must calculate average values for all of its activity.

This example illustrated an operator looking to draw up level 2 values for the parameter: energy source consumption rate of the means of transport.

2. For this purpose, the service provider must collect its annual fuel consumption based on the records that it has taken during the previous year (for example) with its entire fleet of vehicles, and divide this by the number of kilometres travelled with passengers. The different journeys conducted with passengers are those declared with pick-up and drop-off locations. The distance travelled for each journey can be assessed using a road-based distance calculator.

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3. The CO<sub>2</sub> information can be drawn up using the following formula:

**CO<sub>2</sub> information (per kilometre travelled) = Consumption rate x emission factor**

### Example

The private passenger car by driver company recorded a total distance travelled of 500 000 km during the previous year for its entire fleet of diesel vehicles. This total distance recorded includes the distance travelled without passengers.

1. It uses a coefficient of 2 to incorporate empty journeys (see order of April the 10<sup>th</sup>) into the calculation for its consumption rate per kilometre.
2. It records the purchase of 30 000 litres of diesel. The consumption rate per kilometre is therefore:  $[30\ 000 / 500\ 000\ \text{km}] \times 2 = 0,12\ \ell / \text{km}$  travelled.
3. It identifies the diesel energy source emission factor: 3.07 kg CO<sub>2</sub> / ℓ.
4. The CO<sub>2</sub> information to be displayed in the vehicles is:

**CO<sub>2</sub> information (per kilometre travelled) = 0.12 ℓ / km x 3.07 kg CO<sub>2</sub> / ℓ = 369 g CO<sub>2</sub> / km travelled.**



### 28.5. How must this information be transmitted to the beneficiary?

Reminder: general information regarding this issue is provided in chapter 2.6.

#### 1) Quantity of CO<sub>2</sub> emitted

This information is disclosed to the passenger in a simple manner using a display installed within the vehicle, specifying the value in kg CO<sub>2</sub> / km charged. In the aforementioned example, the value to be displayed is 369 g CO<sub>2</sub> / km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO<sub>2</sub> / km in the guide for new vehicles and displayed by car dealers. This is due to the incorporation of real traffic and empty journeys. If the private passenger car with driver operator so desires, it can provide both pieces of information in its display so as to enable its customer to connect these two pieces of information, which do not apply to the same scope of calculation.

The display may for example be drawn up as follows:

"When using this VPR, the quantity of CO<sub>2</sub> emitted per kilometre of journey<sup>2</sup> is: 369 g CO<sub>2</sub> / km".

*For information purposes, the quantity of CO<sub>2</sub> emitted by this vehicle, calculated as per the directive<sup>3</sup> 1999/94/EC on the CO<sub>2</sub> emitted by new vehicles, is 125 g CO<sub>2</sub> / km.*

#### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (28.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: individual passenger transport by road - private passenger car with driver;
- ▶ the value levels used: level 2 for the quantity of energy consumed;
- ▶ the method used to calculate the consumption rate: taking into account the total energy consumed over a 1-year period;
- ▶ the energy source used: road diesel, with the emission factor used.

<sup>2</sup> Value calculated as per article 1431-3 of the French transport code.

<sup>3</sup> The value to be displayed corresponds to that of the vehicle transporting the passenger.



## Passenger transport by 2 or 3-wheelers

### Fact sheet No. 29

#### 29.1. Activities concerned

The activity described as "Transport of passengers by two or wheelers" is governed by the French Home Office. Unlike taxi activities, motorcycles cannot park on the public roads awaiting customers. Furthermore, motorcycles cannot be hailed by users on the public road.

#### 29.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> combines the use of level 1 and 2 values.

The difference between level 2 values and the implementation of level 3 values is in theory very little as vehicle fleets are often homogeneous (same engine size and brand) and are used for all types of journey.

#### 29.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

1. The company transporting passengers by two or three-wheelers notes the aggregate data for the engine size of its vehicle from table 33 in this guide ("level 1 aggregate data - individual passenger transport by road by motorcycle and motorised scooter by road"). This aggregate data incorporates the 100 % rise in energy consumption, provided for by the order of April the 10<sup>th</sup>, to take into account empty journeys.

2. The formula to apply to each service is as follows:

**CO<sub>2</sub> information (per kilometre travelled) = aggregate data**

##### Example

A company transporting passengers by two or three-wheelers is looking to use level 1 values to calculate the quantity of CO<sub>2</sub> emitted by its services. The vehicle used is a motorcycle with a piston displacement greater than 750 cm<sup>3</sup>.

1. The company notes the aggregate data from table 33 for a vehicle with a piston displacement greater than 750 cm<sup>3</sup>: 0,379 kg CO<sub>2</sub> / km.
2. It then uses this data to draw up its CO<sub>2</sub> information:

**CO<sub>2</sub> information (per kilometre travelled) = 0,379 kg CO<sub>2</sub> / km**

#### 29.4. Calculation method combining the use of level 1 and 2 values.

*Reminder: general information on level 2 values is provided in chapter 2.3.*

1. Drawing up level 2 values

The company transporting passengers by two or three-wheelers and looking to use level 2 values, must calculate average for its entire activity.



## Fact sheet No. 29

This example covers the event where the service provider is looking to draw up level 2 values for the parameter: energy source consumption rate of the means of transport.

2. For this purpose, the service provider must collect its annual fuel consumption based on the records that it has made during the previous year (for example) with its entire fleet of vehicles, and divide this by the number of kilometres travelled with passengers. The different journeys conducted with passengers are those declared with pick-up and drop-off locations. The distance travelled for each journey can be assessed using a road-based distance calculator.

3. In this example, the service provider can create the corresponding level 2 aggregate data using the following formula:

$$\text{CO}_2 \text{ information (per kilometre travelled)} = \text{Consumption rate} \times \text{emission factor}$$

### Example

A company transporting passengers by two or three-wheelers is looking to draw up level 2 values to calculate this information. In order to do this:

1. It collects the quantity of petrol RON 98 purchased in the year: 15 600 litres of petrol RON 98.
2. It assesses the distance travelled by its vehicles with passengers and notes a total of 300 000 km travelled.
3. It draws up the level 2 consumption rate per kilometre in the following manner:  
 $15\,600 \text{ l} / 300\,000 \text{ km} \times 2 = 0,104 \text{ l} / \text{km}$ .
4. It notes the emission factor for petrol RON 98: 2.71 kg CO<sub>2</sub> / l.
5. The CO<sub>2</sub> information per kilometre travelled is calculated as follows:

$$\text{CO}_2 \text{ information (per kilometre travelled)} = 0,104 \text{ l} / \text{km} \times 2,71 \text{ kg CO}_2 / \text{l} = 282 \text{ g CO}_2 / \text{km}.$$



### 29.5. How must this information be transmitted to the beneficiary?

*Reminder: general information regarding this issue is provided in chapter 2.6.*

#### 1) Quantity of CO<sub>2</sub> emitted

The sale of a "passenger transport service by two or three-wheelers" takes place using a set tariff package.

This service can be booked, where applicable, by telephone, email or from the company's website. CO<sub>2</sub> information is more easily transmitted at the time of booking the vehicle. Under these circumstances, this information can be provided by telephone or in the booking document (Internet). The calculation is based on the elements provided for the package ordered or based on the journey characteristics if the latter is specific.

Given that the service is not subject to a ticket, the company may also choose to produce a display installed in an appropriate part of the motorcycle (window screen, top case, fairing) as per article 13 of the French order No. 2011-1336.

#### 2) Further information

The additional information provided for by article 13 of the French decree No. 2011-1336 must at least include precisions regarding the calculation method and energy sources used. For the aforementioned example (29.4), the additional information to be provided must at least include:

- ▶ the nature of the activity: individual passenger transport by road by two or three-wheelers;
- ▶ the value levels used: level 2 for the quantity of energy consumed;
- ▶ the method used to calculate the consumption rate: taking into account the total energy consumed over a 1-year period;
- ▶ the energy source used: petrol, providing the emission factor used.

## 5.6. Passenger public transport

### 5.6.1. Reference data

#### 5.6.1.1. The energy source emission factors used

The energy source emission factors to be used for road transport are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of the energy source	Emission factor (kg of CO <sub>2</sub> per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Pumped road diesel	Litre (ℓ)	0,58	2,49	3,07
Liquefied petroleum gas (LPG)	LPG for road vehicles	Litre (ℓ)	0,19	1,58	1,77
Natural gas	Compressed natural gas for road vehicles (CNG)	Litre (ℓ)	0,32	1,81	2,13

Table 41: fuel emission factors - passenger public transport

#### 5.6.1.2. Level 1 values

The table hereinbelow presents the level 1 values for the passenger public transport.

Description (all internal-combustion vehicles, according to the extent of the territory where the transport is provided)	Number of units transported by the means of transport (taking into account unladen journeys)	Rate of consumption of the energy source of the means of transport (in units of measurement of the quantity of energy source per kilometre)
Urban and peri-urban transport in towns with over 250 000 inhabitants	11 passengers	Road diesel: 0,460 ℓ / km Compressed natural gas for road vehicles: 0,081 ℓ / km
Urban and peri-urban transport in towns with 100 000 to 250 000 inhabitants	10 passengers	Road diesel: 0,465 ℓ / km Compressed natural gas for road vehicles: 0,054 ℓ / km
Urban and peri-urban transport in towns with fewer than 100 000 inhabitants/inter-city transport	8 passengers	Road diesel: 0,432 ℓ / km Compressed natural gas for road vehicles: 0,021 ℓ / km

Table 42: level 1 values - passenger public transport

#### 5.6.1.3. Level 1 aggregate data

Level 1 aggregate data is defined by combining the level 1 values with the energy source emission factors.

Description (any combustion engine vehicle, according to the magnitude of the region in which the transport service is provided)	Emission rate in g CO <sub>2</sub> per passenger (calculated values)
Urban and peri-urban transport in towns with over 250 000 inhabitants	144 g CO <sub>2</sub> / passenger.km
Urban and peri-urban transport in towns with 100 000 to 250 000 inhabitants	154 g CO <sub>2</sub> / passenger.km
Urban and peri-urban transport in towns with under 100 000 inhabitants) / inter-urban transport	171 g CO <sub>2</sub> / passenger.km

Table 43: level 1 aggregate data - passenger public transport



## Fact sheet No. 30

# Passenger public transport - combustion engine-powered

### 30.1. Activities concerned

Passenger public transport activities driven by combustion engines include city bus services, inter-city coach services, minibus services, reduced mobility services and demand-responsive transport services.

In the event of the services being managed by the local authorities, these transport services may be carried out either via a public service concession or under the aegis of the former.

### 30.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values;
- the 3<sup>rd</sup> uses level 3 values.

### 30.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 43 ("level 1 aggregate data - passenger public transport") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the type of transport from table 43 according to the size of its city.
2. For a display providing information on the vehicle's consumption rate per kilometre, this data can be used directly. It can also be multiplied by the average journey distance to provide information on the average quantity of emissions generated per journey.
3. To provide information for a given service, the aggregate data must be combined with the distance of the relevant service by applying the following formula:

**CO<sub>2</sub> information (service) = aggregate data x distance (service)**

#### Example

A company managing a public transport service in a 80 000 inhabitants city, is looking to calculate its CO<sub>2</sub> information for the passenger transport services that it carries out using level 1 values.

1. It collects the corresponding level 1 aggregate data from table 43: 171 g CO<sub>2</sub> / passenger.km
2. For information provided via a display, it may directly use this value:

**CO<sub>2</sub> information = 171 g CO<sub>2</sub> per passenger-kilometre**



## Fact sheet No. 30

### 30.4. Calculation method using level 2 values

*Reminder: general information on level 2 values is provided in chapter 2.3.*

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate mean values for all of its activity.

This paragraph covers the case where the service provider has drawn up a level 2 value for the consumption rate for one passenger.

This is an adaptation of the general method, which is normally used to determine the consumption rate per kilometre of the means of transport and the number of units (passengers) transported by the means of transport. This possibility is provided for by article 7 of the French decree 2011-1336. The service provider must therefore state that a specific method has been used.

2. To calculate the consumption rate per passenger, the service provider collects the following data over a given period of time (the previous year):

- ▶ the quantity of fuel consumed by the vehicles;
- ▶ the number of passengers transported.

In this case, the service provider can draw up the corresponding level 2 aggregate data using the following formula. This aggregate data is more practical when making calculations for each service:

**Aggregate data = Consumption rate x emission factor**

3. The calculation formula to apply to each service is as follows:

**CO<sub>2</sub> information (service) = aggregate data**

#### Example

A company providing a public transport service using road vehicles in a city, is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 2 values.

1. It collects the quantity of fuel consumed by its fleet of combustion-engine vehicles: 11 479 000 litres.
2. It draws up the number of passengers transported: 102 800 000 passengers
3. It notes the diesel emission factor: 3,07 kg CO<sub>2</sub> / litre (data provided by the order of 10 April 2012).
4. It then calculates the consumption rate per passenger:  
11 479 000 litres of diesel / 102 800 000 passengers = 0,112 ℓ / passenger.
5. For information provided via a display, the following formula may be used:

**CO<sub>2</sub> information = (0,112 ℓ / passenger x 3,07 kg CO<sub>2</sub> / ℓ) = 0,343 kg CO<sub>2</sub> / passenger.**

**In this example, to specify that the consumption rate is provided for all journeys made throughout the year (and not calculated per kilometre), the company should, as per article 11 of the French decree No. 2011-1336, add the statement "specific method" when displaying this information.**

### 30.5. Calculation method using level 3 values

*Reminder: general information on level 3 values is provided in chapter 2.3.*

#### 1. Drawing up level 3 values

The service provider looking to use level 3 values must firstly break down its activities into subgroups (type of service, type of means of transport, etc.), then produce the corresponding values for each subgroup.

This may, for example, involve a break down per type of vehicle (bus, minibus, etc.). Standard data, specific to the network should therefore be taken into account for each homogeneous set of vehicles.



## Fact sheet No. 30

2. The company can choose to express its CO<sub>2</sub> information per passenger and per kilometre or per journey. The data to be collected include:

▶ **in the first example:**

- ▶ the total quantity of fuel consumed over a given period of time, for example one year;
- ▶ the average journey distance (data obtained via surveys);
- ▶ the number of passengers transported.

▶ **in the second example:**

- ▶ the total quantity of fuel consumed over a given period of time, for example one year;
- ▶ the number of passengers transported over the same period of time.

3. The service provider can create the corresponding level 3 aggregate data using the following formula:

**Aggregate data = [Consumption rate / number of units in the means of transport] x emission factor**

4. For a display providing information on the vehicle's consumption rate per kilometre, this data can be used directly. It can also be multiplied by the average journey distance to provide information on the average quantity of emissions generated per journey.

5. To provide information for a given service, the aggregate data must be combined with the distance of the relevant service by applying the following formula:

**CO<sub>2</sub> information (service) = aggregate data x distance (service)**

### Example

A company providing a public transport service using road vehicles in a city, is whiling looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 3 values.

1. It collects the following information over a 1-year period:
  - ▶ its fleet of single-decker rigid buses consumed 3 425 000 litres of diesel;
  - ▶ its fleet of single-decker rigid buses transported 20 200 000 passengers.
2. It notes the "diesel" energy source emission factor: 3,07 kg CO<sub>2</sub> / ℓ.
3. It calculates its average consumption rate for one journey in a single-decker rigid bus: 3 425 000 litres of diesel / 20 200 000 passengers = 0,170 ℓ / journey.
4. The aggregate data can therefore be calculated per journey using the following formula:

**Aggregate data = (0,170 ℓ x 3,07 kg CO<sub>2</sub> / ℓ) = 522 g CO<sub>2</sub> / journey.**

For a display installed on-board the vehicle, the aggregate data may be used in a direct manner to provide information on the average quantity of emissions generated per kilometre.

**CO<sub>2</sub> information = 522 g CO<sub>2</sub> / journey.**

CO<sub>2</sub> Info

### 30.6. How must this information be transmitted to the beneficiary?

Public transport is often subject to a single tariff system (the price does not depend on the distance travelled) with tickets that can be used regardless of the origin and destination or with passes.

The company can therefore use the possibility stipulated in article 12 of the French decree No. 2011-1336, by displaying its CO<sub>2</sub> information at the bus stop or on-board. This information may relate to:

- ▶ either the distance travelled (emissions per passenger and per kilometre)

Example: "**A journey made within our network emits on average 144 g CO<sub>2</sub> per kilometre for each passenger transported**".

- ▶ or the journey made (emissions per passenger)

Example: "**A journey made within our network emits on average 648 g CO<sub>2</sub> for each passenger transported**". (the information calculated in this example is based on an average distance travelled of 4,5 km per journey).



## Fact sheet No. 31

# Passenger public transport – school transport services

### 31.1. Activities concerned

School transport services are organised by the general councils, which use transport operators to perform these services. This is a form of public transport using a coach or bus service, performing outward and return journeys on a daily basis<sup>1</sup>. These transport services may be carried out either via a public service concession or under the aegis of the local authorities.

The general councils are responsible for informing the users (students - parents) as they organise the transport services. The transport companies provide CO<sub>2</sub> information to the general council for all services performed.

### 31.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

### 31.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 43 ("level 1 aggregate data - public passenger transport by road") and was obtained in the following manner: **Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**, where the consumption rate and number of units transported are both level 1 values in this example.

1. The general council notes the level 1 aggregate data corresponding to the type of city served from table 43.
2. To calculate the CO<sub>2</sub> information corresponding to a given service, the local authorities require the following information:
  - ▶ the distance travelled by these units, represented by "distance (service)" hereinafter. A road-based distance calculator must be used to assess the distance travelled;
  - ▶ the number of units corresponds to the number of passengers; in this case, the information is provided per student (i.e. for one passenger).
3. The calculation formula to apply to each service is as follows:

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{number of units (service)} \times \text{distance (service)}$$

#### Example

A general council is looking to calculate its CO<sub>2</sub> information for the school transport services that it organises for a 150 000 inhabitants city, using level 1 values.

1. It selects the category of city corresponding to its department among the 3 categories provided in table 43: "Urban and peri-urban transport in towns with 100 000 to 250 000 inhabitants".
2. It notes the corresponding aggregate data as provided above: 154 g CO<sub>2</sub> per passenger-kilometre.
3. Application to a travel pass with which a student travels 1 500 km in the year:

$$\text{CO}_2 \text{ information for one student} = 154 \text{ g CO}_2 / \text{passenger.km} \times 1 \text{ passenger} \times 1\,500 \text{ km} = 231 \text{ kg CO}_2$$

<sup>1</sup> The specific case of school trips, where a group of students travel collectively on outings, is not covered in this fact sheet.



## Fact sheet No. 31

### 31.4. Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate average values for all of its activity.

This paragraph covers the case where the service provider has drawn up a level 2 value for the consumption rate for one travel pass.

This is an adaptation of the general method, which is normally used to determine the consumption rate per kilometre of the means of transport and the number of units (passengers) transported by the means of transport. This possibility is provided for by article 7 of the French decree 2011-1336. The service provider must therefore state that a specific method has been used.

2. To calculate the consumption rate per travel pass, the general council collects the following data over a given period of time (the previous academic year):

- ▶ the quantity of fuel consumed by the vehicles;
- ▶ the number of students transported.

In this case, the service provider can draw up the corresponding level 2 aggregate data using the following formula. This aggregate data is more practical when making calculations for each service:

**Aggregate data = Consumption rate x emission factor**

3. The calculation formula to apply to each service is as follows:

**CO<sub>2</sub> information (service) = aggregate data**

#### Example

A general council uses a consumption rate to provide direct information for all journeys made during the year, which corresponds to the service performed as part of an annual travel pass.

1. It collects the quantity of fuel consumed by its fleet of combustion-engine vehicles: 26 479 000 litres.
2. It identifies the number of students transported: 15 000 students.
3. It notes the diesel emission factor: 3,07 kg CO<sub>2</sub> / litre (data provided by the order of April the 10<sup>th</sup>).
4. It then calculates the consumption rate per travel pass:  
26 479 000 litres of diesel / 15 000 students = 176,53 ℓ / student.
5. To provide information to each student regarding his/her annual travel pass, the following formula can be used:

**CO<sub>2</sub> information = (176,53 ℓ x 3,07 kg CO<sub>2</sub> / ℓ) = 542 kg CO<sub>2</sub> / travel pass**

In this example, to specify that the consumption rate is provided for all journeys made throughout the year (and not calculated per kilometre), the local authorities should, as per article 11 of the French decree No. 2011-1336, add the statement "specific method" when displaying this information.



### 31.5. How must this information be transmitted to the beneficiary?

CO<sub>2</sub> information can be provided when issuing the annual travel pass. Additionally, a display may be installed on-board the vehicle by the transport company providing information on its CO<sub>2</sub> emissions per kilometre and per passenger.

## 5.7. Guided passenger transport

### 5.7.1. Reference data

#### 5.7.1.1 The energy source emission factors used

The energy source emission factors to be used for guided transport are as follows:

Nature of the energy source	Detailed type of the energy source	Unit of measurement of the quantity of energy source	Emission factor (kg of CO <sub>2</sub> 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 Corsica	Kilowatt-hour	0,583	0,000	0,583
	Consumed in Guadeloupe	Kilowatt-hour	0,688	0,000	0,688
	Consumed in French Guiana	Kilowatt-hour	0,350	0,000	0,350
	Consumed in Martinique	Kilowatt-hour	0,825	0,000	0,825
	Consumed in Mayotte	Kilowatt-hour	0,765	0,000	0,765
	Consumed in Réunion	Kilowatt-hour	0,764	0,000	0,764
	Consumed in Europe (excluding France)	Kilowatt-hour	0,420	0,000	0,420

Table 44: energy source emission factors - guided passenger transport

#### 5.7.1.2 Level 1 values

The table hereinbelow presents the level 1 values for guided passenger transport.

Description (according to the nature of the means of transport and the extent of the territory where it is provided)	Number of units transported by the means of transport (taking into account empty journeys)	Rate of consumption of the energy source by the means of transport (in units of measurement of the quantity of the energy source per kilometre)
All electricity-powered vehicles (metros, trams, trolleybuses, cable railways) Urban and peri-urban transport in towns with over 250 000 inhabitants	47 passengers	5,87 kWh / km
All electricity-powered vehicles (trams, trolleybuses, cable railways) Urban and peri-urban transport in towns with under 250 000 inhabitants	20 passengers	2,60 kWh / km
Cable car (8 seats)	4 passengers	2,24 kWh / km

Table 45: level 1 values - guided passenger transport

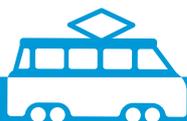
### 5.7.1.3 Level 1 aggregate data

Level 1 aggregate data is defined by combining the level 1 values with the energy source emission factors for guided transport carried out in mainland France (excluding Corsica).

Description (according to the nature of the means of transport and the extent of the territory where it is provided)	Emission rate in g CO <sub>2</sub> per passenger and per kilometre (calculated values)
All electricity-powered vehicles (metros, trams, buses, cable railways) Urban and peri-urban transport in towns with over 250 000 inhabitants in mainland France (excluding Corsica)	6,62 g CO <sub>2</sub> / passenger.km
All electricity-powered vehicles (trams, buses, cable railways) Urban and peri-urban transport in towns with under 250 000 inhabitants in mainland France (excluding Corsica)	6,89 g CO <sub>2</sub> / passenger.km
Cable car (8 seats) in mainland France (excluding Corsica)	29,6 g CO <sub>2</sub> / passenger.km

Table 46: Level 1 aggregate data for the three guided public transport activities in mainland France (excluding Corsica)

For guided transport services performed outside of mainland France or in Corsica, the service provider must use the appropriate electricity emission factors and level 1 values provided in table 44 ("energy source emission factors - guided passenger transport").



## Fact sheet No. 32

# Passenger public transport - electricity-powered

### 32.1. Activities concerned

The passenger public transport via electricity-powered vehicles cover various different public passenger transport services that use electricity as a source of power: metros, trams, trolleybuses and cable railways.

These transport services may be carried out either via a public service concession or under the aegis of the local authorities.

### 32.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

### 32.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 **aggregate data**. For reference, this aggregate data is available in table 46 ("level 1 aggregate data for the three guided public transport activities in mainland France [excluding Corsica]") and was obtained in the following manner:

**Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor**

where the consumption rate and number of units are both level 1 values in this case.

1. The service provider notes the level 1 aggregate data corresponding to the type of transport from table 46 according to the size of its city.
2. For a display providing information on the vehicle's consumption rate per kilometre, this data can be used in a direct manner. It can also be multiplied by the average journey distance to provide information on the average quantity of emissions generated per journey.
3. To provide information for a given service, the aggregate data must be combined with the distance of the relevant service by applying the following formula:

**CO<sub>2</sub> information (service) = aggregate data x distance (service)**

#### Example

A company managing an electricity-powered public transport service (for example a tram) in a city containing more than 250 000 inhabitants, is looking to calculate its CO<sub>2</sub> information for the passenger transport services that it carries out using level 1 values.

1. It collects the corresponding level 1 aggregate data from table 46: 6,62 g CO<sub>2</sub> / passenger.km.
2. For information provided via a display, it may directly use this value:

**CO<sub>2</sub> information = 6,62 g CO<sub>2</sub> per passenger-kilometre.**



## Fact sheet No. 32

### 32.4. Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

#### 1. Drawing up level 2 values

The service provider looking to use level 2 values must calculate mean values for all of its activity.

This paragraph covers the case where the service provider has chosen to draw up a level 2 value for the consumption rate for one passenger.

This is an adaptation of the general method, which is normally used to determine the consumption rate per kilometre of the means of transport and the number of units (passengers) transported by the means of transport. This possibility is provided for by article 7 of the French decree 2011-1336. The service provider must therefore state that a specific method has been used.

To calculate this consumption rate per passenger, the service provider collects the following information over a given period of time (the previous year):

- ▶ the quantity of fuel consumed by the vehicles;
- ▶ the number of passengers transported.

It draws up the consumption rate per journey by dividing the vehicle's consumption by the number of passengers transported. The service provider can thus create the corresponding level 2 aggregate data using the following formula:

**Aggregate data = Consumption rate x emission factor**

#### 2. The calculation formula to apply to each service is as follows:

**CO<sub>2</sub> information (service per passenger) = aggregate data**

#### Example

A service provider operating in a city with under 250 000 inhabitants using a tram line, is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 3 values.

1. It collects the quantity of fuel consumed by its fleet of electric vehicles: 5 980 000 kWh of electricity.
2. It identifies the number of passengers transported: 12 950 000 passengers.
3. It notes the emission factor for electricity consumed in mainland France (excluding Corsica): 0,053 kg CO<sub>2</sub>/kWh.
4. It then calculates the consumption rate per passenger: 5 980 000 kWh / 12 950 000 passengers = 0,462 kWh / passenger.
5. The aggregate data can therefore be calculated per passenger using the following formula:

**Aggregate data = (0,462 kWh / passenger x 0,053 CO<sub>2</sub> / kWh) = 24,5 g CO<sub>2</sub> / passenger.**

For a display installed on-board the vehicle, the aggregate data may be used in a direct manner to provide information on the average quantity of emissions generated per kilometre.

**CO<sub>2</sub> information = (0,462 kWh / passenger x 0,053 CO<sub>2</sub> / kWh) = 24,5 g CO<sub>2</sub> / passenger.**



## Fact sheet No. 32

A small icon of a white card with a paperclip, containing the text "CO<sub>2</sub> Info".

CO<sub>2</sub> Info

### 32.5. How must this information be transmitted to the beneficiary?

In many cases, public transport is subject to a single tariff system (the price does not depend on the distance travelled) with tickets that can be used regardless of the origin and destination.

The company can therefore use the possibility stipulated in article 12 of the French decree No. 2011-1336, by displaying its CO<sub>2</sub> information at the tram (or metro) station or on-board the carriages. This information may relate to:

- ▶ either the distance travelled (emissions per passenger and per kilometre)  
Example: "**A tram journey made within our network emits an average 24,5 g CO<sub>2</sub> per kilometre per passenger transported**".
- ▶ or the journey made (emissions per passenger)  
Example: "**A tram journey made within our network emits an average 93,8 g CO<sub>2</sub> per passenger transported**". (Information calculated based on an average distance travelled of 3,8 km per journey, as determined by the service provider).



## Fact sheet No. 33

### Passenger public transport - cable cars

#### 33.1. Activities concerned

Cable car transportation is managed by the local authorities, which may use transport operators to perform these services.

The information must be provided by the organisation selling the service (the local authority or the company depending on the situation).

#### 33.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1<sup>st</sup> uses level 1 values;
- the 2<sup>nd</sup> uses level 2 values.

#### 33.3. Calculation method using level 1 values

*Reminder: general information on level 1 values is provided in chapter 2.3.*

The following paragraph describes how to use level 1 aggregate data. For reference, this aggregate data is available in table 46 ("level 1 aggregate data for the three guided public transport activities in mainland France [excluding Corsica]") and was obtained in the following manner:

$$\text{Aggregate data} = [\text{Energy source consumption rate} / \text{number of units in the means of transport}] \times \text{emission factor}$$

where the consumption rate and number of units are both level 1 values in this case.

1. The local authority or company notes the level 1 aggregate data corresponding to the type of transport from table 46 according to the size of its city.
2. The distance travelled by the cable car is known and can be used to provide CO<sub>2</sub> information to each passenger.

$$\text{CO}_2 \text{ information (service)} = \text{aggregate data} \times \text{distance (service)}$$

#### Example

A local authority managing a cable car transport service is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 1 values.

1. It identifies the corresponding level 1 aggregate data from table 46: 29,6 g CO<sub>2</sub> / passenger.km.
2. It determines the distance travelled by the cable car of 1,5 km.
3. Application to a given service

The CO<sub>2</sub> information for one passenger is calculated using the following formula:

$$\text{CO}_2 \text{ information} = 29,6 \text{ g CO}_2 / \text{passenger.km} \times 1 \text{ passenger} \times 1,5 \text{ km} = 44,4 \text{ g CO}_2$$



## Fact sheet No. 33

### 33.4. Calculation method using level 2 values

Reminder: general information on level 2 values is provided in chapter 2.3.

#### 1. Drawing up level 2 values

The local authority or service provider looking to use level 2 values must calculate average values for all of its activity.

This chapter covers an example where the service provider has produced level 2 values for each of the following two parameters:

- ▶ the quantity of the energy source consumed by the means of transport;
- ▶ the number of passengers transported by the means of transport.

2. For this purpose, the local authority or company must collect its annual electricity consumption based on the records that it has made during the previous year (for example) with all of its cable cars, and divide this by the number of passengers transported. According to the desired result, the annual occupancy rate can be expressed:

- ▶ in number of passengers to obtain the average emissions per journey made by a passenger;
- ▶ in number of passenger-kilometres (i.e. the number of kilometres performed by all passengers) to obtain average emissions per passenger and per kilometre.

3. The calculation formula to apply to each service is as follows:

$$\text{CO}_2 \text{ Information} = \text{energy source consumption} \times \left[ \frac{\text{number of units transported for the service}}{\text{number of units in the means of transport}} \right] \times \text{emission factor}$$

#### Example

A local authority providing a cable car transport service from a point A to a point B, is looking to calculate its CO<sub>2</sub> information for the transport services that it carries out using level 2 values.

1. It collects the quantity of fuel consumed by all of its cable cars: 95 000 kWh of electricity.
2. It identifies the number of passengers transported: 2 100 000 passengers.
3. It notes the emission factor for electricity consumed in mainland France (excluding Corsica): 0,053 kg CO<sub>2</sub>/kWh.
4. It then calculates the consumption rate per passenger: 95 000 kWh / 2 100 ,000 passengers = 0,045 kWh / passenger.
5. The aggregate data can therefore be calculated per journey using the following formula:

$$\text{Aggregate data} = (0,045 \text{ kWh} / \text{passenger} \times 0,053 \text{ kg CO}_2 / \text{kWh}) = 2,39 \text{ g CO}_2 / \text{passenger}.$$

For a display installed on-board the vehicle, the aggregate data may be used in a direct manner to provide information on the average quantity of emissions generated per kilometre.

$$\text{CO}_2 \text{ information} = 2,39 \text{ g CO}_2 / \text{passenger}.$$



CO<sub>2</sub> Info

### 33.5. How must this information be transmitted to the beneficiary?

Reminder: general information regarding this issue is provided in chapter 2.6.

CO<sub>2</sub> information can be provided using:

- ▶ a notice on the ticket sales website;
- ▶ a display panel at the point of sale (ticket office) specifying the quantity of CO<sub>2</sub> emitted for the different services on offer.

This information can also appear on the ticket issued to the customer (assuming that the ticket production system has been adapted to suit this method).

In the event of one ticket being issued for multiple passengers, this information can be provided for the service as a whole (for all passengers and, where applicable, for the vehicle).



## Fact sheet No. 34

# Travel agent and tour operator activities

## 34.1. Activities concerned

The term "travel agency" covers three subcategories of stakeholders:

- ▶ **travel agencies** (INSEE profession code NAF 79.11Z), whose activities mainly consist in selling, to groups or individuals, travel services, organised holidays, transport and accommodation. This concerns both agencies with physical premises or Internet agencies. These are referenced in the Atout France register of travel and holiday operators<sup>1</sup>;
- ▶ **tour operators** (INSEE profession code NAF 79.12Z), whose activities consist in planning and setting up organised holidays sold by travel agencies

or directly by tour operators. These organised holidays may include transport services, accommodation or catering, etc. These are therefore holiday organisers and may own their own means of transport;

- ▶ **other booking services and related activities** (INSEE profession code NAF 79.90Z), which cover booking activities for transport, hotels, restaurants, car hire and other tourism-related services (advertising, assistance, etc.).

The services provided by these agencies include:

- ▶ **travel (outward and return journeys) to the tourist locations**: this is the initial train, plane or bus journey taking customers to the holiday location.
- ▶ **trips departing from the tourist locations if provided for** in the initial contract and if their activity falls within the scope of application of the decree; these are the trips made to perform activities during the holiday: coach outings, river cruises, ski lifts, etc.

## 34.2. The calculation methods presented in this sheet

For this activity, companies are often required to collect information provided to them by the transport operators providing the transport service.

In the case that this information is not available, the company may therefore provide information based on level 1 values.

This fact sheet presents one method using level 1 values and one method using the values provided by the transport operator.

## 34.3. Calculation method using level 1 values

According to the situation, the agency uses the level 1 methods described in the following sheets:

- ▶ Air passenger transport (see fact sheet No. 20);
- ▶ Railway passenger transport (see fact sheet No. 21);
- ▶ river passenger transport (see fact sheet No. 22);
- ▶ sea passenger transport (see fact sheet No. 23 to 24);
- ▶ passenger transport by road (see fact sheet No. 25 to 30);
- ▶ guided passenger transport (see fact sheet No. 31 to 33);

Assessing the distance of the service:

- ▶ for air transport, the CO<sub>2</sub> aviation emissions calculator provided by the DGAC can be used to calculate this distance;
- ▶ for road transport, this can be assessed using itinerary-based websites;
- ▶ similarly, for rail transport, this distance can be estimated using a road-based distance calculator in the absence of other calculation media.

<sup>1</sup> <https://registre-operateurs-de-voyages.atout-france.fr/web/rovs/#https://registre-operateurs-de-voyages.atout-france.fr/immatriculation/rechercheMenu>

## Fact sheet No. 34



### Example

A travel agency is looking to use level 1 values to calculate the CO<sub>2</sub> information that must be provided to a family of 4 looking to book a plane journey from Paris (CDG) to Madrid (Barajas).

1. The travel agency can therefore use the CO<sub>2</sub> calculator provided by the DGAC:  
<http://www.developpement-durable.gouv.fr/aviation/eco-calculateur/index.php>.
2. By selecting the relevant departure and arrival airports, the agency obtains the result of 274 kg CO<sub>2</sub> per passenger for the Outward and Return flight.
3. The travel agency thus obtains the corresponding CO<sub>2</sub> information that it can provide to its customer:  
4 x 274 kg CO<sub>2</sub> = 1 096 kg CO<sub>2</sub> for the family of 4.

### 34.4. Calculation method using values provided by the transport operator

In this example, the travel agency can reuse the quantity of CO<sub>2</sub> provided by the operator for the service that it markets.



### Example

1. A travel agency is looking to use the values provided by the airline to calculate the CO<sub>2</sub> information that it must provide to a customer looking to book a journey to Canada comprising an outward and return journey between Paris and Quebec.
2. It obtains this information via the booking system used by the agency, via the airline's website. The CO<sub>2</sub> for this flight is 1 412 kg CO<sub>2</sub>.
3. It can therefore directly provide this information to its customer.



### 34.5. How must this information be transmitted to the beneficiary?

Contact between the travel agency and the user essentially occurs before the service is performed and mainly at the time of booking. This applies to both a booking made at a travel agent's and a booking made online.

The CO<sub>2</sub> information for the transport services making up part of the offer presented to the customer, may be provided in the commercial document representing this proposal (holiday file or summary for online bookings).

CO<sub>2</sub> information can also be provided to the customer verbally and is deemed as a sufficient means of communication.

