Info GES transport

GHG information for transport services

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

Methodological guide

Updated version resulting 67 article of the law n° 2015-992

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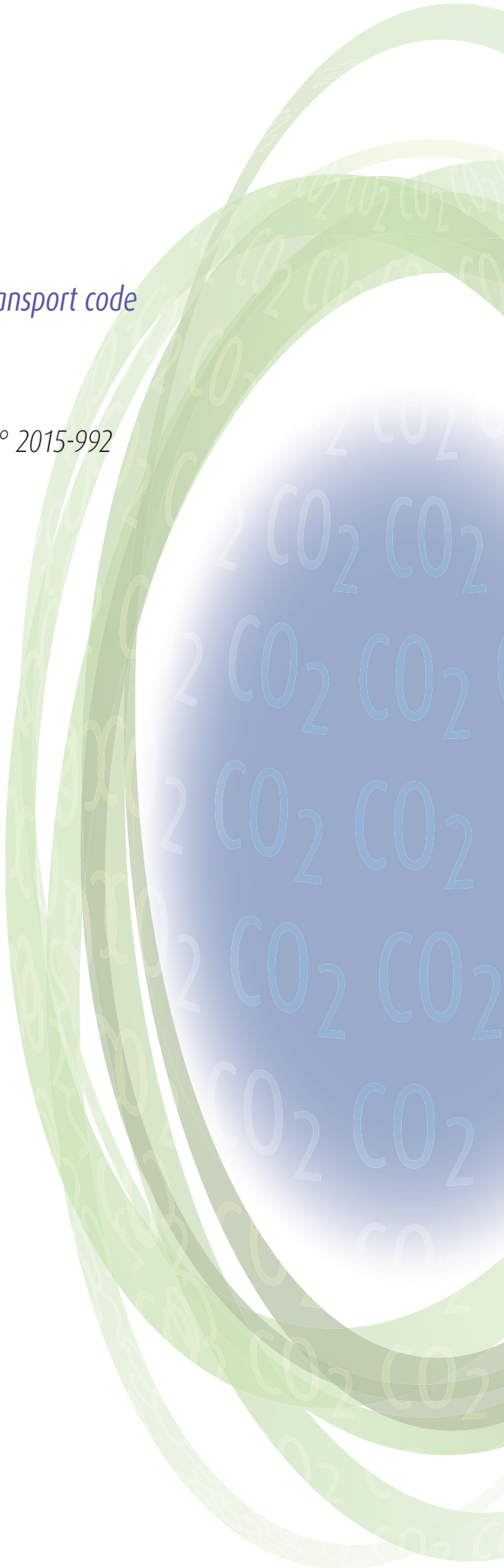

Preface

The first version of the Methodological Guide was published in October 2012, a year before the entry into force of regulations requiring that information on the amount of carbon dioxide (CO_2) emitted during the provision of transport services be made available. These came into force on 1st October 2013.

At the time, the process' implementation needed to be prepared by transport service professionals via the provision of a practical tool.

Article 67 of the Energy Transition for Green Growth Act changed the initial regulations in the following ways:

- expanding the scope of greenhouse gases (GHGs) to include more than just CO_2;
- changing the geographical scope of the regulations' application.

With regard to the scope of gases included, this Guide, in addition to replacing CO_2 with GHG, provides all relevant information on the matter and provides quantified examples after the application of the new emission factors' values.

As for the geographical scope — even though this obligation does not currently apply to international transportation — all examples, which will also be recalculated, have been kept for the service providers who will be providing the information for these journeys.

Some things have been added compared to the previous addition, particularly with regard to other existing processes for the reduction of GHG emissions, or for comparisons with automobile emissions.

This update to the Guide was made by departments of the Ministry of the Environment, Energy and the Sea, and departments of the French Environment and Energy Management Agency.

GHG Info

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Contents

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 greenhouse gas emitted during a given transport service.
This document specifies the range and scope of this measure, presents the principle for calculating the GHG 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 GHG 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 GHG 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 GHG 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"[1] ...

The purpose of providing GHG 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 GHG 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 GHG emissions: a lot of information can be obtained from GHG calculators or eco-comparison tools, however no common framework yet exists for all modes of transport.

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. GHG 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 GHG 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.

1 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).

GHG information and environmental actions

The objective of a process with the climate firmly in mind, developed over several years, is to encourage economic-sector stakeholders to think in terms of overall performance. In managing business activities, this requires that economic criteria exist alongside complementary environmental criteria.

Comprising a number of regulatory and voluntary measures, this concerns the physical impact of business activities on the climate, as well as links between transport stakeholders.

This process was designed around four main principles:

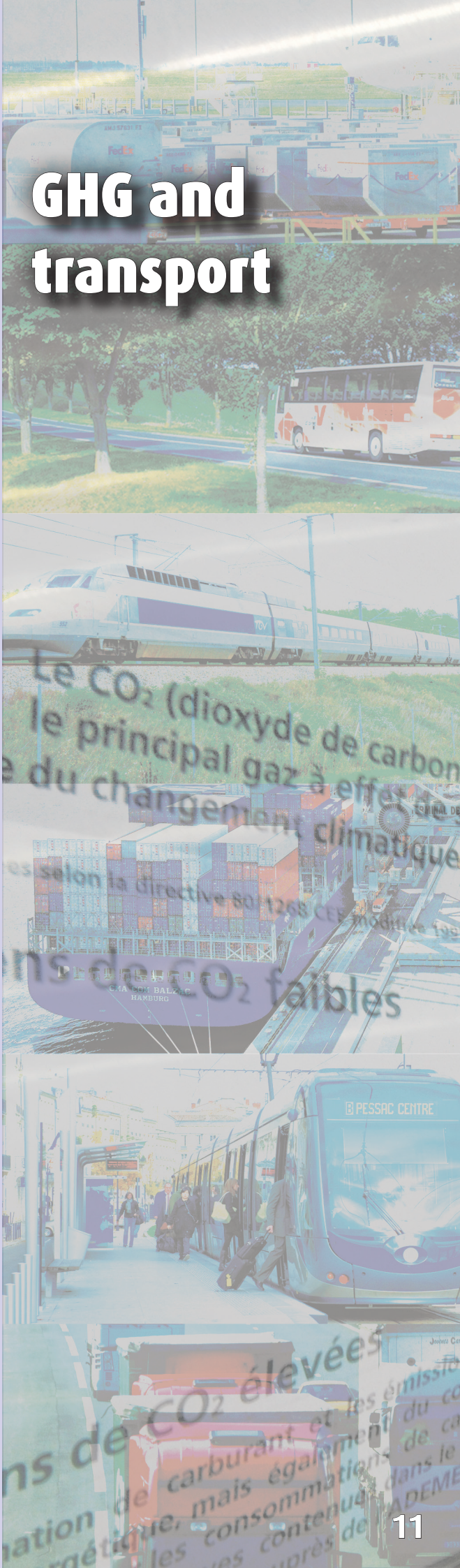
- "Diagnosis", which makes it possible to encourage further synergy between environmental performance and overall performance;
- Partnership commitments and voluntary commitments facilitating the adoption, acceptance, and development of current practices and business activities (CO_2 Objective: Hauliers commit [Les transporteurs s'engagent] and the Label, Fret 21 Loaders commit [Les chargeurs s'engagent]);
- Verified sets of "tools" facilitating the implementation of actions aiming to improve overall performance;
- The information given to third parties regarding actions taken and their contribution to countering the greenhouse effect, information which, in particular, allows for these actions to be paid for by markets.

Information on the amount of GHGs emitted during the provision of transport services is covered by this last principle. Its obligatory nature primarily stems from the fact that market mechanisms do not always guarantee the adequate dissemination of information.

It is also worth noting that the scope of GHGs in this information is identical to that of GHG Balances (which constitute a Diagnosis as defined by the preceding principles).

Chapter 1

GHG 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 mainland France, 30 % 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).

Dans le cadre de la loi relative à la transition énergétique pour la croissance verte, la France s'est fixé un objectif de réduction de 40 % des émissions des gaz à effet de serre entre 1990 et 2030.

1.2. Assessing 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_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and nitrogen fluoride (NF_3).

The number one greenhouse gas emitted by the transport industry is carbon dioxide (GHG), which is emitted during electricity generation and during fuel production and use.

With regard to the regulation subject to this guide of application, the measurements taken provide carbon dioxide equivalent (written CO_2e)[2] quantities expressed in weight (grams, kilograms or tonnes).

2 CO_2e: CO_2 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 GHG 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[3].

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 equivalent by using an **emission factor** specific to the source of energy consumed.

For example, the consumption of 20 litres of diesel generates 63,2 kg of CO_2e given that the emission factor of this fuel is 3,16 kg of CO_2e 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, in addition to the combustion process itself.

For electricity (for example rail transport), although vehicle operation itself does not generate emissions, greenhouse gases are produced when generating the electricity.

This is why this GHG 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[4].

For example, within the scope of this guide, the emission factors for kerosene are 0,53 kg of CO_2e per litre for the upstream phase and 2,52 kg of CO_2e per litre for the operating phase. Therefore, the overall emissions generated for one litre of kerosene are 2,52 + 0,53 = 3,05 kg of CO_2e.

The emission factors for the different energy sources, including the upstream and operating phases, are set out in annex I of the French modified order of 10 April 2012 (*see* table hereinafter). They can also be consulted on the Carbon Basis of the Agency for environment and energy management.

3 The Intergovernmental Panel on Climate Change.

4 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_2e 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	0,048	0,000	0,048
	Consumed in Corsica	Kilowatt-hour	0,59	0,00	0,59
	Consumed in Guadeloupe	Kilowatt-hour	0,70	0,00	0,70
	Consumed in French Guiana	Kilowatt-hour	2,56	0,00	2,56
	Consumed in Martinique	Kilowatt-hour	0,84	0,00	0,84
	Consumed in Mayotte	Kilowatt-hour	0,78	0,00	0,78
	Consumed in the Reunion Island	Kilowatt-hour	0,78	0,00	0,78
	Consumed in Europe (excluding France)	Kilowatt-hour	0,42	0,00	0,42
Aviation fuel	Wide-cut jet fuel (jet B)	Litre	0,53	2,48	3,01
	Aviation fuel (AvGas)	Litre	0,53	2,48	3,01
	Kerosene (Jet A1 or Jet A)	Litre	0,53	2,52	3,05
Automotive fuel	Unleaded petrol (95, 95-E10, 98)	Litre	0,53	2,28	2,80
	E 85	Litre	1,09	0,37	1,46
Fuel oil	Light fuel oil ISO 8217 Classes RMA to RMD	Kilogram	0,68	3,17	3,85
	Heavy fuel oil ISO 8217 Classes RME to RMK	Kilogram	0,50	3,14	3,64
Diesel	Road diesel	Litre	0,66	2,51	3,16
	Non-road diesel	Litre	0,66	2,52	3,17
		Kilogram	0,78	2,98	3,76
	B 30	Litre	0,98	1,88	2,86
	Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,68	3,17	3,85
Liquefied petroleum gas (LPG)	LPG for road vehicles	Litre	0,26	1,60	1,86
	Marine butane	Kilogram	0,49	2,95	3,44
	Marine propane	Kilogram	0,49	2,98	3,47
Natural gas	Compressed natural gas for road vehicles (CNG)	m^3	0,44	1,84	2,28
	Marine liquefied natural gas (LNG)	Kilogram	0,70	2,81	3,51

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

Vehicle Euro emissions class and CO_2e 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); particles; nitrogen oxides (NOx).

The attribution of a Euro class to a vehicle does not therefore enable us to determine the quantity of CO_2e emitted for a given transport service.

Chapter 2

GHG information for transport services

2.1. Legal and regulatory texts

GHG information for transport services is a provision derived from article L1431-3 of the French transport code. This device is subject to following regulatory texts:

- Articles D1431-1 à D1431-23 of the French transport code, derived from **decree No. 2011-1336 of 24 October 2011** on the provision of information regarding the quantity of carbon dioxide emitted during a transport service: these specifie 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 1st of October 2013 as the date from which such GHG information disclosure requirements become mandatory;
- French decree No. 2017-639 of 26 april 2017 on the provision of information regarding the quantity of greenhouse gas emitted during a transport service. This decree résults application of article 67 of the French law related to energy transition for green growth;
- French order of 26 april 2017 implementing the French decree No. 2017-639 of 26 april 2017 on the provision of information regarding the quantity of greenhouse gas emitted during a transport service: this order in particular sets out the emission factors of greenhouse gases for the different energy sources.

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

GHG 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 D1431-2 of the French transport code).

The following are therefore subject to GHG 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.

GHG 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 (goods transport)

GHG 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 GHG information disclosure requirement.

Nonetheless, a company, for example a shipper, can voluntarily calculate the GHG 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 GHG 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, article D1431-16 of the French transport code stipulates that level 1 values can be used until the 1st of July 2019.

2.2.3. According to the scale of the service provided

The GHG 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.

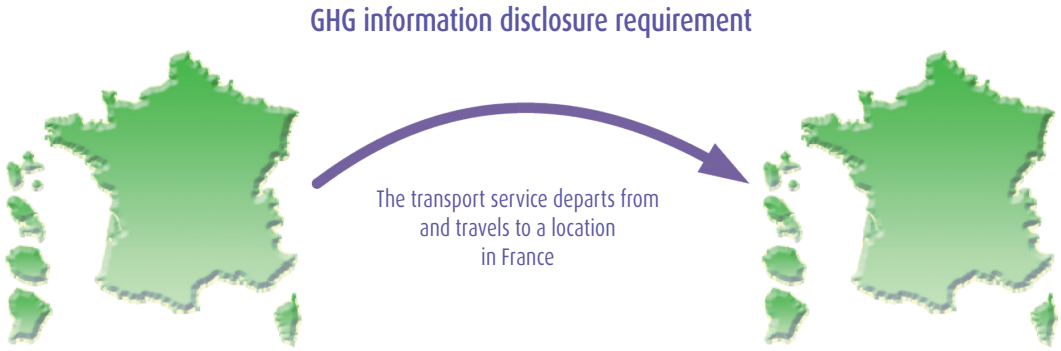
Therefore, for a taxi ride or an underground journey, the simple on-board display of the emissions generated per kilometre will suffice.

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

The services subject to GHG information disclosure requirements are all journeys that depart from and travel to a location in France[5].

Indeed article 67 of the French law related to energy transition for green growth modified article L1431-3 of the French transport code in conditioning implementation of information obligation, for journeys that depart from or travel to a location are out national territory, to adapted dispositions as part of competent european and international organisations.

However transport providers can give information related to their international journeys, according to method of their choice, in informing beneficiaries.



2.3. How to draw up this information?

2.3.1. Presenting the method

Articles D1431-1 to D1431-23 of the French transport code describe the method to be used to calculate the GHG emissions generated by transport services.

This method contains four steps:

- breaking down the transport service into segments[6] (*see* article D1431-6 of the French transport code);
- calculating the quantity of the energy source consumed for each segment (*see* articles D1431-8 to D1431-11 of the French transport code);
- converting the quantity of the energy source used into a quantity of greenhouse gas produced for each segment (*see* article D1431-7 of the French transport code); this conversion takes place using the emission factors appended to the French order of 10 April 2012.
- adding together the quantities of greenhouse gas generated by the different segments.

2.3.2. The main calculation formulae

The four formulae below can be used to calculate the quantity of GHG emitted during a service, according to the different instructions provided:

5 The GHG transport regulation is compulsory in mainland France and in its overseas departments and territories.

6 "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 D1431-1 of the French transport code). 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.

☛ 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:

GHG Information = energy source consumption x emission factor - (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:

GHG Information = energy source consumption x [number of units transported for the service / number of units in the means of transport] x emission factor - (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:

GHG Information = energy source consumption rate x distance x emission factor (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:

GHG Information = energy source consumption rate x distance x emission factor x [number of units transported for the service / number of units in the means of transport] - (formula No. 4)

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":

Aggregate data = [Energy source consumption rate / number of units in the means of transport] x emission factor - (formula No. 5)

The corresponding simplified calculation formula is as follows:

GHG Information= aggregate data x number of units transported for the service x distance (formula No. 6)

2.3.4. Calculating GHG information and data levels

Article D1431-12 of the French transport code 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 or 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 GHG 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 1st of July 2019.

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):

GHG Information = 0,240 ℓ / km x 150 km x 3,16 kg CO_2e / ℓ x (0,5 t / 1,8 t) = 31,6 kg CO_2e

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;
- 3,16 kg CO_2e / 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: 0,048 kg CO_2e / kWh
- number of units transported: 20 passengers

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

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

Aggregate data = [2,6 kWh / km / 20 passengers] x 0,048 kg CO_2e / kWh

Aggregate data = 6,24 g CO_2e / 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 GHG 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 GHG 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 GHG 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 GHG information can be calculated as follows, using formula No. 2 (§ 2.3.2):

GHG Information (Customer A) = 4 000 ℓ x (50/150) x 3,17 kg CO_2e / ℓ = 4 227 kg CO_2e

GHG Information (Customer B) = 4 000 ℓ x (100/150) x 3,17 kg CO_2e / ℓ = 8 453 kg CO_2e

Where 3,17 kg CO_2e / ℓ is the off-road diesel emission factor.

2.3.5. Assessing distance

When used to calculate GHG 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 GHG 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.searates.com/reference/portdistance/), portworld (http://www.portworld.com/map);
- for air transport, either liaison between origin and destination airports is known into calculator of the French General Directorate for Civil Aviation, in which case the distance is given by the calculator, or the liaison is not known, in which case the distance can be estimated using a tool such as www.world-airport-codes.com. This one calculates the orthodromic distance[7] between two airports.
- 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 is a multimodal (road, rail, air, sea and river) and accessible tool which integrates a distance calculator; It can be consulted at the following address: http://www.ecotransit.org/calculation.fr.html
- 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. For high speed trains, it is nevertheless possible to resort to the tool at the following address: https://ressources.data.sncf.com/explore/dataset/emission-co2-tgv/table/.

7 See glossary

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 GHG 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 GHG 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)
...	...	...	...
...	...	...	...
Total			**∑ (t x 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		
...	...	...	...
...	...	...	...
Total	**∑ km with load**	**∑ km without load**	**∑ km in total**

5. the number of units transported can therefore be calculated in the following manner:
∑ (t x km) / ∑ km in total = 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:
∑ (t x km) / ∑ km with load = 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 pubic 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 GHG 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 ca lculations using level 4 values based on real data for the service.

Allocating an empty journey to a given service

Neither the French transport code or the modified order of 10 April 2012 set out the rules to be applied with regard to the terms and conditions for allocating the quantity of GHG 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 OEET (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 GHG 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 1st of July 2019, 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 GHG 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 GHG information (for

example for a portion of the service executed outside of France) or in the event that the GHG 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 GHG emitted;
- its corresponding tonne-kilometres.

By dividing this quantity of GHG by these tonne-kilometres, the service provider produces an aggregate data item in g CO_2e / t.km.

It can then use this aggregate data item, determined for the services performed during the previous year, to calculate the GHG 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 GHG emissions generated by subcontracted activities[8]. 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[9]. 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 GHG 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: this data is provided in the modified order of 10 April 2012 and repeated in this application guide.

This data has 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 L229-25 of the French environment code.

The level 1 values for air transport are not appended to the order of 10 April 2012. These are integrated into the GHG aviation emissions calculator uploaded by the DGAC (French General Directorate for Civil Aviation)[10], which can be found at the following address: http://eco-calculateur.aviation-civile.gouv.fr/.
The DGAC updates this calculator annually during the 4th quarter of each year.

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 greenhouse gas emitted for all upstream and operating phases.

8 Within the scope of level 3 methodologies, modelling is one possibility for breaking down activities.
9 The definition of level 3 values provided in article D1431-12 of the French transport code states that any breakdown must be comprehensive.
10 Direction Générale de l'Aviation Civile - French Civil Aviation Authority.

This information must be given in kilograms (kg), grams (g) or tonnes (t) of CO_2e. 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[11] is therefore possible. 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[12], 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.

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

11 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.
12 For example via the internet.

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 GHG 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 NF EN 16258**.

2.7. Who is targeted by this information?

2.7.1. Don't confuse beneficiary and recipient

The decree specifies the notion of a GHG 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 GHG information to the local authority, which is the direct beneficiary.

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

2.8. How to read GHG information

The beneficiary of GHG 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 GHG information received from a service provider is expressed in grams, kilograms or tonnes of CO_2e (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 GHG 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 GHG emissions between its different service providers;
- furthermore, comparing two pieces of GHG 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).

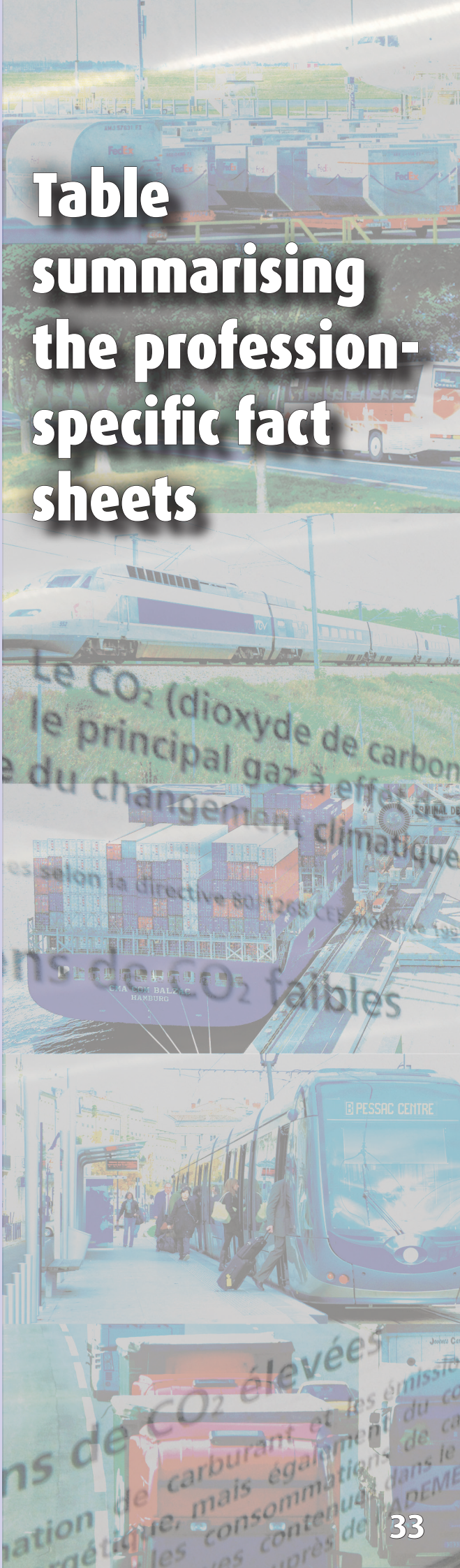
  Finally, when assessing a sustainable development approach undertaken by its service provider, a higher or lower GHG information value must not constitute the sole analysis criteria. The qualitative assessment of other actions undertaken by the service provider in this respect may prove useful (existence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

2.9. How to have GHG information verified

Article D1431-19 of the French transport code 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.

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.

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
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^3	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^3	
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

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 modified French order of 10 April 2012, have been copied into the table below. The values are updated in the GHG aviation emissions calculator available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr.

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_2e 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)	0,53	2,48	3,01
	Aviation fuel (AvGas)	Litre (ℓ)	0,53	2,48	3,01
	Kerosene (Jet A1 or Jet A)	Litre (ℓ)	0,53	2,545	3,075

Table 3: fuel emission factors - freight by air (source: ADEME Carbon Base, at this Guide date)

4.1.1.2. Level 1 values and level 1 aggregate data

The French Civil Aviation Authority (DGAC) provides a GHG aviation emissions calculator, which is available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr. 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_2e / t.km);

Consumption of kerosene in litres per kilometre per passenger equivalent, broken down into distance slices and aircraft category (capacity in number of seats) (round values)					
Distance (km)	Less than 50 seats	51 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	0,073	0,061	0,046	0,038	*
1 000 - 2 000	0,083	0,052	0,038	0,031	0,040
2 000 - 3 000	*	*	0,035	0,030	0,033
3 000 - 4 000	*	*	0,034	0,032	0,032
4 000 -5 000	*	*	0,050	0,041	0,029
5 000 - 6 000	*	*	0,049	0,032	0,029
6 000 - 7 000	*	*	*	0,033	0,027
7 000 - 8 000	*	*	*	0,030	0,028
8 000 - 9 000	*	*	*	0,031	0,028
9 000 - 10 000	*	*	*	0,024	0,027
10 000 - 11 000	*	*	*	*	0,031
More than 11 000 km	*	*	*	*	0,031

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

*Source: GHG aviation emissions calculator, known values in 2016 / * : Non-significant values / Passenger equivalent : a passenger or 100 kilograms of freight or mail*

CO_2e emission rate in g per passenger equivalent kilometre, broken down into distance slices and aircraft category (capacity in number of seats)					
Distance (km)	Less than 50 seats	51 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	223	187	141	117	*
1 000 - 2 000	254	161	117	95	123
2 000 - 3 000	*	*	109	91	101
3 000 - 4 000	*	*	105	99	99
4 000 - 5 000	*	*	153	126	90
5 000 - 6 000	*	*	150	98	88
6 000 - 7 000	*	*	*	100	82
7 000 - 8 000	*	*	*	91	87
8 000 - 9 000	*	*	*	95	87
9 000 - 10 000	*	*	*	73	83
10 000 - 11 000	*	*	*	*	95
More than 11 000 km	*	*	*	*	94

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

*Source: GHG aviation emissions calculator, known values in 2016 / * : Non-significant values / Passenger equivalent : a passenger or 100 kilograms of freight or mail*

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_2e / 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	62,24	49,04	*
1 000 to 4 000 km	84,85	34,63	*
4 000 to 7 000 km	*	*	18,28
More than 7 000 km	*	*	17,46

Table 6: mean consumption values for a cargo plane
*Source: GHG aviation emissions calculator, known values in 2016 / * :Non significant values*

CO_2e 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	3 273	1 952	*
1 000 to 4 000 km	2 330	1 549	*
4 000 to 7 000 km	*	*	641
More than 7 000 km	*	*	653

Table 7: level 1 aggregate data - freight by air in a cargo plane
*Source: GHG aviation emissions calculator, known values in 2016 / * :Non significant values*

N.B.: The values used by the calculator are updated regularly (at least annual updating is aimed for). 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 regulatively subject to this information framework include all journeys departing from and travelling to a location in France. This must not be an obstacle to give information including international journeys.

1.2. The calculation methods presented in this sheet

This fact sheet presents several different calculation methods:

- the 1st uses level 1 values for services performed by a combi aircraft;
- the 2nd uses level 1 values for services performed by a cargo plane;
- the 3rd 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 GHG aviation emissions calculator provided by the DGAC can be used to estimate the quantity of GHG emitted during a flight: (https://eco-calculateur.dta.aviation-civile.gouv.fr).

1st 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" page directly provides the quantity of GHG 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_2e per tonne of goods and per flight.

It therefore applies formula No. 6:

GHG information = aggregate data x weight (service) x 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 GHG emitted for 1 passenger per flight: 0,8105 tonne of CO_2e (671 kg of which are generated during the "operating phase" and 139,5 kg of which during the "upstream" phase).

This value is converted into 8,105 tonnes of CO_2e per tonne of goods.

The application of formula No. 6 gives:

GHG information = 8,105 t CO_2e / t / flight x 2,5 t x 1 flight = 20,26 t CO_2e

Fact sheet No. 1

2nd 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);
- 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 French transport code 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: 3,075 kg CO_2e per litre;
- applying formula No. 4:

  GHG Information = Energy source consumption rate x distance x emission factor x [number of units transported for the service / number of units in the means of transport]

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 5 113 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 passengers / [0,1 t / passenger] = 36,1 t;
- the application of the formula therefore gives:
  GHG information = (1 465 ℓ / 100 km) x 5 113 km x (3,075 kg CO_2e / ℓ) x [2,5 / 36,1] = 15,95 t CO_2e

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);
- 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 GHG emission rate to be applied.

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

GHG Information = aggregate data x number of units transported for the service x 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 1 065 g CO_2e / t.km;
- the application of the formula gives:
  GHG information = 1 065 g CO_2e / t.km x 2,5 t x 2 018 km = 7,81 t CO_2e

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 GH_G 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[1]);
   - 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):

1 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 GHG

Fact sheet No. 1

GHG information (leg No. 1) = 16 160 ℓ / flight x 1 flight x (3,075 kg CO_2e / ℓ) x (3 t /18 t) = 8 282 kg CO_2e

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 10 207 kg CO_2e.

Result for the full service

- this requires adding the results obtained for the two legs:
  GHG information = 8 282 kg + 10 207 kg = 18 489 kg CO_2e

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 (0,53 kg CO_2e / ℓ and 2,545 kg CO_2e/ 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 8 282 kg CO_2e x (0,53 / 3,075) = 1 427 kg CO_2e and the operating phase to emit 8 282 kg CO_2e x (2,545 / 3,075) = 6 855 kg CO_2e;
- for the subcontracted section, the upstream phase is calculated to emit 10 207 kg CO_2e x (0,53 / 3,075) = 1 759 kg CO_2e and the operating phase to emit 10 207 kg CO_2e x (2,545 / 3,075) = 8 448 kg CO_2e.

The GHG emissions generated during the "upstream" phase for the entire service are calculated to equal 1 427 + 1 759 = 3 186 kg CO_2e.

The GHG emissions generated during the "operating" phase for the entire service are calculated to equal 6 855 + 8 448 = 15 303 kg CO_2e.

GHG Info

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 GHG emitted

GHG information is the value in gram, kilogram or tonne of CO_2e for the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service. Communicating GHG 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 GHG information can be provided for this 6-month period.

A more regular transmission of information, monthly for example, anyway seems better to take it into account.

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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	Kilowatt-hour	0,048	0,000	0,048
	Consumed in Europe (excluding France)	Kilowatt-hour	0,420	0,000	0,420
Diesel	Non-road diesel	Kilogram (kg)	0,78	2,98	3,76

Table 8: energy source emission factors - freight by rail (Source: ADEME Carbon Base, at this Guide date)

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^3).
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^3		
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^3		
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^3		
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 GHG 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_2e emissions rate per tonne-kilometre
Goods with a density less than or equal to 249 kg/m³	
Electricity Consumed in France	1,99 g CO_2e / t.km
Electricity Consumed in Europe	17,4 g CO_2e / t.km
Non-road diesel	36,2 g CO_2e / t.km
Mixed: Electricity Consumed in France/non-road diesel	5,36 g CO_2e / t.km
Goods with a density of between 250 and 399 kg/m³	
Electricity Consumed in France	1,55 g CO_2e / t.km
Electricity Consumed in Europe	13,5 g CO_2e / t.km
Non-road diesel	28,1 g CO_2e / t.km
Mixed: Electricity Consumed in France/non-road diesel	4,21 g CO_2e / t.km
Goods with density greater than or equal to 400 kilograms per metre cubed	
Electricity Consumed in France	1,33 g CO_2e / t.km
Electricity Consumed in Europe	11,7 g CO_2e / t.km
Non-road diesel	24,2 g CO_2e / t.km
Mixed: Electricity Consumed in France/non-road diesel	3,64 g CO_2e / t.km

Table 10: level 1 aggregate data - freight by rail

Fact sheet No. 2

Freight by rail

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 1st uses level 1 values;
- the 2nd 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:

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 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:

GHG information = aggregate data x weight (service) x distance

Fact sheet No. 2

Example

For a transport service shipping 250 tonnes of goods, the volume of which is calculated as 700 m³ over a distance of 350 km, powered using electricity:

- the service provider assesses the density of the load subject to this service: 250 t / 700 m³ = 357 kg / m³;
- table 10 provides the aggregate data corresponding to an electric train for a goods density of between 250 and 399 kg / m³: 1,55 g CO_2e / t.km
- the application of formula No. 6 gives:
  GHG information = 1,55 g CO_2e / t.km x 250 t x 350 km = 140 kg CO_2e

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 GHG 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 GHG 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 GHG emissions must be broken down in full. If the consumption curves are drawn up for the year 2011, they must enable all GHG 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 GHG 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_2e is therefore calculated in the following manner:
((672 + 437) x 3,76) + ((11 318 + 7 358) x 0,048) = 5 066 kg CO_2e for the entire train.

GHG information for an 800-tonne transport service making up part of this train can be calculated in the following manner:

GHG information = (800 t / 1 200 t) x 5 066 kg CO_2e = 3 378 kg CO_2e

Fact sheet No. 2

GHG 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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Non-road diesel	Litre (ℓ)	0,66	2,52	3,17

Table 11: energy source emission factors - freight by river (Source: ADEME Carbon Base, at this Guide date)

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) [1] with a capacity of less than 590 kW - Non-road diesel	1 104 tonnes	9,40 ℓ/ km
Pusher tug with barge(s) [1] with a capacity of between 590 and 879 kW - Non-road diesel	1 270 tonnes	14,40 ℓ/ km
Pusher tug with barge(s) [1] 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) [1] 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

1 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_2e emissions rate per unit transported and per km
Self-propelled with a capacity of less than 400 tonnes of deadweight tonnage - Non-road diesel	96,5 g CO_2e / t.km
Self-propelled with a capacity of between 400 and 649 tonnes of deadweight tonnage - Non-road diesel	69,9 g CO_2e / t.km
Self-propelled with a capacity of between 650 and 999 tonnes of deadweight tonnage - Non-road diesel	52,9 g CO_2e / t.km
Self-propelled with a capacity of between 1 000 and 1 499 tonnes of deadweight tonnage - Non-road diesel	50,0 g CO_2e / t.km
Self-propelled with a capacity greater than or equal to 1 500 tonnes of deadweight tonnage - Non-road diesel	52,0 g CO_2e / t.km
Pusher tug with barge(s) [2] with a capacity of less than 590 kW - Non-road diesel	27,0 g CO_2e / t.km
Pusher tug with barge(s) [2] with a capacity of between 590 and 879 kW - Non-road diesel	35,9 g CO_2e / t.km
Pusher tug with barge(s) [2] with a capacity greater than or equal to 880 kW (excluding container shipping) - Non-road diesel	40,8 g CO_2e / t.km
Pusher tug with barge(s) [2] with a capacity greater than or equal to 880 kW (container shipping) - Non-road diesel	75,0 g CO_2e / 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 1st uses level 1 values;
- the 2nd uses unladen distance and the level 1 value for the consumption rate;
- the 3rd 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 GHG 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:

GHG 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 GHG 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: 52,0 g CO_2e / 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:
     GHG information = 52,0 g CO_2e / t.km x 1 300 t x 360 km = 24 336 kg CO_2e i.e. 24,3 tonnes of CO_2e.

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 3,17 kg CO_2e per litre.

3. To calculate the GHG 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:

GHG 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 (3,17 kg CO_2e / ℓ).

3. It therefore obtains its GHG information by applying calculation formula No. 1:

GHG information = energy source consumption x 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 GHG information is calculated as follows:

GHG information = 4 130 ℓ x 3,17 kg CO_2e / ℓ = 13 092 kg CO_2e

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd 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 GHG 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^3 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:

GHG 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 GHG 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: 52,0 g CO_2e / t.km
2. Application to a transport service shipping 20 m^3 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^3, the 20 m^3 of sand corresponds to 37 tonnes.
   - Then, the service provider applies the following formula:
     GHG information = 52,0 g CO_2e / t.km x 37 t x 360 km = 693 kg CO_2e

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:

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

2. To calculate the GHG 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:

GHG 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 GHG 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": 3,17 kg CO_2e /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 3,17 kg CO_2e / ℓ = 37,5 g CO_2e / t.km
6. Application to a given service: bulk freight via a partial load consignment of 30 tonnes of goods over 500 km:
   GHG information = 37,5 g CO_2e / t.km x 30 t x 500 km x = 563 kg CO_2e

GHG Info

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd uses level 3 values.

One specific feature of this fact sheet it 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: 75,0 g CO_2e / t.km.

3. To calculate the GHG 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:

GHG 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 GHG 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: 75,0 g CO_2e / 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:
     GHG information = 75,0 g CO_2e / t.km x 84 t x 360 km = 2,27 t CO_2e

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 GHG 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:

GHG 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 GHG 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 ℓ / 4 790 km = 17,7 ℓ / km;
   - number of units transported by the means of transport: 718 500 TEU.km / 4 790 km = 150 TEU.
3. It notes the energy source emission factor for "Non-road diesel": 3,17 kg CO_2e / ℓ.
4. It can then determine the corresponding level 3 aggregate data:
   - aggregate data (container shipping) = [17,7 ℓ / km / 150 TEU] x 3,17 kg CO_2e / ℓ = 374 g CO_2e / TEU.km
5. Application to a given service: freight of 10 containers representing 15 TEU over a distance of 450 km:
   GHG information = 374 g CO_2e / TEU.km x 15 TEU x 450 km = 2,52 t CO_2e

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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_2e 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	0,50	3,14	3,64
Diesel	Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,68	3,17	3,85
Natural gas	Liquefied natural gas (LNG)	Kilogram	0,70	2,81	3,51
Liquefied petroleum gas (LPG)	Butane	Kilogram	0,49	2,95	3,44
	Propane	Kilogram	0,49	2,98	3,47

Table 14: fuel emission factors - freight by sea (Source: ADEME Carbon Base, at this Guide date)

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 greenhouse gas 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 (1)
VLCC oil tanker - deadweight tonnage of greater than 200 000 tonnes	144 000 tonnes	Heavy fuel oil: 133,00 kg / km Marine diesel oil (1)
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 (1)
Small bulk carrier/sea-river vessel	2 630 tonnes	Heavy fuel oil (1) 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 (1)
Container ship - From 1 900 to 3 849 TEU	18 500 tonnes	Heavy fuel oil: 103,70 kg / km Marine diesel oil (1)
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

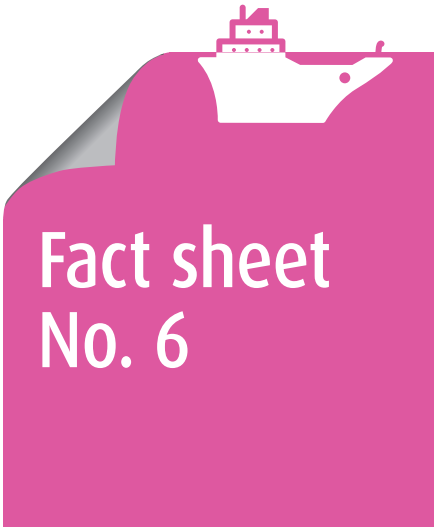
(1) Low indeterminate value, to be considered a null value.

4.4.1.3. Level 1 aggregate data

The level 1 values and GHG 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_2e emissions rate per unit transported and per km
Handysize bulk carrier - deadweight tonnage of less than 40 250 tonnes	11,1 g CO_2e / t.km
Handymax bulk carrier - deadweight tonnage between 40 250 and 63 499 tonnes	5,85 g CO_2e / t.km
Panamax bulk carrier - deadweight tonnage between 63 500 and 127 500 tonnes	5,45 g CO_2e / t.km
Capesize bulk carrier - deadweight tonnage of greater than 127 500 tonnes	3,65 g CO_2e / t.km
Product tanker small oil tanker - deadweight tonnage of less than 26 500 tonnes	25,3 g CO_2e / t.km
Handy product oil tanker - deadweight tonnage between 26 500 and 68 499 tonnes	18,7 g CO_2e / t.km
Aframax oil tanker - deadweight tonnage between 68 500 and 200 000 tonnes	5,42 g CO_2e / t.km
VLCC oil tanker - deadweight tonnage of greater than 200 000 tonnes	3,36 g CO_2e / t.km
Small LPG tanker	54,7 g CO_2e / t.km
VLGC gas tanker	14,7 g CO_2e / t.km
Small bulk carrier/sea-river vessel	18,7 g CO_2e / t.km
Container ship - Less than 1 200 TEU	33,1 g CO_2e / t.km
Container ship - From 1 200 to 1 899 TEU	21,9 g CO_2e / t.km
Container ship - From 1 900 to 3 849 TEU	20,4 g CO_2e / t.km
Container ship - From 3 850 to 7 499 TEU	13,7 g CO_2e / t.km
Container ship - Greater than 7 500 TEU	10,2 g CO_2e / t.km
Night ferry	88,0 g CO_2e / t.km
Day ferry	58,9 g CO_2e / t.km
Ro-Pax	67,8 g CO_2e / t.km
Ro-Ro	103 g CO_2e / 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 regulatively included in the scope of this order are those departing from and travelling to a location in France. This must not be an obstacle to give information including international journeys.

6.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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 GHG 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.ecotransit.org/calculation.fr.html).

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

GHG 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 GHG 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: 10,2 g CO_2e / t.km
3. Application to a given service: freight of 20 containers from Le Havre to Tokyo:
   - Using the marine distance calculator http://www.ecotransit.org/calculation.fr.html, it collects the distance between the ports of Le Havre (IATA code: FRLEH) and Tokyo (IATA code: JPTYO): 20 427 km.
   - It notes the gross weight of the 20 containers from the shipping documents: 208 tonnes.
   - It applies the following calculation formula:
     GHG information = 10,2 g CO_2e / t.km x 208 t x 20 427 km = 44,6 t CO_2e

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:

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

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

Aggregate data = [Consumption rate1 / number of units in the means of transport] x emission factor1 + [Consumption rate2 / number of units in the means of transport] x emission factor2

2. To calculate the GHG 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:

GHG 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 GHG 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: 3,64 kg CO_2e / kg; MDO: 3,85 kg CO_2e / kg.
4. It can then determine the corresponding aggregate data:

Aggregate data (container shipping):

[190 kg / km / 4 360 TEU] x 3,64 kg CO_2e / kg + [21,0 kg / km / 4 360 TEU] x 3,85 kg CO_2e / kg

Aggregate data (container shipping) = 177 g CO_2e / 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.ecotransit.org/calculation.fr.html, it collects the distance between the ports of Le Havre (IATA code: FRLEH) and Tokyo (IATA code: JPTYO): 20 427 km;
   - Then, the service provider applies the formula:
     GHG information = 177 g CO_2e / TEU.km x 15 TEU x 20 427 km = 54,2 t CO_2e

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

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

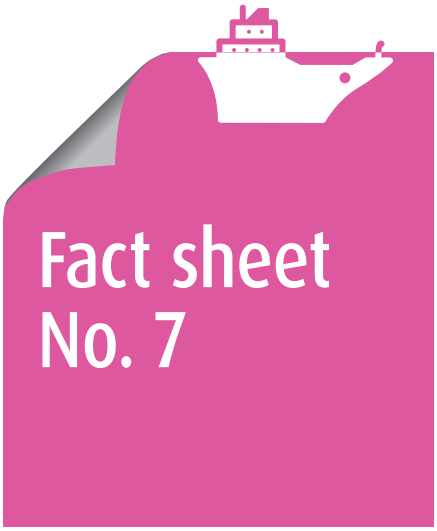
1) Quantity of GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd 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 GHG 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.ecotransit.org/calculation.fr.html.

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

GHG information (service) = aggregate data x number of units (service) x distance (service)

Fact sheet No. 7

Example

A shipping company is looking to calculate GHG 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: 103 g CO_2e / 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.ecotransit.org/calculation.fr.html, 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:
     GHG information = 103 g CO_2e / t.km x 35 t x 502 km x = 1,81 t CO_2e

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_2e per tonne of goods and per journey. It then uses formula No. 5:

Aggregate data = [Consumption rate / objective value] x emission factor

4. To calculate the GHG 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):

GHG information (service) = aggregate data x number of units (service) x number of journeys

Fact sheet No. 7

Example

A shipping company is looking to calculate GHG 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 kg / 20 000 t x 3,64 kg CO_2e / kg] + [652,6 kg / 20 000 t x 3,85 kg CO_2e / kg] = 4,69 g CO_2e / 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:
  GHG information = 4,69 g CO_2e / kg/journey x 35 t x 1 journey = 164 kg CO_2e

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 regulatively included in the scope of this order are those departing from and travelling to a location in France.

This must not be a obstacle to give information including international journeys.

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 1st uses level 1 values;
- the 2nd 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 GHG 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^3 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.ecotransit.org/calculation.fr.html.

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

GHG 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 GHG 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: 5,42 g CO_2e / 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.ecotransit.org/calculation.fr.html: 8 754 km;
   - the number of units transported corresponds to the weight of the goods: 50 000 tonnes.
3. It applies the following calculation formula:
   GHG information = 5,42 g CO_2e / t.km x 50 000 t x 8 754 km = 2 300 t CO_2e

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^3) 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 GHG 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^3 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:

GHG 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 GHG 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: 3,64 kg CO_2e / kg; MDO: 3,85 kg CO_2e / kg.
4. It can then determine the corresponding aggregate data:

Aggregate data (oil tankers) = [70,0 kg/km / 45 000 t] x 3,64 kg CO_2e /kg + [7,78 kg/km / 45 000 t] x 3,85 kg CO_2e / kg

Aggregate data (oil tankers) = 6,33 g CO_2e / 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.ecotransit.org/calculation.fr.html it calculates the distance between the ports of Bahrain (BAH) and Fos sur Mer (FOS): 8 754 km.
   - Then, the service provider applies the formula:
     GHG information = 6,33 g CO_2e / t.km x 20 000 t x 8 754 km = 1,07 t CO_2e

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

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

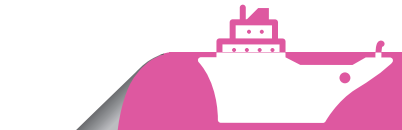
1) Quantity of GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd 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[1].

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 GHG 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.ecotransit.org/calculation.fr.html.

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

GHG information (service) = aggregate data x number of units (service) x distance (service)

1 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 GHG 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 GHG 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_2e emission rate per unit transported and per km" for the "Day ferry" category of ship from table 16. I.e. 59 g CO_2e / t.km.

It then uses the following calculation formula:

GHG information = 59 g CO_2e / t.km x 2 t x 50 km = 5,9 kg CO_2e

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:

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

2. To calculate the GHG 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:

GHG information (service) = aggregate data x number of units (service) x 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:

GHG information = 0,808 kg CO_2e /t.km x 8 t x 40 km = 259 kg CO_2e

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Road diesel	Litre (ℓ)	0,66	2,51	3,16
	Non-road diesel	Litre (ℓ)	0,66	2,52	3,17

Table 17: energy source emission factors - freight by road (Source: ADEME Carbon Base, at this Guide date)

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 greenhouse gas 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_2e emissions rate per unit transported and per km
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (mail, courier services) - Road diesel	1 945 g CO_2e / t.km
Light-weight commercial vehicle with a GVW of 3,5 tonnes - Express (parcels) - Road diesel	1 099 g CO_2e / t.km
Straight truck with a GVW of 19 tonnes - Express - Road diesel	341 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery - Road diesel	180 g CO_2e / t.km
Straight truck with a GVW of 19 tonnes - Parcel delivery - Road diesel	341 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	183 g CO_2e / t.km
Straight truck with a GVW of 19 tonnes - Parcel delivery (refrigerated) - Road diesel/non-road diesel	311 g CO_2e / t.km
Straight truck with a GVW of 7,5 tonnes - Miscellaneous goods - Road diesel fuel	772 g CO_2e / t.km
Straight truck with a GVW of 12 tonnes - Miscellaneous goods - Road diesel fuel	421 g CO_2e / t.km
Semi-trailer truck with a GCW of 26 tonnes - Large volumes - Road diesel	161 g CO_2e / t.km
Semi-trailer truck with a GCW of 35 tonnes - Car carrier - Road diesel	195 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/long-distance - Road diesel	86 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Miscellaneous goods/regional - Road diesel	85 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Large volumes - Road diesel	96 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - With refrigerated unit - Road diesel/non-road diesel	102 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Public works truck - Road diesel	108 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Grain truck - Road diesel	102 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Container truck - Road diesel	94 g CO_2e / t.km
Semi-trailer truck with a GCW of 40 tonnes - Tanker- Road diesel	89 g CO_2e / t.km
Van with a volume of 8 metres cubed - Home moving - Road diesel	181 g CO_2e / m^3.km
Straight truck with a volume of 45 metres cubed - Home moving - Road diesel	54 g CO_2e / m^3.km
Semi-trailer truck with a volume of 90 metres cubed - Home moving - Road diesel	34 g CO_2e / m^3.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 1st uses level 1 values;
- the 2nd 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 GHG 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:

GHG 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: 86 g CO_2e / t.km is the CO_2e 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:
   GHG information = 86 g CO_2e / t.km x 15 t x 221 km = 285 kg CO_2e

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 3,16 kg CO_2e per litre.

3. To calculate the GHG 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:

GHG information = energy source consumption rate x total distance (service) x emission factor

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd 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 GHG 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:

GHG 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 GHG 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: 85 g CO_2e / 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:
     GHG information = 85 g CO_2e / t.km x 2,5 t x 286 km = 60,8 kg CO_2e

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:

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

2. To calculate the GHG 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:

GHG information (service) = aggregate data x number of units (service) x 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 GHG 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 "Road diesel": 3,16 kg CO_2e / 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:

   Aggregate data (partial load consignment - 12 t) = [0,294 ℓ / km / 3,2 t] x 3,16 kg CO_2e / ℓ = 290 g CO_2e / 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:

   GHG information = 290 g CO_2e / t.km x 1,7 t x 150 km = 74 kg CO_2e

Fact sheet No. 11

GHG 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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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

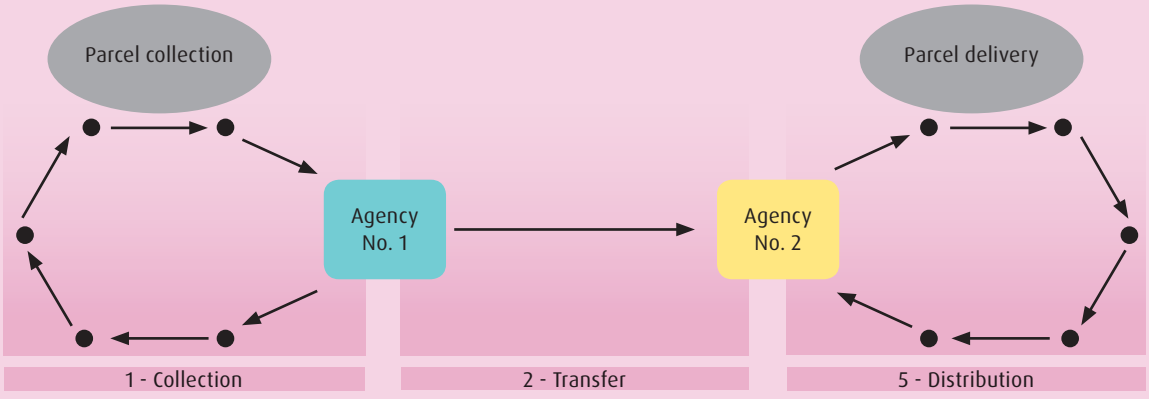
A transport service delivering parcels can be schematically described by the succession of three legs:

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 1st agency and a 2nd agency; this 2nd agency is located near to the delivery address and has the same function as the 1st agency, however in another geographic sector; this form of vehicle use is often called inter-agency "transfer";

3. parcel transport from the 2nd agency to the delivery address; this form of vehicle use is known as "distribution" or "delivery".

The outline below illustrates these three operations.



Transport service for the freight of a parcel via parcel delivery service

As stipulated in article D.1431-6 of the French transport code, the GHG information calculation consists in assessing the emissions of each leg, then in adding together the corresponding thee 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 1st uses level 1 values - where the agencies used are known to the service provider;
- the 2nd uses level 1 values - where the agencies used are not known to the service provider;
- the 3rd 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. GHG information for the 1st 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: 341 g CO_2e / t.km;
- to calculate the GHG 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:
  GHG information (1st leg) = aggregate data x weight (service) x distance (service)

2. GHG information for the 2nd 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: 180 g CO_2e / t.km;
- to calculate the GHG 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:
  GHG information (2nd leg) = aggregate data x weight (service) x distance (service)

3. GHG information for the 3rd 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: 341 g CO_2e / t.km;
- to calculate the GHG 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:
  GHG information (3rd leg) = aggregate data x weight (service) x distance (service)

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4. GHG information for the service:

GHG information (service) = GHG information (1st leg) + GHG information (2nd leg) + GHG 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 GHG 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: 341 g CO_2e / t.km;
- transfer: 180 g CO_2e / t.km;
- distribution: 341 g CO_2e / t.km.

2. Application to a given service: example of a parcel being carried from Etampes (91) to Marignane (13)
- 1st 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:
    GHG information (1st leg) = 341 g CO_2e / t.km x 0,05 t x 36 km = 0,614 kg CO_2e
- 2nd 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:
    GHG information (2nd leg) = 180 g CO_2e / t.km x 0,05 t x 745 km = 6,705 kg CO_2e
- 3rd 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:
    GHG information (3rd leg) = 341 g CO_2e / t.km x 0,05 t x 25 km = 0,426 kg CO_2e
- Finally, it adds together the three results:
  GHG information (service) = 0,614 + 6,705 + 0,426 = 7,445 kg CO_2e

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 GH_G 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: 180 g CO_2e/t.km;

3. To calculate the GHG 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:
  GHG 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 GHG 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: 180 g CO_2e/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:
     GHG information (service) = 180 g CO_2e / t.km x 0,05 t x 738 km = 6,64 kg CO_2e

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_2e / t.km:
Level 3 aggregate data (agency) = level 3 value x emission factor

e. To calculate the GHG 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:
  GHG information (leg) = aggregate data (agency) x weight (service) x distance (service)

Example

A service provider is looking to calculate its GHG 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 160 g CO_2e / 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: 160 g CO_2e / 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:
     GHG information (service) = 160 g CO_2e / t.km x 0,05 t x 36 km = 0,288 kg CO_2e

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 GHG 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:
GHG information (service) = aggregate data x number of units (service) x distance (service)

GHG Info

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 GHG emitted

GHG 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 GHG 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

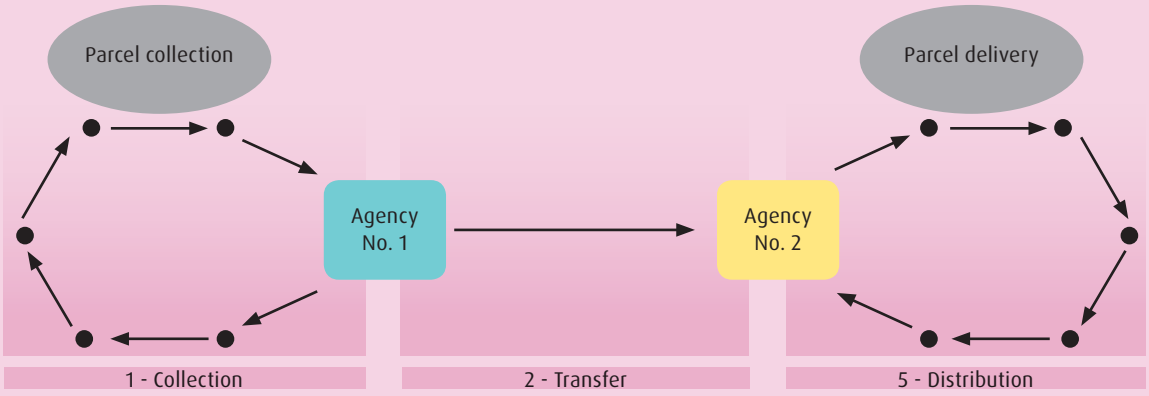
A transport service delivering parcels in a temperature-controlled environment can be schematically described by the succession of three legs:

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 1st agency and a 2nd agency; this 2nd agency is located near to the delivery address and has the same function as the 1st 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 2nd agency to the delivery address; this form of vehicle use is known as "distribution" or "delivery".

The outline below illustrates these three operations.



Transport service for shipping a parcel via parcel delivery service

As stipulated in article 4 of the decree, the GHG information calculation consists in assessing the emissions of each leg, then in adding together the corresponding thee 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 1st method uses level 1 values - where the agencies used are known to the service provider;
- the 2nd 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. GHG information for the 1st 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: 311 g CO_2e / t.km.
- To calculate the GHG 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:
  GHG information (1st leg) = aggregate data x weight (service) x distance (service)

2. GHG information for the 2nd 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: 183 g CO_2e / t.km.
- To calculate the GHG 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:
  GHG information (2nd leg) = aggregate data x weight (service) x distance (service)

3. GHG information for the 3rd 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: 311 g CO_2e / t.km.

Fact sheet No. 13

- To calculate the GHG 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:
  GHG information (3rd leg) = aggregate data x weight (service) x distance (service)

4. GHG information for the service:

GHG information (service) = GHG information (1st leg) + GHG information (2nd leg) + GHG information (3rd 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 GH_G 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: 311 g CO_2e / t.km;
- transfer: 183 g CO_2e / t.km;
- distribution: 311 g CO_2e / t.km

2. Application to a given service: example of a parcel being carried from Etampes (91) to Marignane (13)
- 1st 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:
    GHG information (1st leg) = 311 g CO_2e / t.km x 0,05 t x 36 km = 0,560 kg CO_2e
- 2nd 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:
    GHG information (2nd leg) = 183 g CO_2e / t.km x 0,05 t x 745 km = 6,817 kg CO_2e
- 3rd 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:
    GHG information (3rd leg) = 311 g CO_2e / t.km x 0,05 t x 25 km = 0,389 kg CO_2e
  - Finally, it adds together the three results:
    GHG information (service) = 0,560 + 6,817 + 0,389 = 7,766 kg CO_2e

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 GH_G 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: 183 g CO_2e / t.km
- To calculate the GHG 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:

GHG 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 GHG 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: 183 g CO_{2e} / 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:
     GHG information (service) = 183 g CO_2e / t.km x 0,05 t x 738 km = 6,75 kg CO_2e

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

GHG Info

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

GHG 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 GHG 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. 14

Freight by road - courier services

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 1st uses level 1 values;
- the 1st 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 1 945 g CO_2e / t.km.

3. To calculate the GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

Example

A service provider is looking to calculate its GHG information for the courier services that it performs, using level 1 values.

1. It notes the aggregate data value in table 19: 1 945 g CO_2e / 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:
     GHG information = 1 945 g CO_2e / t.km x 0,0013 t x 22 km = 55,6 g CO_2e

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 GHG 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:

GHG 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 D.1431-11 of the French transport code, which authorises the company to implement a specific reference if this better suits its activities. In compliance with article D.1431-20 of this code, 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 GHG 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 ℓ / 300 000 km = 0,15 ℓ / km;
   - number of units transported by the means of transport: 2 352 440 parcels.km / 300 000 km = 7,84 parcels.
3. It notes the energy source emission factor (road diesel): 3,16 kg CO_2e / ℓ.
4. It can thus calculate the corresponding aggregate data:
   Aggregate data = [0,15 ℓ / km / 7,84 parcels] x 3,16 kg CO_2e / ℓ = 60,5 g CO_2e / 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:
     GHG information = 60,5 g CO_2e / parcels.km x 1 parcel x 22 km = 1,33 kg CO_2e

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 GHG emitted

The method applied to inform the sender of the GHG 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 GHG 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.

Fact sheet No. 15

Multi-modal freight - freight forwarders

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 1st uses level 1 values;
- the 2nd reuses the subcontractor's information to draw up mean values;
- the 3rd involves producing a model.

15.3. Calculation method using level 1 values

Until the 1st of July 2019, 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 GHG 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 GHG 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 GHG 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_2e 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_2e
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
...			...	...
...			...	...
Total			458 640 t.km	57 330 kg CO_2e

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_2e / t.km = **$\sum$ (kg CO_2e) x 1000 / $\sum$ (t.km)**.

Using this example, it produces the value of 125 g CO_2e / 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_2e / t.km.

15.5. Calculation method involving producing a model

A model can also be developed for the CO_2e emissions generated by subcontracted activities[1].

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[2].

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.

1 Within the scope of level 3 methodologies, modelling is one possibility for breaking down activities.
2 The definition of level 3 values provided in article D.1431-12 of the French transport code 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.

GHG 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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

GHG 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

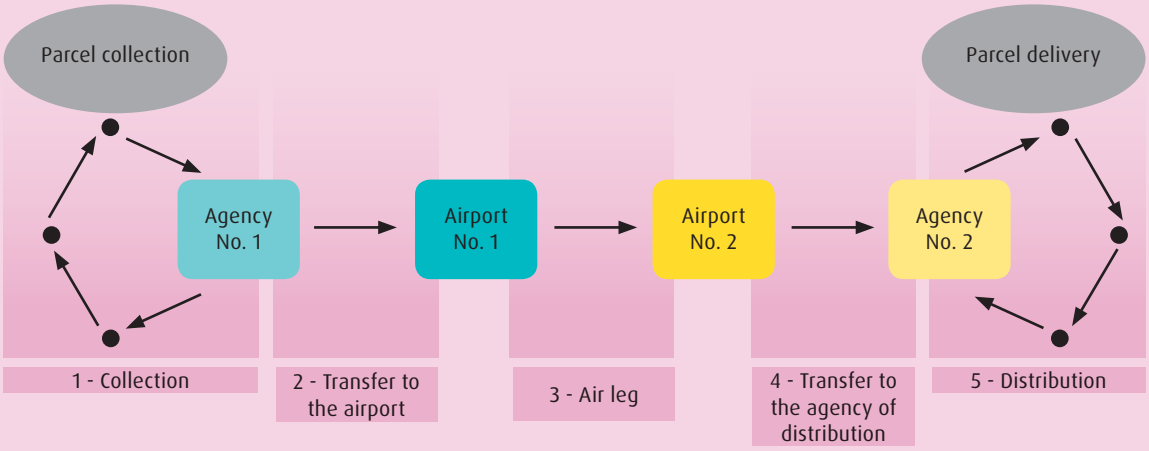
Express transport activities follow the same mode of operation as that of parcel delivery services. The difference here involves the deadlines. Whereas parcel delivery services involve delivery deadlines ranging from 24 to 72 hours, Express services offer shortened deadlines and guarantees.

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.



Transport service for the express freight of a parcel

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 GHG 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. GHG information for the 1st 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: 1 099 g CO_2e / t.km
- To calculate the GHG 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:
  GHG information (1st leg) = aggregate data x weight (service) x distance (service)

2. GHG information for the 2nd 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: 341 g CO_2e / t.km
- To calculate the GHG 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:
  GHG information (2nd leg) = aggregate data x weight (service) x distance (service)

Fact sheet No. 16

3. GHG information for the 3rd 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 GHG aviation emissions calculator (https://eco-calculateur.dta.aviation-civile.gouv.fr):
  - if the link is known by the calculator, it notes the value provided (total emissions in kg of CO_2e / passenger), which it then converts into kg of CO_2e 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:
    GHG information (3rd 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):
    GHG information (3rd leg) = aggregate data x weight (service) x distance (service)

4. GHG information for the 4th 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: 341 g CO_2e / t.km
- To calculate the GHG 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:
  GHG information (4th leg) = aggregate data x weight (service) x distance (service)

5. GHG information for the 5th 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: 1 099 g CO_2e / t.km
- To calculate the GHG 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 GHG 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: 1 099 g CO_2e / t.km;
- transfer: 341 g CO_2e / t.km;
- distribution: 1 099 g CO_2e / 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).
- 1st 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:

  GHG information (1st leg) = 1 099 g CO_2e / t.km x 0,005 t x 36 km = 0,198 kg CO_2e
- 2nd 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:

  GHG information (2nd leg) = 341 g CO_2e / t.km x 0,005 t x 64 km = 0,109 kg CO_2e
- 3rd 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 GHG aviation emissions calculator (https://eco-calculateur.dta.aviation-civile.gouv.fr): the link between Paris-CDG and Tokyo-Narita is known.
  - It notes the value provided by the calculator (total emissions in kg of CO_2e / passenger): 1 983 kg of CO_2e 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: 19,8 kg of CO_2e 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):

  GHG information (3rd leg) = 19,8 kg CO_2e / kg / flight x 5 kg + 1 flight = 99,0 kg CO_2e
- 4th 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:

  GHG information (4th leg) = 341 g CO_2e / t.km x 0,005 t x 105 km = 0,179 kg CO_2e
- 5th 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:

  GHG information (5th leg) = 1 099 g CO_2e / t.km x 0,005 t x 8 km = 0,044 kg CO_2e

- Finally, it adds together the five results:
  GHG information (service) = 0,198 + 0,109 + 99,0 + 0,179 + 0,044 = 99,5 kg CO_2e

Fact sheet No. 16

GHG information (5th leg) = aggregate data x weight (service) x distance (service)

6. GHG information for the service:

GHG information (service) = GHG information (1st leg) + GHG information (2nd leg) + GHG information (3rd leg) + GHG information (4th leg) + GHG information (5th 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.

GHG Info

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e corresponding to the service in question. This information can be transmitted in the quote (ex-ante) or after completion of the service.

GHG 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

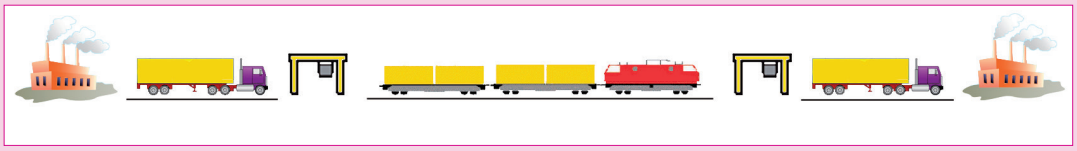
Multi-modal freight - unaccompanied combined rail-road freight

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:

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.

It is assumed that the service provider knows the combined transport terminals used for the services offered.

1. GHG information for the 1st 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: 85,0 g CO_2e / t.km
- To calculate the GHG 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:
  GHG information (1st leg) = aggregate data x weight (service) x distance (service)

2. GHG information for the 2nd 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 GHG 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:
  GHG information (2nd leg) = aggregate data x weight (service) x distance (service)

3. GHG information for the 3rd 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: 85,0 g CO_2e / t.km
- To calculate the GHG 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:
  GHG information (1st leg) = aggregate data x weight (service) x distance (service)

4. GHG information for the full service:

GHG information (service) = GHG information (1st leg) + GHG information (2nd leg) + GHG information (3rd leg)

Fact sheet No. 17

GHG Info

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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 1st uses level 1 values;
- the 2nd 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^3 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 GHG 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:

GHG 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^3;
   - 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 1,99 g CO_2e / t.km (goods density less than or equal to 249 kg / m^3).
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 GHG information for this service is calculated as follows:
     GHG information (service) = 1,99 g CO_2e / t.km x 30 t x 900 km = 53,7 kg CO_2e

18.4. Calculation method using level 1 values and objective values

The French modified 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 GHG emissions per service based on a fill rate objective that does not correspond to real fill rates.

The GHG information calculation formula used is formula No. 6, in which the objective value is the number of units transported by the means of transport:

GHG Information = Energy source consumption rate x distance x emission factor x [number of units transported for the service / 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 GHG 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^3 (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 GHG 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^3 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"): 0,048 kg CO_2e / kWh.
   - The distance travelled by this service is: 1 050 km.
   - The calculation is made using the following formula:
     GHG information = 16,74 kWh / km x 1 050 km x 0,048 kg CO_2e / kWh x [30 t / 650 t] = 38,9 kg CO_2e

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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.

Fact sheet No. 19

Multi-modal freight - moving home

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 1st uses level 1 values;
- the 2nd 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:

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 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 GHG 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^3;
- the distance travelled by these units, represented by "distance (service)" in kilometres.

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

GHG information (service) = aggregate data x number of units (service) x distance (service)

Fact sheet No. 19

Example

A service provider is looking to calculate its GHG 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: 34 g CO_2e / m³.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 m³.
   - It notes the distance to be travelled using a distance calculator: 1 054 km.
   - It applies formula No. 6:
     GHG information = 34 g CO_2e / m³.km x 15 m³ x 1 054 km = 538 kg CO_2e

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 GHG 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:

GHG 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 45m³ 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 m³.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 m³.km / 74 300 km = 16,9 m³.
3. It notes the energy source emission factor for "Road diesel": 3,16 kg CO_2e / ℓ.
4. It can then calculate the level 2 aggregate data item in the following manner:
   Aggregate data = [0,211 ℓ / km / 16,9 m³] x 3,16 kg CO_2e / ℓ = 39,5 g CO_2e / m³.km
5. Application to a given service

The GHG information for a customer moving from Puteaux (92) to Emerainville (77) (distance of 41 km), for a volume of 15 m³ is:

GHG information = 39,5 g CO_2e / m³.km x 15 m³ x 41 km = 24,3 kg CO_2e

Fact sheet No. 19

GHG Info

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 GHG emitted

GHG information is an absolute result in gram, kilogram or tonne of CO_2e 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

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 modified French order of 10 April 2012, have been copied into the table below. The values are updated in the GHG aviation emissions calculator available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr.

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_2e 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*)	0,53	2,48	3,01
	Aviation fuel (AvGas)	Litre (*l*)	0,53	2,48	3,01
	Kerosene (Jet A1 or Jet A)	Litre (*l*)	0,53	2,545	3,075

Table 20: energy source emission factors - air passenger transport (Source: ADEME Carbon Base and Aviation calculator, at this Guide date)

5.1.1.1. Level 1 values and level 1 aggregate data

The French Civil Aviation Authority (DGAC) provides a GHG aviation emissions calculator, which is available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr. 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[1] 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").

1 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) (round values)					
Distance (km)	Less than 50 seats	51 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	0,073	0,061	0,046	0,038	*
1 000 - 2 000	0,083	0,052	0,038	0,031	0,040
2 000 - 3 000	*	*	0,035	0,030	0,033
3 000 - 4 000	*	*	0,034	0,032	0,032
4 000 - 5 000	*	*	0,050	0,041	0,029
5 000 - 6 000	*	*	0,049	0,032	0,029
6 000 - 7 000	*	*	*	0,033	0,027
7 000 - 8 000	*	*	*	0,030	0,028
8 000 - 9 000	*	*	*	0,031	0,028
9 000 - 10 000	*	*	*	0,024	0,027
10 000 - 11 000	*	*	*	*	0,031
More than 11 000 km	*	*	*	*	0,031

Table 21: data for air transport in a combi aircraft - links not identified by the calculator
*Source: GHG aviation emissions calculator, known values in September 2016 / * : Non-significant values*

CO_2e emission rate in g per passenger equivalent kilometre, broken down into distance slices and aircraft category (capacity in number of seats)					
Distance (km)	Less than 50 seats	51 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	223	187	141	117	*
1 000 - 2 000	254	161	117	95	123
2 000 - 3 000	*	*	109	91	101
3 000 - 4 000	*	*	105	99	99
4 000 - 5 000	*	*	153	126	90
5 000 - 6 000	*	*	150	98	88
6 000 - 7 000	*	*	*	100	82
7 000 - 8 000	*	*	*	91	87
8 000 - 9 000	*	*	*	95	87
9 000 - 10 000	*	*	*	73	83
10 000 - 11 000	*	*	*	*	95
More than 11 000 km	*	*	*	*	94

Table 21 bis: level 1 aggregate data - freight by air in a combi plane - links not known by the calculator -
*Source: GHG aviation emissions calculator, known values in 2016 / * : Non-significant values / Passenger equivalent : a passenger or 100 kilograms of freight or mail*

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 and travelling to a location in France. This must not be an obstacle to give information including international journeys.

20.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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 GHG aviation emissions calculator provided by the DGAC ((https://eco-calculateur.dta.aviation-civile.gouv.fr)).

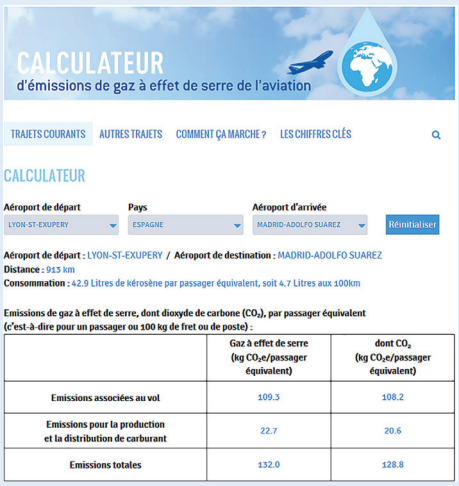
1. The GHG calculator allows for estimating the quantity of GHG emitted during an air transport service for the main inland links.

Example

For a one-way flight from Lyon St-Exupéry - Madrid (Adolfo Suarez), the calculator provides the following information:

- the flight distance (913 km);
- the total GHG emissions per passenger (132 kg CO_2e);
- the total emissions breakdown between the emissions generated during the upstream phase (22,7 kg CO_2e) and those generated during the operating phase (109,3 kg CO_2e);
- the energy consumption rate per passenger = 4,7 ℓ of kerosene per 100 km.

The information that must be provided to the beneficiary in this case is 132 kg CO_2e.



	Gaz à effet de serre (kg CO_2e/passager équivalent)	dont CO_2 (kg CO_2e/passager équivalent)
Emissions associées au vol	109.3	108.2
Emissions pour la production et la distribution de carburant	22.7	20.6
Emissions totales	132.0	128.8

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 French transport code 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. GHG 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 GHG 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 3,075 kg CO_2e / ℓ.
3. Application to the service:
   GHG information = [(6,36 ℓ/ km x 2 560 km) /150 passengers] x 3,075 kg CO_2e / ℓ = 283,39 kg CO_2e.

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 GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

Example

An airline is looking to calculate its GHG 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"): 3,075 kg CO_2e / 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] x 3,075 kg CO_2e / ℓ = 209,73 kg CO_2e / passenger.

6. Application to a given service.

Therefore, for one passenger on a flight from Paris to Stockholm using this airline, the quantity of GHG emitted is:

GHG information = 209,73 kg CO_2e

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 0,53 kg CO_2e / ℓ for the upstream phase and 2,545 kg CO_2e / ℓ for the operating phase:

- the GHG emissions generated during the "upstream" phase for the means of transport are: [209,73 kg CO_2e / 3,075 x 0,53] = 36,15 kg CO_2e;
- the GHG emissions generated during the "operating" phase for the means of transport are: [209,73 kg CO_2e / 3,075 x 2,545] = 173,58 kg CO_2e.

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 GHG emitted

GHG information is an absolute result in kg or tonnes of CO_2e 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 GHG 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 GHG 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);
- if required the comparison with use of car (cf. appendix - Additional elements p. 228).

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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	Kilowatt-hour	0,048	0,00	0,048
	Consumed in Corsica	Kilowatt-hour	0,59	0,00	0,59
	Consumed in Europe (excluding France)	Kilowatt-hour	0,42	0,00	0,42
Diesel	Non-road diesel	Litre (ℓ)	0,66	2,51	3,17

Table 22: energy source emission factors - Railway passenger transport (Source: ADEME Carbon Base, at this Guide date)

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_2e emissions rate per unit transported and per km
TGV high-speed train - Electricity	3,37 g CO_2e / passenger.km
Mainline train - Electricity	5,11 g CO_2e / passenger.km
Local express train - Electricity	8,10 g CO_2e / passenger.km
Local express train - Non-road diesel	79,25 g CO_2e / passenger.km

Table 24: level 1 aggregate data - railway passenger transport

Fact sheet No. 21

Railway passenger transport

21.1. Activities concerned

Passenger rail transport operators provide means of transport as part of a public service enabling people to travel in France.

21.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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 GHG 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:

GHG 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 GHG 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: 3,37 g CO_2e / passenger.km and 8,1 g CO_2e / 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:
     - GHG information (emitted during the journey from Paris to Lyon) = 3,37 g CO_2e / passenger.km x 1 x 455 km = 1,53 kg CO_2e
     - GHG information (emitted during the journey from Lyon to Roanne) = 8,1 g CO_2e / passenger.km x 1 x 82 km = 664 g CO_2e

GHG information (for the passenger making the journey from Paris to Roanne) = 1,53 kg CO_2e + 0,66 kg CO_2e = 2,19 kg CO_2e

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 GHG 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:

GHG 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 GH_G 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"): 0,048 kg CO_2e / 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 0,048 kg CO_2e / kWh = 2,99 g CO_2e / passenger.km
6. Application to a transport service for a family of 4 people travelling a distance of 150 km:
   GHG information = 2,99 g CO_2e X 4 passengers x 150 km = 1,79 kg CO_2e

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 GHG emitted

GHG information is an absolute result in kg or tonnes of CO_2e 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_2e 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 D.1431-21 of the French transport code, by displaying the quantity of CO_2e 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 D.1431-22 of the French transport code 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;
- if required the comparison with use of car (cf. appendix - Additional elements p. 228).

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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Non-road diesel	Litre (ℓ)	0,66	2,52	3,17

Table 25: fuel emission factors - river passenger transport (Source: ADEME Carbon Base, at this Guide date)

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_2e emissions rate per unit transported and per km
Passenger transport Non-road diesel	64,3 g CO_2e / 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 "excursion" cruises in major cities and longer cruises with stopovers.
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 1st uses level 1 values;
- the 2nd 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:

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 27.
2. To calculate the GHG 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:

   GHG information (service) = aggregate data x number of units (service) x distance (service)

Example

A river transport operator is looking to use level 1 values to calculate the GHG 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"): 64,3 g CO_2e / 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:

GHG information = 64,3 g CO_2e / passenger.km x 1 x 7 km = 0,45 kg CO_2e

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 GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

Example

A river cruise operator is looking to calculate its GHG 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": 3,17 kg CO_2e /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 3,17 kg CO_2e /ℓ = 0,617 kg CO_2e/passenger (value for one journey)

Application to a given service for 2 passengers travelling a distance of 10 km:

GHG information = 0,617 kg CO_2e x 2 passengers = 1,23 kg CO_2e

Fact sheet No. 22

GHG 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 GHG emitted

GHG information is an absolute result in kg or tonnes of CO_2e for the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

GHG 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_2e 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 D. 1431-22 of the French transport code 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_2e 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	0,50	3,14	3,64
Diesel	Marine diesel oil ISO 8217 Classes DMX to DMB	Kilogram	0,68	3,17	3,85

Table 28: fuel emission factors - combined sea transport (passengers and goods) (Source: ADEME Carbon Base, at this Guide date)

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.

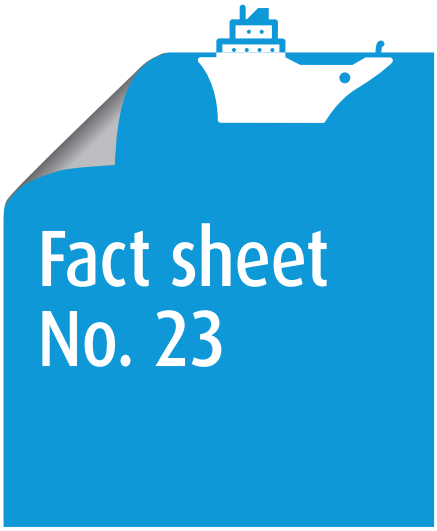
Table 29: level 1 values - combined sea transport (passengers and goods)

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_2e emissions rate per unit transported and per km
Night ferry	524 g CO_2e / passenger.km
	465 g CO_2e / car.km
Day ferry	879 g CO_2e / passenger.km
	296 g CO_2e / car.km
Ro-Pax	468 g CO_2e / passenger.km
	336 g CO_2e / 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.

23.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd uses level 3 values.

The French transport code 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:

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 reference ships used for the activities covered in this fact sheet are the ferry or Ro-Pax[1] 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 GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

1 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 GHG 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 = 879 g CO_2e / km;
     - Per car = 296 g CO_2e / 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 GH_G information:
     - GHG information for all 4 passengers = 878,59 g CO_2e / km x 4 x 450 km = 1,58 t CO_2e
     - GHG information for the vehicle = 295,91 g CO_2e / km x 1 x 450 km = 133,16 kg CO_2e

   GHG information (for a crossing travelling a distance of 450 km for all four passengers and their vehicle) = 1,58 t CO_2e + 0,13 t CO_2e = 1,71 t CO_2e

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 GHG 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:

GHG 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 GHG 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^2 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^2 per heavy goods vehicle.
3. The shipping company notes the HFO emission factor (3,64 kg CO_2e / kg) and MDO emission factor (3,85 kg CO_2e / 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^2) / [(300 x 8,8 m^2) + (150 x 44,2 m^2)] = 4,56 kg of HFO per lightweight vehicle and (540 kg x 8,8 m^2) / [(300 x 8,8 m^2) + (150 x 44,2 m^2)] = 0,51 kg of MDO per lightweight vehicle;
       - for heavy goods vehicles: (4 800 kg x 44,2 m^2) /[(300 x 8,8 m^2) + (150 x 44,2 m^2)] = 22,89 kg of HFO per heavy goods vehicle and (540 kg x 44,2 m^2) / [(300 x 8,8 m^2) + (150 x 44,2 m^2)] = 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:
   - GHG information (1 passenger) = [24 kg x 3,64 kg CO_2e / kg) + (2,7 kg x 3,85 kg CO_2e / kg)] = 97,76 kg CO_2e;
   - GHG information (1 lightweight vehicle) = [4,56 kg x 3,64 kg CO_2e / kg) + (0,51 kg x 3,85 kg CO_2e / kg)] = 18,56 kg CO_2e;
   - GHG information (1 heavy goods vehicle) = [22,89 kg x 3,64 kg CO_2e / kg) + (2,57 kg x 3,85 kg CO_2e / kg)] = 93,21 kg CO_2e.
6. Application to a service corresponding to an outward-return crossing for 2 passengers and one lightweight vehicle.

   GHG information = (2 passengers x 2 x 97,76 kg of CO_2e) + (1 lightweight vehicle x 2 x 18,56 kg of CO_2e) = 428,16 kg of CO_2e

Fact sheet No. 23

GHG Info

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 GHG emitted

GHG information is an absolute result in kg or tonne of CO_2e corresponding to the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

GHG 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_2e 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).

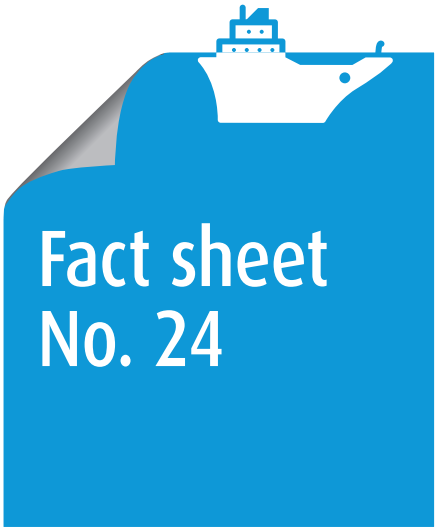
2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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 1st uses level 1 values;
- the 2nd 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[1]. 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:

> **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 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 GHG 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:

> **GHG information (service) = aggregate data x number of units (service) x distance (service)**

1 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 GHG 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 = 879 g CO_2e / 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:

GHG information = 879 g CO_2e / km x 4 x 30 km = 105 kg CO_2e

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:

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

2. To calculate the GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

Fact sheet No. 24

Example

A shipping company is looking to calculate its GHG 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 2nd island is 40 km from the first and the 3rd island is 50 km from the second. The distance from the 3rd 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: 3,64 kg CO_2e / kg; MDO: 3,85 kg CO_2e / 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 x 30 + 72 000 x 40 + 57 600 x 50 + 76 800 x 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 x 30 + 33 600 x 40 + 24 000 x 50 + 14 400 x 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 x 0,1 x 4 416 000 = 5 481 600 t.km *i.e. a mean number of tonnes transported per round trip of* 5 481 600 / (480 x 150) = 76,13 t.

4. Drawing up the level 2 aggregate data
   - The shipping company applies formula No. 5.
   - Aggregate data = [15 kg / km / 76,13 t] x 3,64 kg CO_2e / kg + [1,8 kg / km / 76,13 t] x 3,85 kg CO_2e / kg = 0,808 kg CO_2e / 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:
   - GHG information = 0,808 kg CO_2e / t.km x (1 x 100 kg) x 40 km = 3,23 kg CO_2e.
6. When shipping goods weighting a total of 8 tonnes from island A to island B, the GH_G information is:
   GHG information = 0,808 kg CO_2e / t.km x 8 t x 40 km = 259 kg CO_2e

Fact sheet No. 24

GHG Info

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 GHG emitted

GHG information is an absolute result in kg or tonne of CO_2e corresponding to the service. This information can be communicated in the quote (ex-ante) or after completion of the service.

GHG 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_2e 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 D.1431-22 of the French transport code 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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Petrol	Unleaded petrol (95, 95-E10, 98)	Litre (ℓ)	0,53	2,28	2,80
	E 85	Litre (ℓ)	1,47	0,22	1,68
Diesel	Road diesel	Litre (ℓ)	0.66	2,51	3,16
Liquefied petroleum gas (LPG)	LPG fuel (LPG f)	Litre (ℓ)	0,26	1,60	1,86

Table 31: energy source emission factors - Individual passenger transport by road (Source: ADEME Carbon Base, at this Guide date)

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 vehicle.

Description (according to the nature of the vehicle)	Journey or distance article D.1431-21 of French transport code	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 greenhouse gas 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_2e - 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 cm³ Unleaded petrol (95, 95-E10, 98)		0,072 ℓ / km
Motorcycle or motorised scooter with a piston displacement less than 750 cm³ Unleaded petrol (95, 95-E10, 98)		0,060 ℓ / km

Table 32: level 1 values - Individual passenger transport by road

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 10th, 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^3, the aggregate data is:
0,072 ℓ/km x 2 x 2,80 kg CO_2e / ℓ = 0,403 kg CO_2e / km.

Description	CO_2e emission rate per km
Motorcycle with a piston displacement greater than or equal to 750 cm^3 Unleaded petrol (95, 95-E10, 98)	0,403 kg CO_2e / km
Motorcycle or motorised scooter with a piston displacement less than 750 cm^3 Unleaded petrol (95, 95-E10, 98)	0,336 kg CO_2e / 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 GHG 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 1st uses level 1 values;
- the 2nd 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 transport code 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_2e 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_2 - Véhicules particuliers neufs vendus en France en 2015". The current version of this guide (vehicles registered during the current year) and its previous versions are available from the ADEME website[1].

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_2e emissions rate per litre of fuel to be applied to the conventional fuel consumption rate
Unleaded petrol (95, 95-E10, 98)	6,72 kg CO_2e / ℓ
Petrol - E85	4,03 kg CO_2e / ℓ
Road diesel	7,61 kg CO_2e / ℓ

Table 34: level 1 aggregate data - Individual passenger transport by road - taxi drivers

1 http://www.ademe.fr/consommations-carburant-emissions-co2-vehicules-particuliers-neufs-vendus-france. Note: The CO_2e 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. 25

4. The GHG information is then drawn up using the following formula:

GHG information (per kilometre travelled) = 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= M10VWGVP0044219). 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_2 - Véhicules particuliers neufs vendus en France en 2015" corresponding to its vehicle for use in a combined consumption mode.

	CNIT Code National d'Identification du Type	Puissance Admin. CV	Puissance Max kW	BV	Consommation Urb. (Litres au 100 km)	Consommation Ex-urb. (Litres au 100 km)	Consommation Mixte (Litres au 100 km)	CO_2 g/km	Carburant
hicules Diesel *(suite)*									
(105ch) CR FAP BlueMotion	M10VWGVP0043193	5	77	M 5	5.5	3.9	4.5	119	GO
TDI (110ch) CR FAP	M10VWGVP004J233	6	81	M 5	7.1	4.7	5.6	146	GO
TDI CR (140ch) FAP	M10VWGVP004S207	8	103	M 6	7.3	4.7	5.7	148	GO
TDI CR (140ch) FAP 4MOTION	M10VWGVP004Y213	8	103	M 6	7.7	5.1	6.1	159	GO
TDI CR (140ch) FAP BlueMotion	M10VWGVP004V210	7	103	M 6	6.1	4.2	4.8	127	GO
TDI CR (140ch) FAP DSG	M10VWGVP004P204	8	103	A 6	7.9	5.0	6.1	159	GO
TDI CR (143ch) FAP Blue TDI	M10VWGVP0044219	8	105	M 6	7.0	4.6	5.5	144	GO
TDI CR (143ch) FAP DSG Blue TDI	M10VWGVP0041216	8	105	A 6	7.6	4.9	5.9	155	GO
TDI CR (170ch) FAP	M10VWGVP004A225	10	125	M 6	7.4	4.7	5.7	149	GO
TDI CR (170ch) FAP DSG	M10VWGVP0047222	10	125	A 6	8.0	5.2	6.2	163	GO
TDI CR (170ch) FAP DSG 4MOTION	M10VWGVP004D228	10	125	A 6	8.1	5.5	6.4	169	GO
TDI CR (140ch) FAP	M10VWGVP0059611	8	103	M 6	7.2	4.6	5.6	146	GO
TDI CR (140ch) FAP 4MOTION	M10VWGVP005H619	8	103	M 6	7.9	4.9	6.0	158	GO
TDI CR (140ch) FAP BlueMotion	M10VWGVP005D615	7	103	M 6	6.2	4.2	4.9	128	GO
TDI CR (140ch) FAP DSG	M10VWGVP0055607	8	103	A 6	7.8	5.0	6.0	158	GO
TDI CR (170ch) FAP	M10VWGVP005X635	9	125	M 6	7.4	4.6	5.6	146	GO
TDI CR (170ch) FAP DSG	M10VWGVP005T631	10	125	A 6	7.8	5.1	6.1	159	GO

Table 35: extract from the ADEME's guide "Consommations conventionnelles de carburant et émissions de CO_2 - Véhicules particuliers neufs vendus en France en 2015"

The table below provides the rate of 5,5 ℓ / 100 km, i.e. 0,055 ℓ / km.

2. It then uses the aggregate data corresponding to the GH_6 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 7,61 kg CO_2e / ℓ.
3. It then uses the following calculation formula to draw up its GHG information:
   GHG information (per kilometre travelled) = 7,61 kg CO_2e / ℓ x 0,055 l = 419 g CO_2e / 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_2e 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.

Fact sheet No. 25

2. 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).

3. The GHG information is then drawn up using the following formula:

GHG information (per kilometre travelled) = Consumption rate x emission factor

Example

A taxi driver is looking to calculate his GHG information for all of its activities, i.e. for all services performed with his vehicle.

In order to do this:

1. 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 with passengers aboard: 64 000 km.
2. 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.
3. He notes the emission factor for the fuel used, which in this case is road diesel.
4. To take into account empty journeys, he uses the factor of 2 provided for the level 1 values.

The GHG information is therefore calculated in the following manner:

GHG information (per kilometre travelled) = (0,0593 x 2) x 3,16 kg CO_2e / ℓ = 375 g CO_2e / 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 GHG 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_2e / km charged. Using the aforementioned examples, the value that must be displayed is:

- 419 g CO_2e / km of journey when using level 1 values;
- 375 g CO_2e / km of journey when combining the use of level 1 and level 2 values.

This information differs significantly from the 144 g CO_2e / 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 separatedly.

The display may for example be drawn up as follows:

"When using this taxi, the quantity of CO_2e emitted per kilometre of fare ?[2] is: 375 g CO_2e / km".

For information purposes, the quantity of CO_2e emitted by this vehicle, calculated as per the directive3 1999/94/EC on the CO_2e emitted by new vehicles, is 144 g CO_2e / km.

2 Value calculated as per article L.1431-3 of the French transport code.
3 The value to be displayed corresponds to that of the vehicle transporting the passenger.

Fact sheet No. 25

2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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 GHG 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 GHG information for a taxi company.

26.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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_2 - Véhicules particuliers neufs vendus en France en 2015". The current version of this guide (vehicles registered during the current year) and its previous versions are available from the ADEME website[1].

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_2e emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Unleaded petrol (95, 95-E10, 98)	6,72 kg GH_G / ℓ
Petrol - E85	4,03 kg GH_G / ℓ
Road diesel	7,61 kg GH_G / ℓ

Table 36: level 1 aggregate data - individual passenger transport by road (car)

1 http://www.ademe.fr/consommations-carburant-emissions-co2-vehicules-particuliers-neufs-vendus-france. Note: The CO_2e 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 tax company is looking to use a consumption rate, incorporating both the fares with passengers and empty fares ?

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 and without passengers.

3. The GHG information can be drawn up using the following formula:

GHG 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 GHG 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 3 200 000 km travelled with and without passengers by its entire vehicle fleet.
2. The consumption rate per kilometre is therefore calculated to equal (225 000 ℓ / 3 200 000 km) = 0,07 ℓ / km travelled.
3. It notes the energy source emission factor for road diesel from table 31 ("energy source emission factors - passenger transport by road"): 3,16 kg CO_2e / ℓ.
4. The GHG information to be displayed in the vehicles is:

   GHG information (per kilometre travelled) = (0,125 ℓ / km x 3,16 kg CO_2e / ℓ) = 221 g CO_2e / 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 GHG 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_2e / km charged**. In the aforementioned example, the value to be displayed is 221 g CO_2e / km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO_2e / 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.

Fact sheet No. 26

The display may for example be drawn up as follows:

"When using this taxi, the quantity of CO_2e emitted per kilometre of fare[2] is: 221 g CO_2e / km".

For the purpose of illustration, the quantity of CO_2 emitted by this vehicle, calculated as per the directive[3] 1999/94/EC on the CO_2 emitted by new vehicles, is 144 g CO_2 / km.

2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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.

2 Value calculated as per article 1431-3 of the French transport code.
3 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

Les exploitants de voiture de transport avec chauffeur (VTC), véhicule comportant entre 4 et 9 places, chauffeur compris, sont soumis à des conditions d'installation et d'exploitation : aptitude professionnelle, formation continue, réservation préalable obligatoire. Le chauffeur de VTC doit obligatoirement détenir une carte professionnelle pour exercer son activité et être inscrit, en tant que personne physique ou morale, au registre des exploitants de voitures avec chauffeur (REVTC).Cette activité était auparavant dénommée «voiture de grande remise».

27.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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_2 - Véhicules particuliers neufs vendus en France en 2015". The current version of this guide (vehicles registered during the current year), in addition to its previous versions, are available on the ADEME website[1].

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_2e emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Unleaded petrol (RON 95 - RON 98)	6,72 kg CO_2e / ℓ
Petrol - E85	4,03 kg CO_2e / ℓ
Road diesel	7,61 kg CO_2e / ℓ

Table 37: level 1 aggregate data - Individual passenger transport by road

4) GHG information is then drawn up using the following formula:

GHG information (per kilometre travelled) = aggregate data x conventional consumption rate

1 http://www.ademe.fr/consommations-carburant-emissions-co2-vehicules-particuliers-neufs-vendus-france. Note: The CO_2e 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_2 - Véhicules particuliers neufs vendus en France en 2015" corresponding to this vehicle for use in combined mode.

	CNIT Code National d'Identification du Type	Puissance Admin. CV	Puissance Max kW	BV	Consommation Urb. (Litres au 100 km)	Consommation Ex-urb. (Litres au 100 km)	Consommation Mixte (Litres au 100 km)	CO_2 g/km	Carburant
les essence *(suite)*									
3ch) Euro5	M10RENVP002D026	8	98	M 5	9.1	5.7	6.9	160	ES
)	M10RENVP001F514	6	74	M 5	8.0	5.3	6.3	145	ES
les Diesel									
lution 3P dCi (65ch) eco2	M10RENVP001E319	4	47	M 5	5.4	3.8	4.4	115	GO
lution 5P dCi (65ch) eco2	M10RENVP0010305	4	47	M 5	5.4	3.8	4.4	115	GO
lution 5P dCi (85ch) eco2	M10RENVP0011306	4	62	M 5	4.9	3.8	4.2	111	GO
05ch) eco2 Euro5	M10RENVP0010923	6	81	M 6	5.5	4.0	4.5	119	GO
'0ch) Eco2	M10RENVP001Y181	4	50	M 5	5.2	3.9	4.3	115	GO
'5ch) eco2 Euro5	M10RENVP002B387	4	55	M 5	4.9	3.5	4.0	106	GO
0ch) eco2 Euro5	M10RENVP002P390	5	65	M 5	4.9	3.5	4.0	106	GO
0ch) Euro5	M10RENVP0029385	5	65	M 5	4.9	3.5	4.0	106	GO
5ch) eco2 Euro5	M10RENVP001X920	6	78	M 6	5.5	4.0	4.5	119	GO
ch) eco2 Euro5	M10RENVP0023379	5	65	M 5	4.9	3.5	4.0	106	GO
ch) eco2 Euro5	M10RENVP002J358	4	55	M 5	4.9	3.5	4.0	106	GO
ch) eco2 Euro5	M10RENVP002E354	5	65	M 5	4.9	3.5	4.0	106	GO
) eco2 Euro5	M10RENVP001T916	6	78	M 6	5.5	4.0	4.5	119	GO
eco2 Euro5	M10RENVP002P364	5	65	M 5	4.9	3.5	4.0	106	GO
? dCi (75ch) eco2 Euro5	M10RENVP002X373	6	55	M 5	5.0	3.7	4.3	110	GO
? dCi (90ch) eco2 Euro5	M10RENVP002T369	6	65	M 5	5.0	3.7	4.3	110	GO
ch) FAP Euro5	M10RENVP003F803	8	96	M 6	8.2	5.7	6.5	170	GO
ch) BVA6 FAP Euro5	M10RENVP003J806	9	110	A 6	9.3	6.1	7.2	189	GO
ch) FAP Euro5	M10RENVP003H805	9	110	M 6	8.2	5.7	6.5	170	GO
ch) BVA6 FAP Euro5	M10RENVP003L809	11	127	A 6	9.3	6.1	7.2	189	GO
dCi (130ch) FAP Euro5	M10RENVP003G804	8	96	M 6	8.2	5.7	6.5	170	GO
dCi (150ch) BVA6 FAP Euro5	M10RENVP003K808	9	110	A 6	9.3	6.1	7.2	189	GO
dCi (150ch) FAP Euro5	M10RENVP003J807	9	110	M 6	8.2	5.7	6.5	170	GO
dCi (175ch) BVA6 FAP Euro5	M10RENVP003M810	11	127	A 6	9.3	6.1	7.2	189	GO
)ch) FAP eco2 Euro5	M10RENVP0012792	6	81	M 6	5.6	4.0	4.6	120	GO
)ch) FAP EDC eco2 Euro5	M10RENVP0036636	6	81	A 6	5.2	4.0	4.4	114	GO
ch) FAP eco2 Euro5	M10RENVP0015795	5	66	M 5	5.3	4.0	4.4	115	GO
' dCi (110ch) FAP Euro5	M10RENVP001A897	6	81	M 6	6.4	5.0	5.5	144	GO
' dCi (90ch) FAP Euro5	M10RENVP001V203	5	66	M 5	6.0	4.9	5.3	140	GO
ch) FAP Euro5	M10RENVP0017894	6	81	M 6	6.2	4.8	5.3	140	GO
ch) FAP Euro5	M10RENVP0018895	6	81	M 6	6.4	5.0	5.5	144	GO
h) eco2	M10RENVP0001537	4	50	M 5	5.6	4.8	5.1	135	GO

Table 38: extract from the document "Consommations conventionnelles de carburant et émissions de CO_2 - Véhicules particuliers neufs vendus en France en 2015"

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_2e emission rate per litre of fuel from table 37, which is 7,61 kg CO_2e / ℓ.
3. It then uses the following calculation formula to draw up its GHG information:

GHG information (per kilometre travelled) = 7,61 kg CO_2e / ℓ x 0,065 ℓ = 495 g CO_2e / km travelled

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.

Fact sheet No. 27

3. The GHG information can be calculated using the following formula:

GHG 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 has recorded the purchase of 45 000 litres of road diesel for journeys with and without passengers. The consumption rate per kilometre travelled is therefore: [45 000 / 480 000 km] x 2 = 0,187 ℓ / km travelled.
2. It identifies the diesel energy source emission factor: 3,16 kg CO_2e / ℓ.
3. The GHG information to be displayed in the vehicles is:

GHG information (per kilometre travelled) = 0,187 ℓ / km x 3,16 kg CO_2e / ℓ = 591 g CO_2e / 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 GHG 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_2e / km charged. In the aforementioned example, the value to be displayed is 591 g CO_2e/ km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO_2e / 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_2e emitted per kilometre of journey[2] is: 591 g CO_2e / km".

For information purposes, the quantity of CO_2 emitted by this vehicle, calculated as per the directive[3] 1999/94/EC on the CO_2 emitted by new vehicles, is 170 g CO_2 / km.

2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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.

2 Value calculated as per article L.1431-3 of the French transport code.
3 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 3rd 1977 on the operation of vehicles known as "petite remise" (private hire vehicles). This activity requires a prefectorial order. 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 1st uses level 1 values;
- the 2nd 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 GH_G - Véhicules particuliers neufs vendus en France en 2015". The current version of this guide (vehicles registered during the current year), in addition to its previous versions, are available on the ADEME website[1].

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_2e emission rate per litre of fuel to be applied to the conventional fuel consumption rate
Unleaded petrol (95, 95-E10, 98)	6,72 kg CO_2e / ℓ
Petrol - E85	4,03 kg CO_2e / ℓ
Road diesel	7,61 kg CO_2e / ℓ

Table 39: level 1 aggregate data - Individual passenger transport by road (car)

4. The GHG information is then drawn up using the following formula:

GHG information (per kilometre travelled) = aggregate data x conventional consumption rate

1 http://www.ademe.fr/consommations-carburant-emissions-co2-vehicules-particuliers-neufs-vendus-france. Note: The CO_2e 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. 28

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_2 - Véhicules particuliers neufs vendus en France en 2015" corresponding to its vehicle for use in extra-urban mode.

Marques	CNIT	Admin. CV	Max kW	BV	U
C-CROSSER 7PL HDi (160ch) FAP DCS	M10CTRVP000B737	10	115	A 6	9
C3 Classic AirDream HDI (70ch)	M10CTRVP0008249	4	50	M 5	5
Nouvelle C3 e-HDI (90ch) AirDream	M10CTRVP000Z725	5	68	M 5	4
Nouvelle C3 HDI (110ch) FAP BVM6	M10CTRVP000S391	6	82	M 6	5
Nouvelle C3 HDI (70ch)	M10CTRVP000U720	4	50	M 5	4
Nouvelle C3 HDI FAP (90ch)	M10CTRVP000D387	5	68	M 5	4
Nouvelle C3 HDI FAP (90ch) AirDream	M10CTRVP000P388	5	68	M 5	4
C3 PICASSO HDI (90ch) FAP	M10CTRVP000P556	5	68	M 5	5
C3 PICASSO HDI 110 FAP BVM6	M10CTRVP000W952	6	82	M 6	6
C3 PLURIEL AirDream HDi (70ch)	M10CTRVP0005404	4	50	M 5	5
C4 5P HDi (110ch) FAP BMP6 AirDream	M10CTRVP000D218	6	80	A 6	5
C4 5P HDi (92ch) AirDream	M10CTRVP0009214	5	66	M 5	5
C4 COUPE HDi (92ch) AirDream	M10CTRVP000Z592	5	66	M 5	5
Nouvelle C4 e-HDI (110ch) Airdream BMP6	M10CTRVP000P679	6	82	A 6	5
Nouvelle C4 HDI (110ch) FAP BVM6	M10CTRVP000C677	6	82	M 6	5
Nouvelle C4 HDI (150ch) FAP BVM6	M10CTRVP000A675	8	110	M 6	6
Nouvelle C4 HDI (90ch) FAP	M10CTRVP0008673	5	68	M 5	5
C4 PICASSO 5PL e-HDI (110ch) AirDream BMP6	M10CTRVP000B931	6	82	A 6	5
C4 PICASSO 5PL HDI (110ch) FAP BMP6	M10CTRVP000E934	6	82	A 6	6
C4 PICASSO 5PL HDI (110ch) FAP BVM6	M10CTRVP0008928	6	82	M 6	6
C4 PICASSO 5PL HDI (150ch) FAP BMP6	M10CTRVP000Y979	8	110	A 6	6
C4 PICASSO 5PL HDI (150ch) FAP BMP6	M10CTRVP000Z980	8	110	A 6	6
C4 PICASSO 5PL HDI (150ch) FAP BVM6	M10CTRVP0003305	8	110	M 6	7
C4 PICASSO 5PL HDI (150ch) FAP BVM6	M10CTRVP0002304	8	110	M 6	7
C4 PICASSO 5PL HDI (160ch) FAP BVA6	M10CTRVP0004306	10	120	A 6	8
GRAND C4 PICASSO 5PL HDI (110ch) FAP BMP6	M10CTRVP000J938	6	82	A 6	6
GRAND C4 PICASSO 5PL HDI (110ch) FAP BMP6	M10CTRVP000M942	6	82	A 6	6
GRAND C4 PICASSO 5PL HDI (110ch) FAP BVM6	M10CTRVP000H937	6	82	M 6	6
GRAND C4 PICASSO 5PL HDI (110ch) FAP BVM6	M10CTRVP000G936	6	82	M 6	6
GRAND C4 PICASSO 7PL e-HDI (110ch) AirDream BMP6	M10CTRVP0003923	6	82	A 6	5
GRAND C4 PICASSO 7PL HDI (110ch) FAP BMP6	M10CTRVP0006926	6	82	A 6	6
GRAND C4 PICASSO 7PL HDI (110ch) FAP BVM6	M10CTRVP0000920	6	82	M 6	6
GRAND C4 PICASSO 7PL HDI (150ch) FAP BMP6	M10CTRVP000W977	8	110	A 6	6

Table 40: extract from the ADEME guide "Consommations conventionnelles de carburant et émissions de CO_2 - Véhicules particuliers neufs vendus en France en 2015"

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_2e emission rate per litre of fuel from table 39. The value for diesel is therefore 7,61 kg CO_2e / ℓ.
3. It then uses the following calculation formula to draw up its GHG information:

GHG information (per kilometre travelled) = 7,61 kg CO_2e / l. x 0,045 l = 342 g CO_2e / km travelled

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.

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 and without passengers.

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3. The GHG information can be drawn up using the following formula:

GHG 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 records the purchase of 30 000 litres of road diesel for journeys with and without passengers. The consumption rate per kilometre is therefore: [30 000 / 500 000 km] x 2 = 0,12 ℓ / km travelled.
2. It identifies the diesel energy source emission factor: 3,16 kg CO_2e / ℓ.
3. The GHG information to be displayed in the vehicles is:

GHG information (per kilometre travelled) = 0,12 ℓ / km x 3,16 kg CO_2e / ℓ = 379 g CO_2e / 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 GHG 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_2e / km charged. In the aforementioned example, the value to be displayed is 379 g CO_2e / km of distance travelled when using level 2 values.

This information differs significantly from the value provided in g CO_2e / 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_2e emitted per kilometre of journey[2] is: 379 g CO_2e / km".

For information purposes, the quantity of CO_2 emitted by this vehicle, calculated as per the directive[3] 1999/94/EC on the GHG emitted by new vehicles, is 125 g CO_2 / km.

2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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.

2 Value calculated as per article L.1431-3 of the French transport code.
3 The value to be displayed corresponds to that of the vehicle transporting the passenger.

Fact sheet No. 29

Passenger transport by 2 or 3-wheelers

29.1. Activities concerned

L'activité de transport public particulier au moyen de véhicules à deux ou trois roues (activité dite des motos-taxis) est réglementée. Pour l'exercer, le chauffeur doit respecter des conditions d'aptitude professionnelle, d'entretien et de caractéristiques du véhicule. Le conducteur doit pouvoir justifier d'une réservation préalable. Les véhicules-motos ne peuvent ni circuler, ni stationner sur la voie publique en quête de client. À la différence des taxis, les tarifs sont libres.

29.2. The calculation methods presented in this sheet

This fact sheet presents two different calculation methods:

- the 1st uses level 1 values;
- the 2nd 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 10th, to take into account empty journeys.

2. The formula to apply to each service is as follows:

GHG 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 GHG emitted by its services. The vehicle used is a motorcycle with a piston displacement greater than 750 cm^3.

1. The company notes the aggregate data from table 33 for a vehicle with a piston displacement greater than 750 cm^3: 0,403 kg CO_2e / km.
2. It then uses this data to draw up its GHG information:

   GHG information (per kilometre travelled) = 0,403 kg CO_2e / km travelled

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.

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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:

GHG information (per kilometre travelled) = Consumption rate x 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 ℓ / 300 000 km x 2 = 0,104 ℓ / km.
4. It notes the emission factor for petrol RON 98: 2,80 kg CO_e2 / ℓ.
5. The GHG information per kilometre travelled is calculated as follows:
GHG information (per kilometre travelled) = 0,104 ℓ / km x 2,80 kg CO_2e / ℓ = 219 g CO_2e / km travelled

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 GHG 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. GHG 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 D.1431-22 of the French transport code.

2) Further information

The additional information provided for by article D.1431-22 of the French transport code 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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Diesel	Road diesel	Litre (ℓ)	0,66	2,51	3,16
Liquefied petroleum gas (LPG)	LPG fuel (LPGf)	Litre (ℓ)	0,26	1,60	1,86
Natural gas	Compressed natural gas for road vehicles (CNG)	Cubic metre (m^3)	0,44	1,84	2,28

Table 41: fuel emission factors - passenger public transport (Source: ADEME Carbon Base, at this Guide date)

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 m^3 / 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 m^3 / 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 m^3 / 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_2e per passenger (calculated values)
Urban and peri-urban transport in towns with over 250 000 inhabitants	149 g CO_2e / passenger.km
Urban and peri-urban transport in towns with 100 000 to 250 000 inhabitants	160 g CO_2e / passenger.km
Urban and peri-urban transport in towns with under 100 000 inhabitants) / inter-urban transport	177 g CO_2e / 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 1st uses level 1 values;
- the 2nd uses level 2 values;
- the 3rd 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:

GHG 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 GH_G 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: 177 g CO_2e / passenger.km
2. For information provided via a display, it may directly use this value:

GHG information = 177 g CO_2e 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 D.1431-11 of the French transport code. 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:

GHG information (service) = aggregate data

Example

A company providing a public transport service using road vehicles in a city, is looking to calculate its GHG 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. Its draws up the number of passengers transported: 102 800 000 passengers
3. It notes the road diesel emission factor: 3,16 kg CO_2e / 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:
   GHG information = (0,112 ℓ / passenger x 3,16 kg CO_2e / ℓ) = 0,354 kg CO_2e / 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 D.1431-20 of the French transport code, 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.

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2. The company can choose to express its GHG 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:

GHG information (service) = aggregate data x distance (service)

Example

A company providing a public transport service using road vehicles in a city, is whilling looking to calculate its GHG 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 road diesel energy source emission factor: 3,16 kg CO_2e / 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 3,16 kg CO_2e / ℓ) = 537 g CO_2e / 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.

GHG information = 537 g CO_2e / journey.

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 D.1431-21 of the French transport code, by displaying its GHG 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_2e 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_2e 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[1]. 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 GHG 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 1st uses level 1 values;
- the 2nd 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 GHG 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:

GHG information (service) = aggregate data x number of units (service) x distance (service)

Example

A general council is looking to calculate its GHG 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: 160 g CO_2e per passenger-kilometre.
3. Application to a travel pass with which a student travels 1 500 km in the year:

GHG information for one student = 160 g CO_2e / passenger.km x 1 passenger x 1 500 km = 240 kg CO_2e

1 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 D.1431-11 of the French transport code. 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:

GHG 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 road diesel emission factor: 3,16 kg CO_2e / litre (data provided by the order of April the 10th).
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:
   GHG information = (176,53 ℓ x 3,16 kg CO_2e / ℓ) = 558 kg CO_2e / 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 D.1431-20 of the French transport code, add the statement "specific method" when displaying this information.

31.5. How must this information be transmitted to the beneficiary?

GHG 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 GHG 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_2e per unit of measurement of the quantity of energy source)		
			Upstream phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	Kilowatt-hour	0,048	0,00	0,048
	Consumed in Corsica	Kilowatt-hour	0,59	0,00	0,59
	Consumed in Guadeloupe	Kilowatt-hour	0,70	0,00	0,70
	Consumed in French Guiana	Kilowatt-hour	2,56	0,00	2,56
	Consumed in Martinique	Kilowatt-hour	0,84	0,00	0,84
	Consumed in Mayotte	Kilowatt-hour	0,78	0,00	0,78
	Consumed in Réunion	Kilowatt-hour	0,78	0,00	0,78
	Consumed in Europe (excluding France)	Kilowatt-hour	0,42	0,00	0,42

Table 44: energy source emission factors - guided passenger transport (Source: ADEME Carbon Base, at this Guide date)

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_2e 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)	6,99 g CO_2e / 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)	6,24 g CO_2e / passenger.km
Cable car (8 seats) in mainland France (excluding Corsica)	26,9 g CO_2e / 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 1st uses level 1 values;
- the 2nd 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:

GHG 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 GHG 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: 5,99 g CO_2e / passenger.km.
2. For information provided via a display, it may directly use this value:

GHG information = 5,99 g CO_2e 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 D.1431-11 of the French transport code. 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:

GHG 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 GHG 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): 0,048 kg CO_2e/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 0,048 CO_2e / kWh) = 22,2 g CO_2e / 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.

GHG information = (0,462 kWh / passenger x 0,048 CO_2e / kWh) = 22,2 g CO_2e / passenger.

Fact sheet No. 32

GHG 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 D. 1431-21 of the French transport code, by displaying its GHG 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 22,2 g CO_2e 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_2e per passenger transported***". (Information calculated based on an average distance travelled of 3,8 km per journey, as determined by the service provider).

  If required the comparison with use of car (cf. appendix - Additional elements p. 228).

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 1st uses level 1 values;
- the 2nd 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:

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 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 GHG information to each passenger.

GHG information (service) = aggregate data x distance (service)

Example

A local authority managing a cable car transport service is looking to calculate its GHG 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: 26,9 g CO_2e / passenger.km.
2. It determines the distance travelled by the cable car of 1,5 km.
3. Application to a given service

The GHG information for one passenger is calculated using the following formula:

GHG information = 26,9 g CO_2e / passenger.km x 1 passenger x 1,5 km = 40,4 g CO_2e

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:

GHG Information = energy source consumption x [number of units transported for the service / number of units in the means of transport] x 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 GHG 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): 0,048 kg CO_2e/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:

   Aggregate data = (0,045 kWh / passenger x 0,048 kg CO_2e / kWh) = 2,16 g CO_2e / 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.

GHG information = 2,16 g CO_2e / passenger.

33.5. How must this information be transmitted to the beneficiary?

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

GHG 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_2e 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).

If required the comparison with use of car (cf. appendix - Additional elements p. 228).

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[1];
- **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 GHG 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.

1 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 GH_G information that must be provided to a family of 4 looking to book a plane journey from Paris (CDG) to Madrid (Adolfo Suarez).

1. The travel agency can therefore use the GHG 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 486 kg CO_2e per passenger for the Outward and Return flight.
3. The travel agency thus obtains the corresponding GHG information that it can provide to its customer: 4 x 486 kg CO_2e = 1 944 kg CO_2e 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_2e 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 GHG 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 GHG information for this flight is 955 kg CO_2e.
3. It can therefore directly provide this information to its customer.

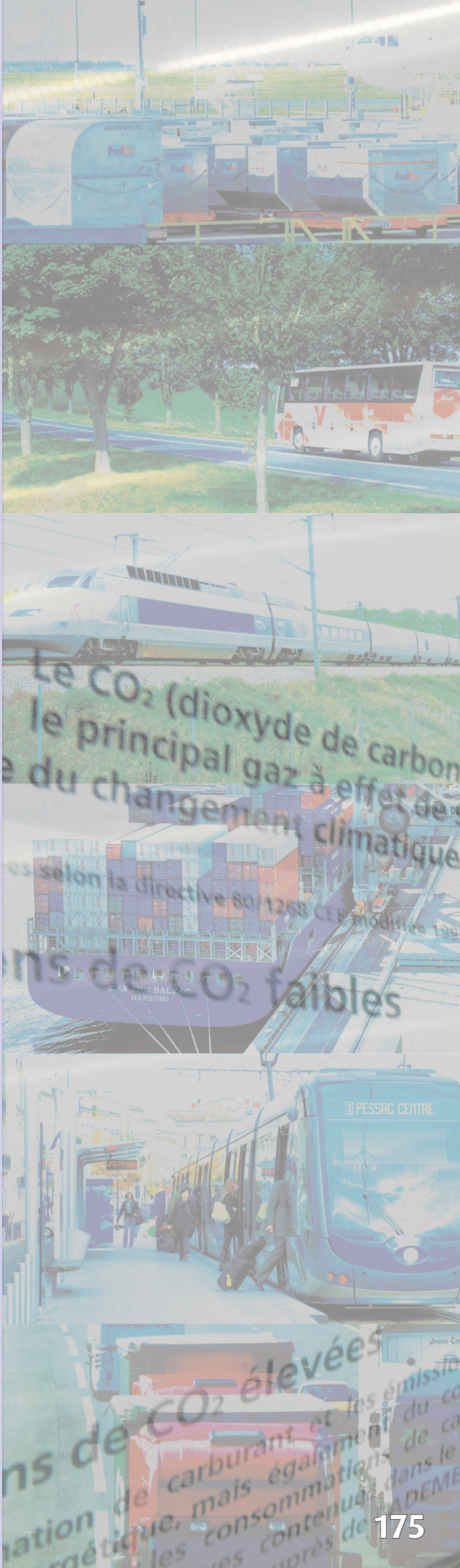
34.5. How must this information be transmitted to the beneficiary?

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 GHG 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).

GHG information can also be provided to the customer verbally and is deemed as a sufficient means of communication.

Appendices



6.1. Connection with the European standard NF EN 16258

Parallel to setting up the GH_G information framework for transport services in France, taking place within the scope of the OEET (French Observatory for Energy, the Environment and Transport), European methodological works have been conducted within the European Committee for Standardization (CEN), as proposed by France, since early 2008.

These works made enable the European standard NF EN 16258 to be published late 2012, tackling energy consumption and greenhouse gas emissions of transport services (freight and passengers).

The different respective work groups received support from the same experts in France, clearly seeking to obtain the same methodology. However, several differences can be observed, in particular:

- the French framework was excluding all greenhouses gases other than GH_G; this is no more the case since adoption of article 67 of the French law related to energy transition for green growth;
- the standard relates to energy consumption and greenhouse gas emissions; the declarations for a given transport service must therefore comprise 4 results in order to comply with this standard:
  - "well to wheels" energy consumption (= "upstream + operating" phase);
  - "tank to wheels" energy consumption (= "operating" phase);
  - "well to wheels" greenhouse gas emissions (= "upstream + operating" phase);
  - "tank to wheels" greenhouse gas emissions (= "operating" phase).

The appendix of this standard provides the default values for the main fuels used in the transport sector, however the use of these values is not compulsory; comparison with the values provided in annex I of the modified order of April 10th 2012, leads to observe a few minimal deviations in intermediary results or data (for example the density selected):

- for electricity emission factors, the standard stipulates the type of data to be used according to three possibilities, presented in order of preference; these values do not specify the use of a value specific to "transport" activities, as applicable to the order of April 10th 2012.
- the standard does not propose any level 1 values, however allows for their use (in this standard, these are the "default values");
- the use of "objective values" is specific to the French framework;
- the standard requires a transparent description of the calculation method, including for example the default values used where relevant;
- in the standard, the description of the calculation method is purposefully conceptual and theoretical, which makes this method applicable to all services in a rigorous and flexible manner; articles D.1431-8 to D.1431-10 of the French transport code on the other hand presents a more operational calculation method, followed by article 7, which stipulates the possibility of adapting the method provided in articles D.1431-8 to D.1431-10 in various different ways;
- the standard does not mention the principle of re-using information provided by a subcontractor, unlike article D.1431-17 of the French transport code;
- for the combined transport of passengers and goods by sea, the European standard requires the use of either a method based on weight (passengers, vehicles, goods) or a method based on surface area (see annex B); the method stipulated in the French transport code on the other hand is based on the number of decks reserved for passengers and goods;
- by definition, a transport service according to the standard corresponds to a service for the transport of a cargo or a passenger from a departure point to a destination point; in the French framework, GHG information may relate to a set of services performed within the scope of the same contract (for example annually).

Consequently, a service provider applying the standard will provide GHG information compliant with the French framework and vice-versa.

6.2. Sources behind the emission factors and level 1 values

This annex provides detailed explanations regarding the nature of the sources and the values chosen.

6.2.1. Emission factors

6.2.1.1. Electricity emission factor[1]

Introduction

Electricity-powered rail or road transport does not directly emit any greenhouse gases. However greenhouse gases are emitted indirectly in the upstream phase during electricity production.

The electricity emission factor is therefore an important data item in assessing the GHG content of a given goods or passenger transport service carried out via a vehicle using electricity as its energy source.

This notice presents the main elements in understanding how the value selected in the modified order of April 10th 2012 is determined for calculating the GHG information for transport services in mainland France, and why other values are recommended in other contexts and in particular in other European countries.

Electricity and CO_2 emissions: the French example

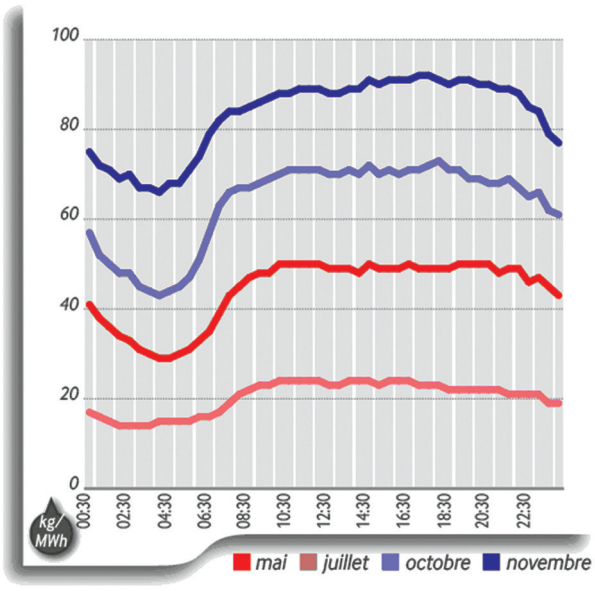


Figure 1: mean daily curves per month for the GHG emission rates in 2011
Source: TEN, Ecomix

The emissions produced to generate electricity depend on the primary energy source and conversion technology used. A coal-fired power station emits approximately 950 g GHG / kWh, a gas-fired power station emits approximately 350 to 500 g GHG / kWh; emissions are very low in the case of wind farms or nuclear power plants (no emissions for the power plant and a few g/kWh for all emissions produced upstream of the power plant. Power stations vary greatly from one European country to the next and the mean emission factor also varies significantly according to the country. France's case is very specific due to the significance of its nuclear and hydraulic power plants and a mean emission factor particularly low compared to its neighbours.

However, France has another specific characteristic: the seasonal consumption factor is much greater than in other countries (with for example daily peak demand varying by a factor of 2, from 50 GW in summer to more than 100 GW in winter), more particularly caused by the development of electric heating. However, the adaptation of production to meet peak demand in winter cannot take place using the same production means. These are carbon-based means (coal and gas) and are highly solicited at this time, given the lower cost over a short operating period. Reminder: electricity cannot be stored on a large scale: production must be constantly adapted to suit demand. The emission factor is therefore higher in winter and may be associated with uses pertaining to this issue.

1 Text drawn up by the Ecole des Mines de Nantes (Bernard Bourges and Maël Le Bail), under the responsibility of Eric Vidalenc, of the Economy and Prospective Division of ADEME

Emission factors per use, in particular for transport

A calculation method was implemented in France to calculate emission factors per use[2], based on values that are significantly higher for seasonal uses (approximately 200 g / kWh). Industrial uses, which are much more regular throughout the year, have a much lower emission factor (approximately 50 g / kWh). These values incorporate the emissions associated with electricity imported from other European countries at certain times.

Transport (essentially rail) uses electricity in a relatively constant manner throughout the year: fluctuations in monthly consumption do not exceed ±10% of the annual mean. This is why the emission factor for this use, which is almost exclusively "base" production, is particularly low.

Fluctuations in electricity demand within the day are also noticeable. In this case the electricity production tools must be adapted and GH_G emissions are a little higher at peak times. It appears that the intraday emission factors vary by an approximate factor of 2, whereas the seasonal emission factors vary by an approximate factor of 4 (*see* TEN load curve, Ecomix provided hereinbelow). More importantly however, these cannot be allocated to one or several specific uses: most uses follow the same rhythm of daytime activity and are therefore in phase. The use of electricity in the transport sector is no exception to this rule and no additional correction is required.

Within the scope of application of article L.1431-3 of the French Transport Code, electricity emission factors have thus been selected for France on both a national basis and per use so as to take into account the specific features of our country in terms of electricity production and use. The same factors are recommended when assessing GH_G emissions using the "Base Carbone" database for other applications such as calculating the carbon footprint of a company or local authority.

Emission factor values per electricity provider?

In other countries, the methods used to assess GH_G effects sometimes propose the equal use of national annual mean values or values specific to the electricity provider, taking into account the composition of its power stations and own energy mix. This possibility concerning the use of one emission factor per provider raises many questions on the meaning that can be given to this information, on the use that can be made thereof and on its consequences, however also on the difficulties involved in collecting the information required.

The electricity's origin is difficult to establish

It should firstly be reminded that the privatisation of the electrical sector in Europe has changed how the electrical system operates to a relatively large extent by uncoupling sales and contractual aspects on the one hand and physical aspects on the other. One consequence of this is the distinction between providers and producers (non-existent in the more traditional monopolies): an electricity provider may actually not own any production means itself and simply represent a wholesaler that purchases and resells electricity. A producer, which in appearance owns its own production means capable of meeting its customer demand, in reality continuously purchases or resells electricity to other providers in order to balance its provisions at the lowest possible cost. A large portion of these exchanges take place via power exchanges such as Epex, where transactions are anonymous: at any moment in time, a pool of anonymous buyers is the customer of a pool of anonymous sellers. This enables the market to operate in an efficient and transparent manner, however the origin of the electricity purchased no longer has any significance in commercial terms.

Moreover, in physical terms, all kWh pass over the same network and cannot be traced either. The network's operation must be balanced in real time and classic, highly carbon-based means are widely used for this purpose. The solidarity and security provided by the shared network also results in unclear origins. Renewable electricity - above all if intermittent in nature - cannot go without support from an easily modulated electricity system, which may be renewable (renewable thermal or hydraulic energy, etc.) or not (gas, coal, etc.), which makes its isolated accounting system rather complex. This does not mean that the electricity produced by renewable energy is not essential, but that it contributes to reducing the emissions generated by the electricity consumed by all, rather than by those specific customers.

2 See ADEME notice "Contenu CO_2 du kWh électrique par usage en France 2008-2010» (01/09/2012) appended hereto.

With regard to country-based interconnections: in 2010, 513 TWh were consumed in France for 30 TWh exported (480 and 60 in 2011, the year of least consumption). French production first and foremost meets French consumption needs; at some moments in time, international flows are greater than French flows (e.g.: consumption peak of 102 GW and some 15 GW of import).

A limited impact

Calculating an emission factor per electricity provider is often motivated by the target of making a customer responsible for its purchases. This applies to material goods or a service for which traceability has been established. This is more questionable if the goods are "mixed" and unmarked. In particular in a sector as capitalist as electricity production, the link between the purchase act and adaptation of the production tool is much longer and more complex than for consumer products. Furthermore, the effective impact of the choice made by a relatively carbon-based provider on mass emissions could be questioned: in reality, a change in electricity provider has no effect on the composition of French power stations or on short-term emissions. Similarly, origin guarantees only play a very marginal role in developing renewable energies. In the long-term, only the commitments made by a provider to invest in renewable production means appear to have the potential to affect the purchase of "renewable electricity". The undeniable emergence of renewable energy in France and Europe is a direct consequence of the political choices made and of a regulatory context in place. This in particular includes the highly efficient system based on feed-in tariffs: the transfer of the sums collected, from renewable energy consumers to producers, reduces the emission factor for everyone[3].

Technical calculation difficulties

Several of the arguments made above discourage a provider-based approach. These directly concern concrete difficulties:

- in collecting the data required to calculate en emission factor per electricity provider;
- and in defining the calculation procedure.

Some data, for example that relating to direct block trading or power exchanges, is confidential in nature. Other data is simply non-existent. Furthermore, the calculation method to be implemented must ensure coherence with the other approaches, in particular that of the Base Carbone database according to seasonal uses. A mean annual electricity provider factor not taking into account the seasonal nature of the customer's uses, would be misleading in this respect. The calculation must incorporate this seasonal aspect.

Conclusion

Additional works are therefore required to identify the likely limited situations[4] in which an emission factor calculation per electricity provider could be relevant and feasible, and on which bases this could be made coherent with the other approaches and in particular that of the Base Carbone database.

In any event, the emission factor specific to a "transport" use, defined in the Base Carbone database based on a seasonal analysis of the emissions and uses, is required as reference value within the scope of the French GHG information framework for transport services.

6.2.1.2. Upstream emission factors for liquid fossil fuels[5]

The source used to quantify the upstream emissions is the Well-to-wheels study performed by the Joint Research Centre (JRC) of the European Commission, which replaced the IFP study of 2001 previously used in the “Bilan Carbone” method. This study can be downloaded at http://iet.jrc.ec.europa.eu/about-jec/downloads.

3 On a completely different level, those producing carbon-based kWh are subject to GH_G emission quotas and are therefore meant to have purchased carbon neutrality. Isn't GH_G labelling a form of double sentence... or the observation that the quota system has no meaning and is ineffective?
4 For example: origin guarantees, the impact of which in terms of directly contributing to the development of low-carbon power stations could be determined.
5 Text drawn up within the scope of the Base Carbone database –See www.basecarbone.fr.

This study originally concerned the following products only: crude oil, petrol, diesel and naphtha. For want of a better alternative, the other fuels used in the database are generally associated with diesel, with a few minor exceptions:

- firstly, the distribution of aircraft fuels is disregarded as these fuels are transported by pipeline;
- refining data for heavy fuel oil originates from the study "traditionally" used, i.e. the IFP 2001;
- data on bitumen originates from the study "traditionally" used, i.e. the IFP 2001.

60 % and 40 % of butane and propane are derived from oil and natural gas respectively. Data regarding these upstream steps is therefore derived from this database (for initial oil estimations, diesel is chosen as a raw material). The emissions connected to distribution are derived from a study performed by the CFBP (French Butane and Propane Committee) in 2005.

	Tonnes of gas per TJ NCV[6]								Total (tGH_Ge/ TJ NCV)
	Extraction and process		Transport		Refining		Distribution		
	GH_G	CH_4	GH_G	CH_4	GH_G	CH_4	GH_G	CH_4	
Crude Oil	4,42	0,04	0,90	0,00	0,00	0,00	0,00	0,00	6,2
Wide-cut jet fuel (Jet B)	4,42	0,04	0,90	0,00	8,32	0,01	0,00	0,00	14,9
Aviation fuel (AvGas)	4,42	0,04	0,90	0,00	8,32	0,01	0,00	0,00	14,9
Kerosene (Jet A1 or Jet A)	4,42	0,04	0,90	0,00	8,32	0,01	0,00	0,00	14,9
Naphtha	4,22	0,04	0,90	0,00	4,21	0,01	1,00	0,00	11,4
Shale oils	4,42	0,04	0,90	0,00	8,32	0,01	1,00	0,00	15,9
Pure diesel	4,42	0,04	0,90	0,00	8,32	0,01	1,00	0,00	15,9
Pure petrol	4,34	0,04	0,90	0,00	6,78	0,01	1,00	0,00	14,2
Domestic fuel	4,42	0,04	0,90	0,00	8,32	0,01	1,00	0,00	15,9
Heavy fuel oil	4,42	0,04	0,90	0,00	5,13	0,00	1,03	0,00	12,4
Bitumen	2,96	0,00	2,52	0,00	1,56	0,00	1,03	0,00	8,1
Butane (LPG)	2,96	0,01	0,95	0,08	2,62	0,00	1,14	0,00	10,2
Propane (LPG)	2,93	0,01	0,94	0,08	2,59	0,00	1,13	0,00	10,1

Table 1: upstream emission factors for liquid fossil fuels (/TJ NCV)

6 NCV: Net Calorific Value - Due to the presence of water vapour in the combustion products, two manners exist for measuring the energy available per unit of fuel, according to whether the water remains in gaseous form or whether most of this has condensed once brought to 0°C:
- when the water formed during combustion is kept in a gaseous state (vapour), the quantity of heat measured corresponds to the Net Calorific Value (NCV);
- when the water formed during combustion is mostly brought to a liquid state (the other products remaining in their gaseous state), the quantity of heat measured corresponds to the Gross Calorific Value (GCV).

The GCV/NCV distinction therefore resides in the fact that the GCV incorporates the energy liberated by the condensation of the water (known as latent heat of condensation) after combustion, whereas the NCV does not.
Source: Méthode Bilan Carbone® – Guide des facteurs d'émissions – Version 6.1

The energy content per unit of weight (GJ/t) of the main liquid fuels originates from the OMINEA 2011 report of the CITEPA for France and from the Well-to-wheels report of the JRC of November 2011 for petrol and diesel on a European scale. The decisions of the European Commission 2007/589/EC and 2009/339/EC are also used on a European level.

Densities are derived from the memorandum No. 9501 of December 28th 2004, from the directive 1999/100/EC of December 15th 1999 or from estimations when these were not provided.

France	Total (kg GH_Ge/kWh NCV)	Total (kg GH_Ge/kWh toe)	NCV in GJ/t (France)	Total in kg GH_Ge/t (France)	Density (kg/m^3)	Total in kgGH_Ge/l
Crude Oil	0,022	262	42,0	262	900	0,236
Wide-cut jet fuel (jet B)	0,053	624	44,0	653	800	0,523
Aviation fuel (AvGas)	0,053	624	44,0	653	800	0,523
Kerosene (Jet A1 or Jet A)	0,053	624	45,0	653	800	0,523
Naphtha	0,041	478	36,0	512		
Shale oils	0,057	666	42,0	571		
Pure diesel	0,057	666	44,0	666	845	0,563
Pure petrol	0,051	595	42,0	623	755	0,470
Domestic fuel	0,057	666	40,0	666	845	0,563
Heavy fuel oil	0,045	520	40,2	496	900	0,446
Bitumen	0,029	339	45,6	324		
Butane (LPG)	0,037	427	46,0	464	538	0,249
Propane (LPG)	0,036	423	46,0	464	538	0,249

Table 2: upstream emission factors for liquid fossil fuels (in units of energy, mass and volume) for France

Europe	NCV in GJ/t (Europe)	Total in kg GH_Ge/t (Europe)	Density (kg/m^3)	Total in kgGH_Ge/l
Crude Oil	42,3	264	900	0,236
Wide-cut jet fuel (jet B)	44,3	658	800	0,523
Aviation fuel (AvGas)	44,1	658	800	0,523
Kerosene (Jet A1 or Jet A)	44,5	655	800	0,523
Naphtha	38,1	507		
Shale oils	43,0	604		
Pure diesel	43,0	682	845	0,563
Pure petrol	43,0	609	755	0,470
Domestic fuel	40,0	682	845	0,563
Heavy fuel oil	40,2	496	900	0,446
Bitumen	47,3	324		
Butane (LPG)	47,3	481	538	0,249
Propane (LPG)	0,0	477	538	0,249

Table 3: upstream emission factors for liquid fossil fuels for Europe (units in mass and volume)

6.2.1.3. Upstream emission factors and combustion of liquid fossil fuels

The emission factors for the GH_G emissions generated by the combustion of the main liquid fuels to produce energy are derived from the OMINEA 2011 report of the CITEPA for France and from the decision 2007/589/EC for Europe.

Emission factors for CH_4 and N_2O are also associated thereto. For petrol (both pure and mixed), diesel (pure and mixed) and LPG, this data is applicable to mobile land sources. Emissions for heavy fuel oils and domestic fuels are applicable to all modes of transport (specific data has been added within the scope of regulatory data regarding the French transport code for seagoing applications, i.e. 1,19 kg CH_4/TJ).

This data is reproduced in the tables below for application in France.

France	Upstream (tGH_Ge/TJ NCV)	Combustion (t of gas /TJ NCV)			Total combustion (tGH_Ge/TJ NCV)
		GH_G	CH_4	N_2O	
Crude Oil	6,2	73,0	0,0000	0,0000	73,0
Wide-cut jet fuel (jet B)	14,9	71,6	0,0000	0,0000	71,6
Aviation fuel (AvGas)	14,9	71,6	0,0000	0,0000	71,6
Kerosene (Jet A1 or Jet A)	14,9	71,6	0,0000	0,0000	71,6
Naphtha	11,4	73,0	0,0000	0,0000	73,0
Shale oils	15,9	73,0	0,0000	0,0000	73,0
Pure diesel	15,9	75,0	0,0011	0,0023	75,7
Pure petrol	14,2	73,0	0,0199	0,0023	74,2
Domestic fuel	15,9	75,0	0,0043	0,0015	75,6
Heavy fuel oil	12,4	78,0	0,0013	0,0018	78,6
Bitumen	8,1	81,0	0,0000	0,0000	81,0
Butane (LPG)	10,2	64,0	0,0030	0,0022	64,7
Propane (LPG)	10,1	64,0	0,0030	0,0022	64,7

Table 4: upstream emission factors and combustion of liquid fossil fuels (tGH_Ge / TJ NCV) for France

France	Total upstream + combustion (tGH_Ge/TJ NCV)	Total upstream + combustion (kg GH_Ge/kWh NCV)	Total upstream + combustion (kg GH_Ge/Toe NCV)	Total upstream + combustion (kg GH_Ge/t NCV)	Total upstream + combustion (kg GH_Ge/l)
Crude Oil	79	0,285	3 328	3 328	2,995
Wide-cut jet fuel (jet B)	86	0,311	3 631	3 804	3,043
Aviation fuel (AvGas)	86	0,311	3 631	3 804	3,043
Kerosene (Jet A1 or Jet A)	86	0,311	3 631	3 804	3,043
Naphtha	84	0,304	3 544	3 797	
Shale oils	89	0,320	3 732	3 199	
Pure diesel	92	0,330	3 845	3 845	3,249
Pure petrol	88	0,318	3 710	3 886	2,934
Domestic fuel	91	0,329	3 839	3 839	3,244
Heavy fuel oil	91	0,327	3 820	3 638	3,274
Bitumen	89	0,321	3 741	3 580	
Butane (LPG)	75	0,270	3 146	3 416	1,838
Propane (LPG)	75	0,269	3 142	3 442	1,852

Table 5: upstream emission factors and combustion of liquid fossil fuels (tGH_Ge / unit of energy in NCV, mass and volume) for France

The data for application in Europe is provided below:

Europe	Upstream (tGH_GE/TJ NCV)	Combustion (t of gas /TJ NCV)			Total combustion (tGH_GE/TJ NCV)
		GH_G	CH_4	N_2O	
Crude Oil	6,2	73,3	0,0000	0,0000	79,5
Wide-cut jet fuel (jet B)	14,9	70,0	0,0000	0,0000	84,9
Aviation fuel (AvGas)	14,9	70,0	0,0000	0,0000	84,9
Kerosene (Jet A1 or Jet A)	14,9	71,5	0,0000	0,0000	86,4
Naphtha	11,4	71,2	0,0000	0,0000	82,6
Shale oils	15,9	73,3	0,0000	0,0000	89,2
Pure diesel	15,9	73,3	0,0011	0,0023	89,8
Pure petrol	14,2	73,4	0,0199	0,0023	88,7
Domestic fuel	15,9	73,3	0,0043	0,0015	89,7
Heavy fuel oil	12,4	77,3	0,0013	0,0018	90,2
Bitumen	8,1	80,6	0,0000	0,0000	88,7
Butane (LPG)	10,2	63,0	0,0030	0,0022	73,9
Propane (LPG)	10,1	63,0	0,0030	0,0022	73,8

Table 6: upstream emission factors and combustion of liquid fossil fuels (tGH_GE/TJ NCV) for Europe

Europe	Total upstream + combustion (tGH_GE/TJ NCV)	Total upstream + combustion (kg GH_GE/kWh NCV)	Total upstream + combustion (kg GH_GE/kWh NCV)	Total upstream + combustion (kg GH_GE/kWh NCV)	Total upstream + combustion (kg GH_GE/l NCV)
Crude Oil	80	0,286	3 341	3 365	3,007
Wide-cut jet fuel (jet B)	85	0,305	3 564	3 759	2,987
Aviation fuel (AvGas)	85	0,305	3 564	3 759	2,987
Kerosene (Jet A1 or Jet A)	86	0,311	3 627	3 808	3,040
Naphtha	83	0,297	3 468	3 675	
Shale oils	89	0,321	3 744	3 397	
Pure diesel	90	0,323	3 772	3 862	3,187
Pure petrol	89	0,319	3 726	3 814	2,947
Domestic fuel	90	0,323	3 765	3 855	3,182
Heavy fuel oil	90	0,325	3 790	3 610	3,249
Bitumen	89	0,319	3 724	3 564	
Butane (LPG)	74	0,266	3 104	3 496	1,813
Propane (LPG)	74	0,266	3 100	3 491	1,827

Table 7: upstream emission factors and combustion of liquid fossil fuels (tGH_GE / unit of energy in NCV, mass and volume) for Europe

6.2.1.4. Specific case of fuel at the pump

Fuel at the pump emissions must take into account the biofuel incorporation rate. Annex V C of the European directive on renewable energy (No. 2009/28/EC) is used as a basis for calculating the values associated to biofuel impacts.

The calculation method thus selected involves allocating GHG emissions to the biofuel equal to 65 % of the emissions of the fossil fuel into which it is incorporated. Using the aforementioned fossil fuel values, pure biodiesel and bioethanol therefore respectively emit 59,7 g GH_Ge/MJ and 57,4 g GH_Ge/MJ. This data provides us with an overall impact. The LCA biofuel 2010 study (BIOIS) can be used as a basis when distributing this efficiency between gases. Therefore, in a conventional manner, the emission values for CH_4 and N_2O gases are those retained in the study and the GH_G value is deduced from the difference between the total (GH_Ge) and these two other gases.

From a general point of view, the inclusion of biogenic carbon in the Base Carbone database is explained in detail in a separate document that can be directly consulted from the FAQ section on the following website: www.basecarbone.fr. The values presented hereinbelow are thus obtained.

PETROL industry

Pure petrol and bioethanol

Pure bioethanol	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	- 71,73	44,63	1,43	11,30	57,36
kg GH_Ge per litre	- 1,52	0,94	0,03	0,24	1,21
Pure bioethanol	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion excluding bio GH_G
g GH_Ge per MJ	71,73	0	0	0	0,00
kg GH_Ge per litre	1,52	0	0	0	0,00

Pure bioethanol	Total upstream + combustion
g GH_Ge per MJ	57,36
kg GH_Ge per litre	1,21

Table 8: pure bioethanol emission factors

Pure petrol	Upstream				
	Bio GH_G	Fossil GH_G	CH4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	0,00	14,10	0,1	0	14,20
kg GH_Ge per litre	0,00	0,47	0,00	0,00	0,47
Pure petrol	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N20	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	0,00	73,0	0,15	0,894	74,04
kg GH_Ge per litre	0,00	2,43	0,00	0,03	2,46

Pure petrol	Total upstream + combustion
g GH_Ge per MJ	88,24
kg GH_Ge per litre	2,93

Table 9: pure petrol emission factors

Petrol at the pump (petrol and bioethanol blended)

2009 incorporation rate	5,11 %	Energy
	7,76 %	Volume

Petrol at the pump	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	- 3,67	15,66	0,17	0,58	16,41
kg GH_Ge per litre	- 0,12	0,51	0,01	0,02	0,53

Petrol at the pump	Combustion				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	3,67	69,27	0,14	0,85	70,26
kg GH_Ge per litre	0,12	2,24	0,00	0,03	2,27

Petrol at the pump	Total upstream + combustion
g GH_Ge per MJ	86,66
kg GH_Ge per litre	2,80

Table 10: petrol at the pump emission factors

E10 (petrol and bioethanol blended)

Incorporation rate	6,61 %	Energy
	10,00 %	Volume

E10	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	-4,74	16,12	0,19	0,75	17,05
kg GH_Ge per litre	-0,15	0,52	0,01	0,02	0,55

E10	Combustion				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	4,74	68,17	0,14	0,83	69,15
kg GH_Ge per litre	0,15	2,18	0,00	0,03	2,21

E10	Total upstream + combustion
g GH_Ge per MJ	86,20
kg GH_Ge per litre	2,76

Table 11: E10 emission factors

E85 (petrol and bioethanol blended)

2009 incorporation rate	78,32 %	Energy
	85,00 %	Volume

E85	Upstream				
	Bio GH_G	GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	- 56,18	38,01	1,14	8,85	48,00
kg GH_Ge per litre	- 1,29	0,87	0,03	0,20	1,10

E85	Combustion				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	56,18	15,83	0,03	0,19	16,06
kg GH_Ge per litre	1,29	0,36	0,00	0,00	0,37

E85	Total upstream + combustion
g GH_Ge per MJ	64,06
kg GH_Ge per litre	1,47

Table 12: E85 emission factors

DIESEL industry

Pure diesel and biodiesel

Pure biodiesel	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	- 69,86	43,35	0,86	15,55	59,76
kg GH_Ge per litre	- 2,31	1,44	0,03	0,51	1,98
Pure biodiesel	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	69,86	0	0	0	0,00
kg GH_Ge per litre	2,31	0	0	0	0,00

Pure biodiesel	Total upstream + combustion
g GH_Ge per MJ	59,76
kg GH_Ge per litre	1,98

Table 13: biodiesel emission factors

Pure diesel	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	0,00	15,80	0,1	0	15,90
kg GH_Ge per litre	0,00	0,56	0,00	0,00	0,56
Pure diesel	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	0,00	75,0	0,15	0,894	76,04
kg GH_Ge per litre	0,00	2,66	0,01	0,03	2,70

Pure diesel	Total upstream + combustion
g GH_Ge per MJ	91,94
kg GH_Ge per litre	3,26

Table 14: pure diesel emission factors

Diesel at the pump (diesel and biodiesel blended)

2009 incorporation rate	6,09 %	Energy
	6,28 %	Volume

Diesel at the pump	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	-4,26	17,48	0,15	0,95	18,57
kg GH_Ge per litre	-0,15	0,58	0,04	0,03	0,65
Diesel at the pump	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	4,26	70,43	0,14	0,84	71,41
kg GH_Ge per litre	0,15	2,49	0,00	0,02	2,52

Diesel at the pump	Total upstream + combustion
g GH_Ge per MJ	89,98
kg GH_Ge per litre	3,17

Table 15: diesel emission factors

B30 (diesel and biodiesel blended)

2009 incorporation rate	28,56 %	Energy
	30,00 %	Volume

B30	Upstream				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total upstream (excluding bio GH_G)
g GH_Ge per MJ	-19,95	23,67	0,32	4,44	28,43
kg GH_Ge per litre	-0,69	0,79	0,04	0,15	0,98
B30	**Combustion**				
	Bio GH_G	Fossil GH_G	CH_4	N_2O	Total combustion (excluding bio GH_G)
g GH_Ge per MJ	19,95	53,58	0,11	0,64	54,32
kg GH_Ge per litre	0,69	1,86	0,00	0,02	1,88

B30	Total upstream + combustion		
g GH_Ge per MJ	82,75		
kg GH_Ge per litre	2,87		

Table 16: B30 emission factors

6.2.1.5. Gaseous fossil fuels

The emission factors per unit of energy (GH_G/J) of the main gaseous fuels are derived from an LCA study conducted by GDF-Suez in 2007 and subject to external expertise (critical review conducted by Armines)[7]. GDF-Suez performed an LCA to determine the precise chemical composition of the gas distributed in France (and in particular its CH_4 content).

With regard to LNG, which represented a little more than one quarter of gross imports (27,6 %) in 2010, the impacts specific to this chain are taken into account. LNG is also available as a direct fuel, although very few stakeholders are currently concerned by this.

This study presents a GH_G content upon combustion mildly lower than the aforementioned data and in particular the CITEPA values, however is increased for the upstream portion. It is used to specify the types of gas according to the provisions, their origins and the steps required throughout the life cycle.

The OMINEA 2011 report of the CITEPA for France is used for blast furnace gases and coke oven gases in addition to energy contents per unit of weight (GJ/t). For Europe, the source used for energy contents per unit of weight is the decision 2007/589/EC and ETS directive.

The density of LNG is derived from the directive 1999/100/EC of December 15th 1999.

For Europe, IPCC data is used for emissions connected to combustion. All of this data is reproduced in the tables below.

Upstream emissions - France and Europe

		t of gas per TJ NCV										
		Extraction / production / treatment		Intern. transport Pipeline		Liquefaction		Distribution		Rest of process		Upstream Total (t GH_Ge/TJ NCV)
		GH_G	CH_4	GH_G	CH_4	GH_G	CH_4	GH_G	CH_4	GH_G	CH_4	
France	Natural gas	2,0	0,0	1,0	0,1	1,8	0,0	1,5	0,0	0,7	0,0	10,2
	Liquefied natural gas	2,0	0,0	1,0	0,1	5,2	0,0	1,5	0,0	0,7	0,0	13,6
	Natural gas vehicle	2,0	0,0	1,0	0,1	1,8	0,0	1,5	0,0	3,4	0,0	12,9
	Blast furnace gas	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	Coke oven gas	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Europe	Natural gas	2,0	0,0	1,0	0,1	1,8	0,0	1,5	0,0	0,7	0,0	10,2

Table 17: Upstream emission factors for gaseous fossil fuels (/TJ NCV)

		Total (kg GH_Ge/kWh NCV)	Total (kg GH_Ge/ kWh toe)	NCV (GJ/t)	Total (kg GH_Ge/t)	Density (kg/m³)	Total (kg GHG_e/l)
France	Natural gas	0,037	427	49,6	504	–	–
	Liquefied natural gas	0,049	570	49,6	673	654	0,42
	Natural gas vehicle	0,046	540	49,6	638	–	–
	Blast furnace gas	0	0	0	0	0	0
	Coke oven gas	0	0	0	0	0	0
Europe	Natural gas	0,037	427	48	488	–	–

Table 18: upstream emission factors for gaseous fossil fuels (in units of energy, mass and volume) for France and Europe

7 Source: GDF SUEZ/DRI and Paul Scherrer Institut, 2007/ The GWP have been updated

Upstream and combustion emissions - France and Europe

		Upstream (t GH_Ge/TJ NCV)	Combustion (t of gas /TJ NCV)			Total combustion (t GH_Ge/TJ NCV)
			GH_G	CH_4	N_2O	
France	Natural gas	10,2	55,8	0,005	0,0025	56,7
	Liquefied natural gas	13,6	55,8	0,005	0,0025	56,7
	Natural gas vehicle	12,9	55,8	0,005	0,0025	56,7
	Blast furnace gas	0,0	268	0,0003	0,0025	268,8
	Coke oven gas	0,0	47	0,0003	0,0025	47,8
Europe	Natural gas	10,2	56,1	0,0005	0,0025	56,1

Table 19: Upstream emission factors and combustion of gaseous fossil fuels (tGH_Ge/TJ NCV) for France and Europe

		Total upstream + combustion (t GH_Ge/TJ NCV)	Total upstream + combustion (kg GH_Ge/kWh NCV)	Total upstream + combustion (kg GH_Ge/toe NCV)	Total upstream + combustion (kg GH_Ge/t NCV)	Total upstream + combustion (kg GH_Ge/l)
France	Natural gas	67	0,240605333	2 807	3 315,006815	–
	Liquefied natural gas	70	0,252845333	2 950	3 483,646815	–
	Natural gas vehicle	70	0,250325333	2 920	3 448,926815	2,26
	Blast furnace gas	269	0,967509	11 288	618,13075	–
	Coke oven gas	48	0,171909	2 006	1 504,20375	–
Europe	Natural gas	66	0,238564133	2 783	3 180,855111	–

Table 20: Upstream emission factors and combustion of gaseous fossil fuels (t GH_Ge / unit of energy in NCV, mass and volume) for France and Europe

Uncertainties

For gaseous fuels, the production methods and compositions are relatively standard and the combustion conditions are well known. This results in the allocation of only 5 % uncertainty to this aspect.

6.2.2. Level 1 values

6.2.2.1. Freight

a. Freight by air

The French Civil Aviation Authority (DGAC) provides a GHG aviation emissions calculator, which is available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr

Links involving France, excluding cargo planes

The calculator contains approximately one thousand links; these links involve less than 2 flights per week departing from a location in France, operated for passenger transport and for the shipment of goods in the cargo hold (combined or passenger-only flights).

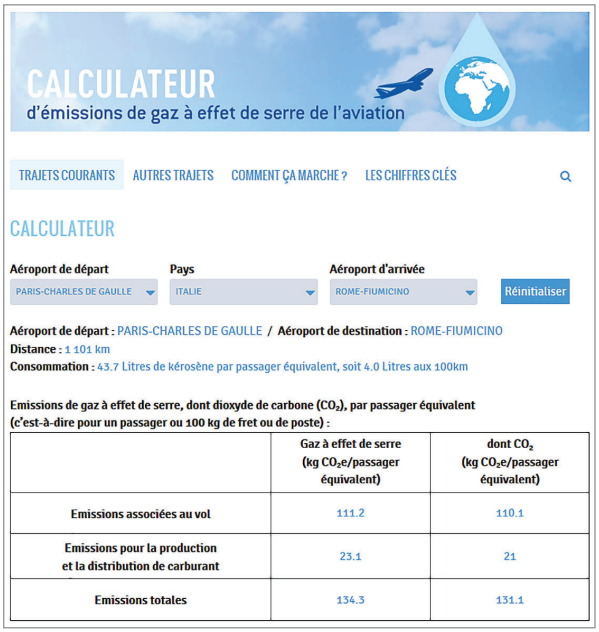


Figure 2: screenshot of the GHG aviation emissions calculator

For each link taking place between two airports, the GHG emissions are estimated using a tool combining the international methods used for emissions inventories (CORINAIR and MEET), the engine emissions database of the OACI (containing approximately 300 engines) and air traffic data for each link characterised by the number of movements, type of aeroplane used, number of passengers and weight of the freight shipped. The Corinair and MEET methods model the emissions generated by more than 50 different aeroplanes.

This tool was developed by the Citepa (French Interprofessional Technical Centre for Studies on Air Pollution), a certified body producing emissions inventories.

This methodology enables the calculator to remain fully coherent with the national inventories, based on real fuel sales made on national territory. In other words, the GH_G emissions generated by air transport appearing in the national inventories are equal to the sum of the emissions calculated for each air link.

The consumption estimation is however provided with an uncertainty margin of approximately plus or minus 5 %. This is due to:

- the type of aeroplane used: some links can be operated using aircraft that have not been modelled by the CORINAIR and MEET methods;
- the aircraft fill rate: this varies according to the flight, given that the data provided involves mean emissions for the relevant link, based on mean traffic and mean fill conditions;
- the route taken and weather conditions: for example consumption is higher for flights heading in a westwards direction than for flights heading eastwards under prevailing winds.

This tool is regularly re-assessed via communication with professionals in this sector.

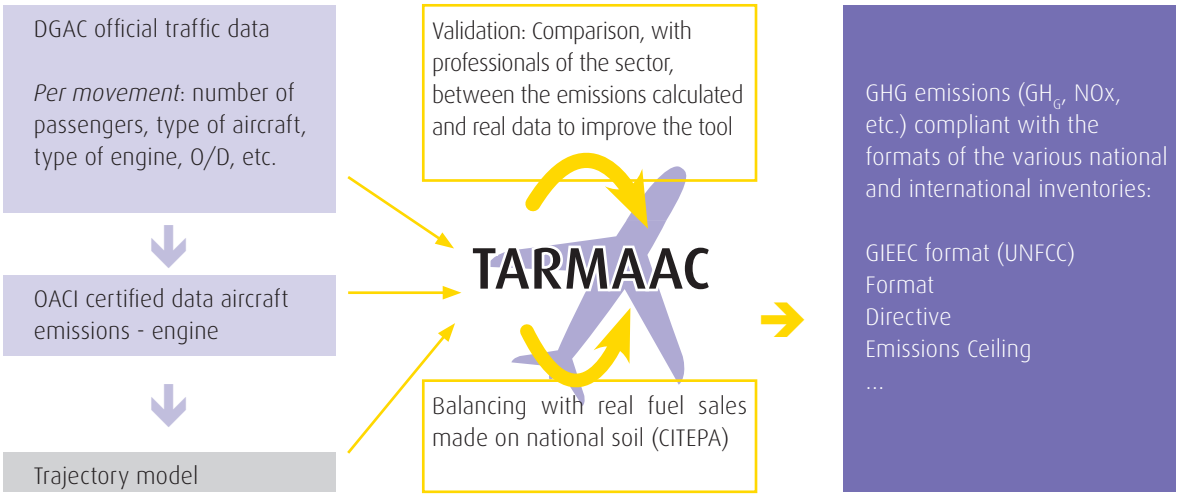


Figure 3: Figure 3: process for drawing up and improving the calculator

The data is obtained per passenger. For freight shipped using a combi plane, the conversion rule "1 passenger = 100 kg" must be applied to obtain results applicable to the shipment of goods.

Links not identified by the calculator, excluding cargo planes

For links not identified by the calculator, means have been calculated according to 12 flight distance brackets and 5 types of aircraft (broken down into brackets according to the aircraft's passenger seating capacity).

Given the technical impossibility of some situations (for example an aircraft with 0 - 50 seats flying more than 9 000 km) or given the lack of observed cases in other situations (for example an aircraft with 100 to 180 seats providing a link over a distance of 6 to 7 000 km), 31 cases have been selected as important.

The information obtained for each of these 31 cases is as follows:

- the aircraft consumption rate (litres per 100 km);
- the mean number of passengers transported per flight.

Consulting the calculator provides results corresponding to those shown at the following address:
https://eco-calculateur.dta.aviation-civile.gouv.fr

The table below presents the corresponding aggregate data, in litres of kerosene per passenger per kilometre for each of the 31 cases.

Consumption of kerosene (in litres per passenger equivalent-kilometre), broken down into distance brackets and aircraft category (capacity in number of seats) (round values)					
	Aircraft category				
Distance (km)	Less than 50 seats	50 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	0,073	0,061	0,046	0,038	*
1 000 - 2 000	0,083	0,052	0,038	0,031	0,040
2 000 - 3 000	*	*	0,035	0,030	0.033
3 000 - 4 000	*	*	0,034	0,032	0,032
4 000 - 5 000	*	*	0,050	0,041	0,029
5 000 - 6 000	*	*	0,049	0,032	0,029
6 000 - 7 000	*	*	*	0,033	0,027
7 000 - 8 000	*	*	*	0,030	0,028
8 000 - 9 000	*	*	*	0,031	0,028
9 000 - 10 000	*	*	*	0,024	0,027
10 000 - 11 000	*	*	*	*	0,031
Over 11 000	*	*	*	*	0,031

Results drawn up based on the TARMAAC I calculator

*Table 21: Consumption of kerosene (in litres per passenger equivalent-kilometre), broken down into distance brackets and aircraft category (capacity in number of seats) / * : Non-significant values / Passenger equivalent : a passenger or 100 kilograms of freight or mail)*

For freight shipped using a combi plane, the conversion rule "1 passenger = 100kg" must be applied to obtain results applicable to the shipment of goods.

Freight using a cargo plane

Mean emissions have been calculated according to 4 flight distance brackets and 3 types of aircraft (defined according to their Maximum Take-Off Weight). Given the technical impossibility of some situations (an aircraft with an MTOW of less than 100 tonnes flying more than 7 000 km) or given the lack of observed cases in other situations (for example an aircraft with an MTOW of 100 to 150 tonnes providing a link over a distance of 4 to 7 000 km), 6 cases have been selected as important.

The information is provided in litres of fuel per 100 km per tonne in the table below.

Consumption in litres of fuel per 100 km per tonne	Maximum take-off weight		
Distance	< 100 tonnes	100 to 250 tonnes	More than 250 tonnes
0 to 1,000 km	62,24	49,04	*
1,000 to 4,000 km	84,85	34,63	*
4 000 to 7 000 km	*	*	18,28
More than 7 000 km	*	*	17,46

Table 22: Consumption in litres of fuel per 100 km per tonne according to the Maximum Take-Off Weight

b. Freight by rail

General Information

The values are drawn directly from or established based on the source EcoTransIT World (www.ecotransit.org). The tables hereinbelow are extracts from the document "Methodology and Data - Update - July 31st 2011", which can be downloaded at: http://www.ecotransit.org/download/ecotransit_background_report.pdf

Electrical power

The table below provides energy consumption values for electricity-powered trains and differentiates between five types of train according to the train's gross tonnage and three categories of goods according to density.

Train Type	Final Energy Consumption			
	Train	Freight		
		Bulk	Average	Volume
Unit	Wh/Gtkm[8]	Wh/Ntkm[9]		
Light Train (500t)	25,5	42,7	49,5	63,9
Average Train (1000t)	16,6	27,8	32,2	41,5
Large (1500t)	12,9	21,6	25,0	32,3
Extra Large (2000t)	10,8	18,1	20,9	27,0
Heavy (>2000t)	10,0	16,8	19,4	25,1

Source: Railion 2007, IFEU 2008

Table 23: extract from the EcoTransIT World methodological report - Energy consumption for five types of train

To reduce the number of values proposed, the category "medium-sized train with a tonnage of 100 t" has been selected; however the three goods categories have been retained: dense goods ("bulk"), goods with an average density ("average") and light goods ("volume").

This table therefore directly provides the three values for the "electricity" energy source, corresponding to the energy consumption rate per reference and per kilometre, in Wh/Nt.km (watt hours per net tonne-kilometre), which is converted into kWh / (t.km) by dividing this value by one thousand. The following is thus obtained:

- 0,0415 kWh / (t.km) for a train weighing 1000 t, bulk goods;
- 0,0322 kWh / (t.km) for a train weighing 1000 t, average goods;
- 0,0278 kWh / (t.km) for a train weighing 1000 t, volume goods.

The table below provides the value of the ratio between the net tonnage of the goods loaded (which takes into account unladen journeys and fill rate) and the total gross tonnage of the train ("Nt/Gt ratio").

Given a total gross tonnage of 1000 t, the number of units transported by the means of transport (including unladen

	Load factor LF_{NC}	Empty trip factor ET	Capacity utilisation CUNC	Relation Nt/Gt CUNG
Train wagon				
Bulk	100%	80%	56%	0,60
Average	60%	50%	40%	0,52
Volume	30%	20%	25%	0,40

Table 24: extract from the EcoTransIT World methodological report - Ratio between the net freight tonnage transported and the total gross tonnage of the train ("ratio Nt/Gt")

journeys), expressed in tonnes, is therefore:

- 600 t for bulk goods;
- 520 t for average goods;
- 400 t for volume goods.

8 Wh/Gtkm: Watt hour per gross tonne-kilometre
9 Wh/Ntkm: Watt hour per net tonne-kilometre

For electricity-powered transport, the consumption rate per kilometre can be determined for the entire train by multiplying the energy consumption rate per reference and per kilometre by the tonnage shipped:

- 16,60 kWh/km for a train weighing 1000 t, bulk goods;
- 16,74 kWh/km for a train weighing 1000 t, average goods;
- 16,68 kWh/km for a train weighing 1000 t, volume goods.

Diesel power

For "non-road diesel", the table below provides the energy consumption values in Watt hours per net tonne-kilometre according to the total tonnage of the train and type of goods shipped.

Train Type	Final Energy Consumption			
	Train	Freight		
		Bulk	Average	Volume
Unit	Wh/Gtkm	Wh/Ntkm		
Light train (500t)	68.8	115.5	133.7	172.6
Average train (1000t)	44.8	75.2	87.0	112.3
Large (1500t)	34.8	58.4	67.6	87.3
Extra Large (2000t)	29.1	48.9	56.6	73.1
Heavy (>2000t)	27.0	45.4	52.5	67.8
Values of heavy trains	Average (not specified)			
China 2008	27			
Canada 2003	33		61	
US Track 1 2006			66	

Source: Railion 2007, IFEU 2008, EPS 2005, USDOT 2008

Table 25: extract from the EcoTransIT World methodological report - Energy consumption values according to total train tonnage and type of goods.

These values are then converted into kg of diesel by dividing the result expressed by 11 667 (the energy content of one kg of diesel being 11 667 kWh). The following is thus obtained:

- 0,0096 kg / (t.km) for a train weighing 1000 t, bulk goods;
- 0,0075 kg / (t.km) for a train weighing 1000 t, average goods;
- 0,0064 kg / (t.km) for a train weighing 1000 t, volume goods.

Using the tonnages calculated above, the consumption rate per kilometre can be determined for the entire diesel train by multiplying the energy consumption rate per reference and per kilometre by the tonnage shipped:

- 3,85 kg/km for a train weighing 1000 t, bulk goods;
- 3,88 kg/km for a train weighing 1000 t, average goods;
- 3,86 kg/km for a train weighing 1000 t, volume goods.

Combined power

For cases where the energy source is not identified, the assumption is made that 90 % of the transport operation is powered by electricity and 10 % by diesel, based on the information provided by the SNCF and corresponding to their data in France.

The corresponding values therefore represent the existence of two complementary energy sources (which are therefore added together), and are established based on "electrical power" and "diesel power" values by multiplying the latter by 90 % and 10 % respectively. The following results are obtained:

- for a train weighing 1 000 t, bulk goods:
  - 14.94 kWh/km (electricity) and 0.38 kg/km (non-road diesel).
- for a train weighing 1 000 t, average goods:
  - 15.07 kWh/km (electricity) and 0.39 kg/km (non-road diesel).
- for a train weighing 1 000 t, volume goods:
  - 15.01 kWh/km (electricity) and 0.39 kg/km (non-road diesel).

c. Freight by river

General Information

The values are drawn directly from or established based on the following study: "Efficacités énergétiques et émissions unitaires de GH_G du transport fluvial de marchandises", financed by ADEME and VNF and conducted by TL&Associés Consulting (final report dated January 2006).

Categories of equipment

The study summary provides the following results:

Basin	Equipment		Unit energy consumption (goe/t.km)	Unit GH_G emission (gGH_G/t.km)	Energy efficiency (t.km/koe)	Total energy consumption (toe)	Total GH_G emissions (tGH_G)
Interbasin	Self-propelled	< 400t	12,1	38,2	82,4	9 699,6	30 553,9
Total	Self-propelled	< 400t	14,0	44,3	71	29 934,3	94 293,0
		400 - 650 t	13,8	43,4	73	1 996,5	6 288,9
		650 - 1,000 t	12,3	38,8	81	4 948,7	15 588,5
		1 000 - 1 500 t	11,5	36,3	87	13 851,9	43 633,4
		> 1 500 t	9,5	30,0	105	11 444,3	36 049,7
	Pusher tug	295 - 590 kW	8,6	27,1	116	5 052,9	15 916,6
		590 - 880 kW	7,8	24,4	129	4 559,8	14 363,3
		> 880 kW	6,8	21,5	147	7 209,1	22 708,8

Table 26: Extract from the ADEME VNF (2006) study: main results per equipment category

The same segmentation method per type of equipment has been selected for calculating the level 1 values in this table, thus producing the following 8 categories:

Freight	River	Self-propelled	< 400t
Freight	River	Self-propelled	400 - 650 t
Freight	River	Self-propelled	650 - 1,000t
Freight	River	Self-propelled	1 000 - 1,500 t
Freight	River	Self-propelled	> 1 500 t
Freight	River	Pusher tug	295 - 590 kW
Freight	River	Pusher tug	590 - 880 kW
Freight	River	Pusher tug	> 880 kW

Table 27: categories of equipment selected

Furthermore, a "Pusher tug > 880 kW, container shipment" has been added.

Number of units transported per equipment

The study then provides the Deadweight values per category of equipment in the following table:

Type	Basins	Range	Dead-weight (t)	Number of engines	Total Power (kW)	Type of injection	Engine Construction Year	Goods
Self-propelled	Seine Interbasin	250 - 400 t	378	1	300	Classic then High Pressure	2004	Solid Bulk
	Rhone	650 - 1,000 t	910	1	650	Classic	-	Solid Bulk
	Rhone	> 1 500 t	2 200	2	920	Classic	2000	Liquefied Gas
	Rhone	> 1 500 t	1 596	1	660	Classic	1990	Liquefied Gas
	Seine Interbasin	250 - 400 t	375	1	233	Classic	-	Solid Bulk
	Seine Interbasin Rhine Nord	650 - 1,000 t	970	2	600	Classic	2001	Solid Bulk
	Rhone	> 1 500 t	2 300	1	920	Classic	1997	Solid Bulk
	Rhone Interbasin Seine Rhine Nord	250 - 400 t	397	1	301	High Pressure Injection	2003	Solid Bulk
	Seine Interbasin Rhine Moselle Nord Pas de Calais	250 - 400 t	377	1	375	Classic	1996	Solid Bulk
	Seine Interbasin	250 - 400 t	375	1	233	Classic	-	Solid Bulk
	Interbasin Nord	250 - 400 t	380	1	350	Classic	2000	Solid Bulk
Pusher tug	Rhone	> 800 kW	-	2	1890	Classic	2002	Solid Bulk Container
	Rhone	> 800 kW	-	2	1380	Classic	-	Liquid Bulk
	Seine	> 800 kW	-	4	986	Classic	1998	Solid Bulk
	Seine		-	2	580	Classic	2002	Solid Bulk
	Seine	590 - 880 kW	-	2	750	Classic	1996	Solid Bulk
Pushed convoy (self-propelled)	Seine	> 1 500 t	1 540	1	440	Classic	2002	Solid Bulk
	Seine	1 000 - 1 500 t	1 440	1	295	Classic	2000	Container
	Seine	650 - 1 000 t	720	1	183	Classic	1992	-
	Seine Interbasin Nord	1 000 - 1 500 t	1012	1	270	Classic	1984	Solid Bulk

Table 28: Extract from the ADEME VNF (2006) study: deadweight values per equipment category

This information was used to select the following values:

Nature of the transport	Mode	Type of means of transport	Category of means of transport	Use of the means of transport	Maximum capacity of the means of transport (goods)
Freight	River	Self-propelled	< 400 t		375 t
Freight	River	Self-propelled	400 - 650 t		600 t
Freight	River	Self-propelled	650 - 1,000 t		900 t
Freight	River	Self-propelled	1 000 - 1 500 t		1 400 t
Freight	River	Self-propelled	> 1 500 t		2 200 t
Freight	River	Pusher tug	295 - 590 kW		2 000 t
Freight	River	Pusher tug	590 - 880 kW		2 300 t
Freight	River	Pusher tug	> 880 kW	Excluding shipping containers	4 000 t
Freight	River	Pusher tug	> 880 kW	Shipping containers	4 000 t

Table 29: maximum capacity values selected

Missing data was added based on specific information regarding river units subject to the survey and not published in the study report.

The following two hypotheses were provided in the study:

- the percentage of unladen journeys made is 31 %;
- the loading coefficient is between 80 % and 100 %.

Using this information, the following values were adopted for the first 8 cases:

- unladen journey rate equal to 31 %;
- fill rate of the means of transport (with load) equal to 80 %.

For container shipment, the values selected based on the information provided by professionals within the scope of the OEET are:

- unladen journey rate equal to 0 %;
- fill rate of the means of transport (with load) equal to 30%.

It should be noted that the fill rate values relate to the capacity expressed in tonnage (example 4 000 t for pusher tugs "> 800 kW") and not in volume (for example the number of container slots).

The overall rate of use of the means of transport (with and without load) is obtained by multiplying the fill rate by the journey rate with load. The following is thus obtained:

Type of means of transport	Category of means of transport	Use of the means of transport	"Fill rate of the means of transport (with load)"	Rate of unladen journeys	"Rate of use of the means of transport (with + without load)"
Self-propelled	< 400 t		80 %	31 %	55 %
Self-propelled	400 - 650 t		80 %	31 %	55 %
Self-propelled	650 - 1 000 t		80 %	31 %	55 %
Self-propelled	1 000 - 1 500 t		80 %	31 %	55 %
Self-propelled	> 1 500 t		80 %	31 %	55 %
Pusher tug	295 - 590 kW		80 %	31 %	55 %
Pusher tug	590 - 880 kW		80 %	31 %	55 %
Pusher tug	> 880 kW	Excluding shipping containers	80 %	31 %	55 %
Pusher tug	> 880 kW	Shipping containers	30 %	0 %	30 %

Table 30: rate of use of the means of transport

The number of units transported (including unladen journeys) is then calculated by multiplying the maximum capacity by the rate of use, thus producing the following results:

Type of means of transport	Category of means of transport	Use of the means of transport	Maximum capacity of the means of transport (goods)	"Rate of use of the means of transport (with + without load)"	"Number of units transported by the means of transport (including unladen journeys"
Self-propelled	< 400 t		375 t	55 %	207 t
Self-propelled	400 - 650 t		600 t	55 %	331 t
Self-propelled	650 - 1 000 t		900 t	55 %	497 t
Self-propelled	1 000 - 1 500 t		1 400 t	55 %	773 t
Self-propelled	> 1 500 t		2 200 t	55 %	1 214 t
Pusher tug	295 - 590 kW		2 000 t	55 %	1 104 t
Pusher tug	590 - 880 kW		2 300 t	55 %	1 270 t
Pusher tug	> 880 kW	Excluding shipping containers	4 000 t	55 %	2 208 t
Pusher tug	> 880 kW	Shipping containers	4 000 t	30 %	1 200 t

Table 31: number of units transported

Consumption rate per kilometre

River units use non-road diesel

The detailed results of this study show values that differ according to the basin, equipment, operating conditions and in particular the upstream or downstream direction. So as to avoid providing a level 1 value that is too low in some cases, the highest value has been chosen from the study panel for each equipment; these values do not appear in the study report, but in the unpublished, detailed files. The corresponding values are:

Type of means of transport	Category of means of transport	Use of the means of transport	Consumption rate per kilometre of the energy source
Self-propelled	< 400 t		6.3 ℓ/km
Self-propelled	400 - 650 t		7.3 ℓ/km
Self-propelled	650 - 1 000 t		8.3 ℓ/km
Self-propelled	1 000 - 1 500 t		12.2 ℓ/km
Self-propelled	> 1 500 t		19.9 ℓ/km
Pusher tug	295 - 590 kW		9.4 ℓ/km
Pusher tug	590 - 880 kW		14.4 ℓ/km
Pusher tug	> 880 kW	Excluding shipping containers	28.4 ℓ/km
Pusher tug	> 880 kW	Shipping containers	28.4 ℓ/km

Table 32: Consumption rate per kilometre

d. Freight by sea

General Information

The values are drawn directly from or established based on the following source: "Etude de l'efficacité énergétique et environnementale du transport maritime", conducted on behalf of ADEME and the French Ministry of Ecology, Energy, Sustainable Development and Spatial Planning by the MLTC and TECNITAS companies (final report dated April 2009).

In-depth data

The following data, most of which was extracted from calculation tables not available in the final study report, constitutes all of the precise sources used to draw up level 1 values.

Table 33 hereinbelow presents the characteristics of the categories of ships studied.

Type of vessel	Deadweight - total (tonnes)
CAPESIZE	180 000
PANAMAX	75 000
HANDYMAX	52 000
HANDYSIZE	28 500
SEA-RIVER	5 500
VLCC	300 000
AFRAMAX	100 000
HANDY PRODUCT	37 000
SMALL PRODUCT OIL TANKER	16 000
SMALL LPG TANKER	6 500

Type of vessel	Deadweight - total (tonnes)
VLGC	53 000
PC 800	10 000
PC 1600	21 500
PC 2200	30 500
PC 5500	73 500
PC 9500	115 000
NIGHT FERRY	3 800
DAY FERRY	5 700
ROPAX	6 300
RORO	5 900

Table 33: deadweight (in tonnes) per type of vessel

Table 34 hereinbelow provides data on ship consumption and corresponding journeys. The energy sources used are HFO (Heavy Fuel Oil), MDO (Marine Diesel Oil) or combined fuel sources. The consumption rate of the ships per kilometre is calculated for either fuel or for both fuels simultaneously if the ship uses both types of fuel.

Type of vessel	Consumption (tonnes)		Journey		Rate per kilometre (kg/km)	
	HFO	MDO	Miles	Km	HFO	MDO
CAPESIZE	13 638,3	0,0	92 305	170 949	79,8	0,0
PANAMAX	665,8	0,0	7 284	13 490	49,4	0,0
HANDYMAX	4 678,5	0,0	63 616	117 817	39,7	0,0
HANDYSIZE	4 635,3	0,0	63 880	118 306	39,2	0,0
SEA-RIVER	-	17,2	724	1 341	0,0	12,8
VLCC	3 907,3	0,0	15 816	29 291	133,4	0,0
AFRAMAX	454,5	0,0	3 384	6 267	72,5	0,0
HANDY PRODUCT	8 904,5	397,8	63 265	117 167	76,0	3,4
SMALL PRODUCT OIL TANKER	100,7	0,9	988	1 830	55,0	0,5
SMALL LPG TANKER	5 177,6	297,3	108 021	200 055	25,9	1,5
VLGC	21 173,7	0,0	127 191	235 558	89,9	0,0
PC 800	150,7	3,6	2 516	4 660	32,3	0,8
PC 1600	2 904,6	0,0	23 642	43 785	66,3	0,0
PC 2200	1 527,8	0,0	7 952	14 727	103,7	0,0
PC 5500	6 750,1	0,0	20 944	38 788	174,0	0,0
PC 9500	8 771,3	0,0	22 496	41 663	210,5	0,0
NIGHT FERRY	23,3	15,2	191	354	65,9	43,0
DAY FERRY	10,2	1,3	46	85	119,7	15,3
ROPAX	37,9	0,0	178	330	115,0	0,0
RORO	268,4	6,7	2 668	4 941	54,3	1,4

Table 34: consumption, distance and rate per kilometre per type of vessel

The table hereinbelow provides information on ship tonnage with load and the distances travelled with and without load, in addition to the deadweight of the ship studied.

Type of vessel	Outward journey (with load)	Unladen journey ("ballast condition", outward or return journey)	Return journey (with load)	Outward tonnage with load	Return tonnage with load	Deadweight indicated
	Miles	Miles	Miles	Tonnes	Tonnes	Tonnes
CAPESIZE	42 988	49 318	-	163 217	-	171 909
PANAMAX	3 576	3 708	-	70 000	-	78 000
HANDYMAX	31 808	31 808	-	52 601	-	55 427
HANDYSIZE	31 940	31 940	-	25 511	-	28 471
SEA-RIVER	362	362	-	4 960	-	5 190
VLCC	7 908	7 908	-	289 100	-	300 300
AFRAMAX	1 692	1 692	-	104 287	-	107 115
HANDY PRODUCT	31 328	31 936	-	31 290	-	36 941
SMALL PRODUCT OIL TANKER	553	435	-	14 277	-	16 000
SMALL LPG TANKER	53 123	54 898	-	3 801	-	6 625
VLGC	61 643	65 548	-	46 158	-	53 207
PC 800	1 180	-	1 336	6 129	2 060	10 884
PC 1600	12 035	-	11 607	12 012	9 734	21 264
PC 2200	3 692	-	4 260	25 025	13 170	30 804
PC 5500	11 052	-	9 892	33 920	56 578	70 738
PC 9500	11 286	-	11 210	55 257	92 123	113 067
NIGHT FERRY	92	-	99	1 161	1 433	3 832
DAY FERRY	23	-	23	2 470	2 223	5 700
ROPAX	89	-	89	1 729	1 729	6 300
RORO	1 334	-	1 334	1 976	1 976	5 928

Table 35: information on tonnage with load, distances with and without load and deadweights

Values are thus determined for the rate of load and rate of unladen journeys made, as presented in the table below.

Type of vessel	Load factor (loaded) FREIGHT	Rate of unladen journeys	"Rate of use of the means of transport (loaded and unladen)"
	%	%	
CAPESIZE	95 %	53 %	44 %
PANAMAX	90 %	51 %	44 %
HANDYMAX	95 %	50 %	47 %
HANDYSIZE	90 %	50 %	45 %
SEA-RIVER	96 %	50 %	48 %
VLCC	96 %	50 %	48 %
AFRAMAX	97 %	50 %	49 %
HANDY PRODUCT	85 %	50 %	42 %
SMALL PRODUCT OIL TANKER	89 %	44 %	50 %
SMALL LPG TANKER	57 %	51 %	28 %
VLGC	87 %	52 %	42 %
PC 800	36 %	0 %	36 %
PC 1600	51 %	0 %	51 %
PC 2200	61 %	0 %	61 %
PC 5500	63 %	0 %	63 %
PC 9500	65 %	0 %	65 %
NIGHT FERRY	34 %	0 %	34 %
DAY FERRY	41 %	0 %	41 %
ROPAX	27 %	0 %	27 %
RORO	33 %	0 %	33 %

Table 36: rate of load, unladen journeys and rate of use of the means of transport

Finally, the rate of use presented above is multiplied by the characteristic deadweight of the category of ship (presented in table 1). The number of units transported by the means of transport is thus obtained (including unladen journeys), expressed in tonnes.

Type of vessel	Deadweight	"Rate of use of the means of transport (loaded and unladen)"	"Number of units transported by the means of transport (including unladen journeys)"
	Total (tonnes)		Tonnes
CAPESIZE	180 000	44 %	79 589
PANAMAX	75 000	44 %	33 044
HANDYMAX	52 000	47 %	24 674
HANDYSIZE	28 500	45 %	12 768
SEA-RIVER	5 500	48 %	2 628
VLCC	300 000	48 %	144 406
AFRAMAX	100 000	49 %	48 680
HANDY PRODUCT	37 000	42 %	15 520
SMALL PRODUCT OIL TANKER	16 000	50 %	7 991
SMALL LPG TANKER	6 500	28 %	1 834
VLGC	53 000	42 %	22 283
PC 800	10 000	36 %	3 646
PC 1600	21 500	51 %	11 014
PC 2200	30 500	61 %	18 490
PC 5500	73 500	63 %	46 364
PC 9500	115 000	65 %	74 887
NIGHT FERRY	3 800	34 %	1 291
DAY FERRY	5 700	41 %	2 347
ROPAX	6 300	27 %	1 729
RORO	5 900	33 %	1 967

Table 37: number of units transported by the means of transport

e. Freight by road

General Information

The values are drawn directly from or established based on the following sources:

- surveys conducted by the Comité National Routier (CNR - French national road freight transport committee);
- road work group of the OEET (French Observatory for Energy, the Environment and Transport) - October and November 2011.

Using the results of the CNR surveys

The CNR surveys conducted in 2010 and available on the CNR Internet provide the following results:

Categories	Sub-categories	Litres per 100 km	Source	
Long-distance 40 tonnes	Tractor and semi-trailer 40 tonnes - Regional shipment of	34,2	CNR 2010	Regular surveys
Regional 40 tonnes	Tractor and semi-trailer 40 tonnes Regional - Shipment of miscellaneous goods	33,8	CNR 2010	Regular surveys
Regional Straight Trucks	Regional Straight Trucks - Shipment of miscellaneous goods	25,0	CNR 2010	Simulation
Specialities	26 t large volume tow truck	30,5	CNR 2010	Isolated surveys
Specialities	40 t large volume tow truck	37,9	CNR 2010	Isolated surveys
Specialities	40 t tractor and semi-trailer with refrigeration unit	33,2	CNR 2010	Isolated surveys
Specialities	40 t tractor and semi-trailer public works truck	42,7	CNR 2010	Isolated surveys
Specialities	Tractor and semi-trailer skip truck grain truck	40,5	CNR 2010	Isolated surveys
Specialities	35 t car carrier	37,0	CNR 2010	Isolated surveys
Specialities	40 t tractor and semi-trailer car carrier	37,3	CNR 2010	Isolated surveys
Specialities	40 t stainless steel liquid food tanker	35,3	CNR 2010	Isolated surveys
Specialities	40 t bi-tronconical liquid food truck	35,3	CNR 2010	Isolated surveys

Table 38: summary of the results of the CNR surveys (2010)

It should be noted that the value for a 40 t tractor and semi-trailer with refrigeration unit does not incorporate the quantity of energy consumed by the refrigeration unit.

This information has been almost entirely reproduced and completed in the following manner:

- the result of the "regional straight trucks" category has not been included;
- a "40 t tanker" category has been created using two "tanker" categories from the study;
- a value of 7 litres per 100 km has been proposed by the OEET for the quantity of energy consumed by the refrigeration unit for the "40 t tractor and semi-trailer with refrigeration unit";
- useful load values (or "maximum capacity of the means of transport") have been estimated:
  - 25 tonnes for tractors and semi-trailers weighing 40 tonnes;
  - 15 tonnes for car carriers weighing 35 t;
  - 12 tonnes for large volume tow trucks weighing 26 t.
- finally, hypotheses have been added by the OEET for the rate of use of the means of transport (with and without load, in relation to useful load):
  - 50 % for standard cases;
  - 40 % for car carriers weighing 35 t.
- the number of units transported has been calculated by multiplying the maximum capacity of the means of transport by the rate of use.

This gives the following table:

Category of means of transport	Use of the means of transport		Maximum capacity of the means of transport (goods)	"Rate of use of the means of transport (loaded and unladen)"	Energy source consumption rate per kilometre		"Number of units transported by the means of transport (including unladen journeys)"
					source 1	source 2	
Tractor and semi-trailer 26 tonnes	26 t large volume tow truck		12.0 t	50 %	0.305 ℓ/km		6.00 t
Tractor and semi-trailer 35 tonnes	35 t car carrier		15.0 t	40 %	0.370 ℓ/km		6.00 t
Tractor and semi-trailer 40 tonnes	Regional shipment of	miscel-laneous goods	25.0 t	50 %	0,342 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	Regional shipment of	miscel-laneous goods	25.0 t	50 %	0.338 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	40 t large volume tow truck		25.0 t	50 %	0.379 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer with refrigeration unit		25.0 t	50 %	0.332 ℓ/km	0.070 ℓ/km	12.50 t
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer public works truck		25.0 t	50 %	0.427 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	Large volume tractor and semi-trailer grain truck		25.0 t	50 %	0.405 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer car carrier		25.0 t	50 %	0.373 ℓ/km		12.50 t
Tractor and semi-trailer 40 tonnes	40 t tanker		25.0 t	50 %	0.353 ℓ/km		12.50 t

Table 39: consumption rate per kilometre and number of units transported for the categories of vehicle covered by the CNR survey

Additional categories and results from the OEET

The road work group expressed the need to provide additional categories for the following activities:

- parcel delivery: transfer, collection and distribution (using classic transport or transport in a refrigerated environment);
- express: transfer, collection and distribution ("mail, courier services" and "parcels");
- home moving;
- miscellaneous goods, use of 7,5 t and 12 t straight trucks.

The values for payload, rate of use (all journeys, including unladen journeys) and mean vehicle consumption have been proposed by the work group for these additional categories. These are provided in the following table:

Category of means of transport	Use of the means of transport			Maximum capacity of the means of transport	"Rate of use of the means of transport (loaded and unladen)"	Energy source consumption rate per kilometre		"Number of units transported by the means of transport (including unladen journeys)"
						Source 1	Source 2	
GVW 3,5 tonnes	Express	Collection distribution	Mail, courier services	1.3 t	20 %	0.160 ℓ/km		0.26 t
GVW 3,5 tonnes	Express	Collection distribution	Package	1.3 t	35 %	0.160 ℓ/km		0.46 t
Straight truck with a GVW of 19 tonnes	Express	Drive		10.0 t	25 %	0.270 ℓ/km		2.50 t
Tractor and semi-trailer 40 tonnes	Parcel delivery	Drive		25.0 t	24 %	0,342 ℓ/km		6.00 t
Straight truck with a GVW of 19 tonnes	Parcel delivery	Collection distribution		10.0 t	25 %	0.270 ℓ/km		2.50 t
Tractor and semi-trailer 40 tonnes with a refrigeration unit	Parcel delivery	Drive	Transport with a refrigeration unit	22.0 t	32,3 %	0,342 ℓ/km	0.070 ℓ/km	7.10 t
Straight truck with a GVW of 19 tonnes with refrigeration unit	Parcel delivery	Collection distribution	Transport with a refrigeration unit	8.5 t	38,8 %	0.270 ℓ/km	0.055 ℓ/km	3.30 t
7,5 t straight truck	Shipment of miscellaneous goods			3.0 t	30 %	0.220 ℓ/km		0.90 t
12 t straight truck	Shipment of miscellaneous goods			6.0 t	30 %	0.240 ℓ/km		1.80 t
Van 8 m^3	Removals			8.0 m^3	35 %	0.160 ℓ/km		2.8 m^3
Straight truck 45 m^3	Removals			45.0 m^3	35 %	0.270 ℓ/km		15.8 m^3
Tractor and semi-trailer 90 m^3	Removals			90,0 m^3	35 %	0,342 ℓ/km		31.5 m^3

Table 40: consumption rate per kilometre and number of units transported for the other categories of vehicle

Additional data relating to unladen journeys

The rate of use of the means of transport (loaded and unladen) can be obtained by combining the following two parameters:

- rate of unladen journeys;
- load factor of the means of transport (loaded).

According to the mathematical formula:

- rate of use = load factor loaded x (1 - rate of unladen journeys).

The corresponding values are provided in the following table.

Category of means of transport	Use of the means of transport			Maximum capacity of the means of transport	"Load factor of the means of transport (loaded)"	Rate of unladen journeys	"Rate of use of the means of transport (loaded and unladen)"
GVW 3,5 tonnes	Express	Collection distribution	Mail, courier services	1.3 t	25 %	20 %	20 %
GVW 3,5 tonnes	Express	Collection distribution	Package	1.3 t	44 %	20 %	35 %
Straight truck with a GVW of 19 tonnes	Express	Drive		10.0 t	31 %	20 %	25 %
Tractor and semi-trailer 40 tonnes	Parcel delivery	Drive		25.0 t	30 %	20 %	24 %
Straight truck with a GVW of 19 tonnes	Parcel delivery	Collection distribution		10.0 t	31 %	20 %	25 %
Tractor and semi-trailer 40 tonnes with a refrigeration unit	Parcel delivery	Drive	Transport with refrigeration unit	22.0 t	40 %	20 %	32,3 %
Straight truck with a GVW of 19 tonnes with refrigeration unit	Parcel delivery	Collection distribution	Transport with refrigeration unit	8.5 t	49 %	20 %	38,8 %
7,5 t straight truck	Shipment of miscellaneous goods			3.0 t	38 %	20 %	30 %
12 t straight truck	Shipment of miscellaneous goods			6.0 t	38 %	20 %	30 %
Tractor and semi-trailer 26 tonnes	26 t large volume tow truck			12.0 t	63 %	20 %	50 %
Tractor and semi-trailer 35 tonnes	35 t car carrier car carrier			15.0 t	50 %	20 %	40 %
Tractor and semi-trailer 40 tonnes	Shipment of miscellaneous goods	Long-distance		25.0 t	63 %	20 %	50 %
Tractor and semi-trailer 40 tonnes	Shipment of miscellaneous goods	Regional		25.0 t	63 %	20 %	50 %
Tractor and semi-trailer 40 tonnes	40 t large volume tow truck			25.0 t	63 %	20 %	50 %
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer with refrigeration unit			25.0 t	63 %	20 %	50 %
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer public works truck			25.0 t	100 %	50 %	50 %
Tractor and semi-trailer 40 tonnes	Large volume tractor and semi-trailer grain truck			25.0 t	100 %	50 %	50 %
Tractor and semi-trailer 40 tonnes	40 t tractor and semi-trailer car carrier			25.0 t	63 %	20 %	50 %
Tractor and semi-trailer 40 tonnes	40 t tanker			25.0 t	100 %	50 %	50 %
Van 8 m^3	Removals			8.0 m^3	58 %	40 %	35 %
Straight truck 45 m^3	Removals			45.0 m^3	58 %	40 %	35 %
Tractor and semi-trailer 90 m^3	Removals			90,0 m^3	58 %	40 %	35 %

Table 41: Rate of unladen journeys

The source used to estimate the rate of unladen journeys is the TRM 2011 survey (*see* tables hereinafter), for the category of services performed on behalf of others. The two tables below show that the rate is generally near 20 %. This value has therefore been selected, with the exception of the following cases:

- skip trucks and tankers: the rate proposed is 50 %;
- home moving: the rate proposed is 40 %.

in millions of vehicle-kilometres

Payload classes (in tonnes)	Total	Of which unladen	% unladen
Less than 4,6 t	163	33	20,5
4.6 t to 6.5 t	506	81	16,1
6.6 t to 8.9 t	696	127	18,3
9.0 t to 12.9 t	976	206	21,0
13,0 t to 16,9 t	602	186	30,9
17,0 t and above	150	72	48,0
Total	3 093	705	22,8

Source: SOeS, TRM 2011 survey, on behalf of others

Table 42: extract from the TRM 2011 survey, trucks (in detail)

in millions of vehicle-kilometres

Journeys	Types		
	Trucks	Road tractors and trailers	Total
Total	3 093	11 013	14 106
Of which with load	2 388	8 655	11 043
Of which without load	705	2 358	3 063
% unladen	22,8 %	21,4 %	21,7 %

Source: SOeS, TRM 2011 survey, on behalf of others

Table 43: extracts from the 2011 survey, trucks and road tractors and semi-trailers

6.2.2.2 Passenger transport

a. Passengers – Transport by air

The French Civil Aviation Authority (DGAC) provides a GHG aviation emissions calculator, which is available at the following address: https://eco-calculateur.dta.aviation-civile.gouv.fr

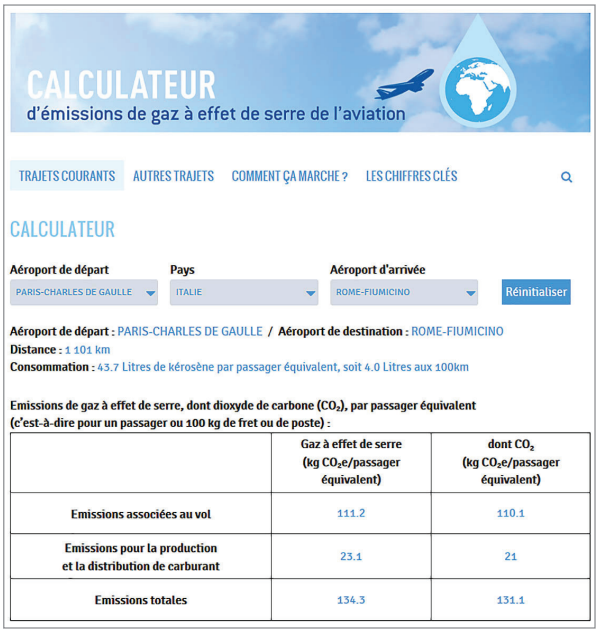


Figure 5: screenshot of the GHG aviation emissions calculator

Links involving France

The calculator contains approximately one thousand links; these links involve less than 2 flights per week departing from a location in France, operated for passenger transport and for the shipment of goods in the cargo hold (combined or passenger-only flights).

For each link taking place between two airports, the GHG emissions are estimated using a tool combining the international methods used for emissions inventories (CORINAIR and MEET), the engine emissions database of the OACI (containing approximately 300 engines) and air traffic data for each link characterised by the number of movements, type of aeroplane used, number of passengers and weight of the freight shipped. The CORINAIR and MEET methods model the emissions generated by more than 50 different aeroplanes.

This tool was developed by the Citepa (French Interprofessional Technical Centre for Studies on Air Pollution), a certified body producing emissions inventories.

This methodology enables the calculator to remain fully coherent with the national inventories, based on real fuel sales made on national territory. In other words, the GH_G emissions generated by air transport appearing in the national inventories are equal to the sum of the emissions calculated for each air link.

The consumption estimation is however provided with an uncertainty margin of approximately plus or minus 5%. This is due to:

- the type of aeroplane used: some links can be operated using aircraft that have not been modelled by the CORINAIR and MEET methods;
- the aircraft fill rate: this varies according to the flight, given that the data provided involves mean emissions for the relevant link, based on mean traffic and mean fill conditions;
- the route taken and weather conditions: for example consumption is higher for flights heading in a westwards direction than for flights heading eastwards under prevailing winds.

This tool is regularly re-assessed via communication with professionals in this sector.

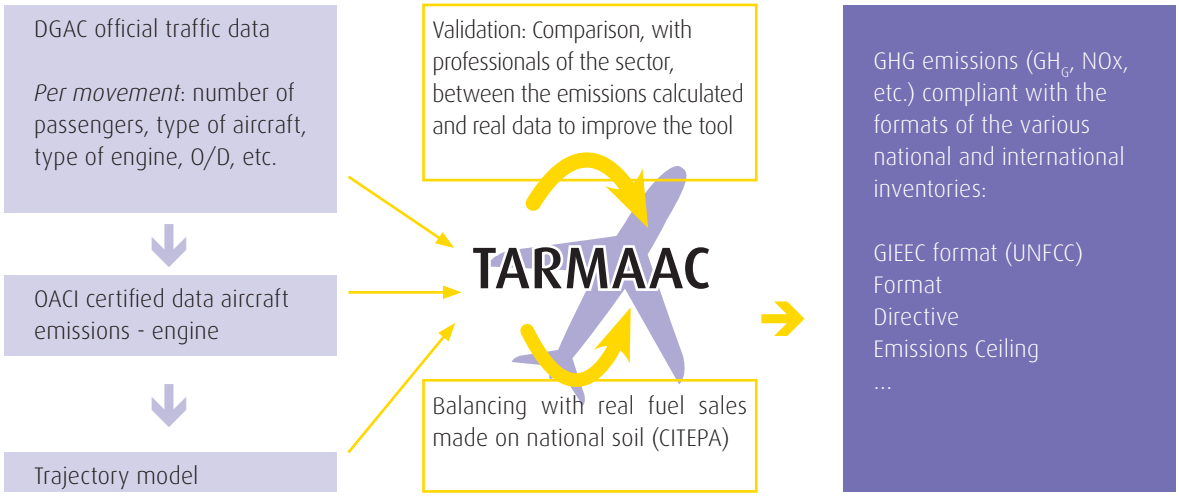


Figure 6: Figure 3: process for drawing up and improving the calculator

Links not identified by the calculator

For links not identified by the calculator, average values have been calculated according to 12 flight distance brackets and 5 types of aircraft (broken down into brackets according to the aircraft's passenger seating capacity).

Given the technical impossibility of some situations (for example an aircraft with 0 - 50 seats flying more than 9 000 km) or given the lack of observed cases in other situations (for example an aircraft with 100 to 180 seats providing a link over a distance of 6 to 7 000 km), 31 cases have been selected as important.

The information obtained for each of these 31 cases is as follows:

- the aircraft consumption rate (litres per 100 km);
- the mean number of passengers transported per flight.

The calculator consulted at the following address:
https://eco-calculateur.dta.aviation-civile.gouv.fr provides the corresponding results.

The table below presents the corresponding aggregate data, in litres of kerosene per passenger per kilometre for each of the 31 cases. (round values) (round values)

Consumption of kerosene (in litres per passenger-kilometre), broken down into distance brackets and aircraft category (capacity in number of seats) (round values)					
	Aircraft category				
Distance (km)	Less than 50 seats	50 to 100 seats	101 to 180 seats	181 to 250 seats	More than 250 seats
0 - 1 000	0,073	0,061	0,046	0,038	*
1 000 - 2 000	0,083	0,052	0,038	0,031	0,040
2 000 - 3 000	*	*	0,035	0,030	0,033
3 000 - 4 000	*	*	0,034	0,032	0,032
4 000 - 5 000	*	*	0,050	0,041	0,029
5 000 - 6 000	*	*	0,049	0,032	0,029
6 000 - 7 000	*	*	*	0,033	0,027
7 000 - 8 000	*	*	*	0,030	0,028
8 000 - 9 000	*	*	*	0,031	0,028
9 000 - 10 000	*	*	*	0,024	0,027
10 000 - 11 000	*	*	*	*	0,031
Over 11 000	*	*	*	*	0,031

Results drawn up based on the TARMAAC I calculator

*Table 44: Consumption of kerosene (in litres per passenger-kilometre), broken down into distance brackets and aircraft category (capacity in number of seats) / * : Non-significant values*

b. Passengers - Private cars: taxis, car transport service provided by a driver (VTC), private passenger car with driver (VPR)

Taxis and private hire vehicles are considered to essentially operate their activities in urban and extra-urban zones. The energy sources considered are diesel, petrol and E85 petrol.

Consultations with professionals in this sector show a consensus regarding an unladen journey rate of 50 %.

For the energy source consumption rate per kilometre, the service provider must note the value corresponding to its exact vehicle model and area of operation from the annual guide published by ADEME "Véhicules particuliers vendus en France - Consommations conventionnelles de carburant et émissions de GH_G". This conventional consumption must be increased by 20 % to represent real vehicle usage conditions (rise adopted following OEET meetings based on expert claims).

c. Passengers - Motorcycles: transport of passengers by chauffeur-driven motorcycle

The transport of passengers by chauffeur-driven motorcycle (and motorised scooter) almost exclusively takes place in urban areas. Two categories of engine sizes are differentiated as less than or greater than 750 cm^3, using petrol as an energy source. The rate of unladen journeys is set at 50 % according to expert claims. The values of the consumption rate per kilometre are derived from the ADEME-Deloitte (2007) study on environmental and energy efficiency of modes of transport:

Calculated data	Unit consumption per engine size and per geographic zone (L/100 km)			
Source data	ARTEMIS simulation			
	Consumption calculation - Artemis			
L/100 km	Urban (30 km/h)	Peri-urban (60 km/h for < 150 cm^3, 70 km/h for > 150 cm^3)	Regional (90 km/h for < 150 cm^3, 105 km/h for > 150 cm^3)	Inter-regional (120 km/h for > 150 cm^3)
2 stroke < 150 cm^3	6,5	4,9	6,4	-
4 stroke 150 - 250 cm^3	4,0	3,4	5,5	6,9
4 stroke 250 - 750 cm^3	6,0	5,2	7,4	8,9
4 stroke > 750 cm^3	7,2	5,8	6,5	7,7

Table 45: motorcycle unit consumption per engine size and per geographic zone

d. Passengers - Urban and interurban transport networks

The urban and interurban transport networks are divided into combustion-powered and electricity-powered transport modes. Combustion-powered modes correspond to uses according to three classes of town:

- Class 1: towns with more than 250 000 inhabitants;
- Class 2: towns with 100 000 to 250 000 inhabitants;
- Class 3: towns with more than 100 000 inhabitants;

Electricity-powered modes are only present in class 1 and 2 town networks.

The data used is that derived from the annual "Cahiers Verts" survey, jointly conducted by the DGITM/CERTU, the GART and the UTP. If the information on the energy used is insufficient, this information was cross-checked with the "Parc" survey conducted by the UTP on the 1st of January 2010.

Data regarding the journeys made only differentiates between journeys made by metro, tram, demand-responsive transport services and the transport of disabled passengers from all possible journeys made (does not differentiate according to the type of bus).

Data regarding fuel consumption corresponds to all services in each category of fuel.

Demand-responsive transport services and the transport of disabled passengers, which generate little traffic but travel long distances, are not identified in a specific manner.

The journey hypotheses made are derived from the UTP internal survey:

Average journey assumptions in km		
UTP internal survey, excluding Ile-de-France		
Class 1	Class 2	Class 3
Towns with more than 250 000 inhabitants	Towns with 100 to 250 000 inhabitants	Towns with less than 100 000 inhabitants and inter-urban zones
3,62	3,64	3,70

Table 46: average journey assumptions selected for the three classes of town and inter-urban zone

Combustion-powered modes of transport

For combustion-powered modes (town classes 1, 2 and 3), a single theoretical combustion-engine vehicle is defined, systematically using diesel and NGV as energy sources. A consumption rate for both energy sources is calculated; a corrective factor is calculated and applied to proportionally incorporate the share of GHG emissions generated by the fuels not taken into account (marine diesel oil, petrol, LPG).

The results are as follows:

Class 1 networks

	Gross rates (before correction)			Corrected rates		
No. of kilometres	Average No. of passengers transported	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)	Correction factor	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)
260 249 088	11,24	0,442	0,078	1,041	0,460	0,081

Class 2 networks

	Gross rates (before correction)			Corrected rates		
No. of kilometres	Average No. of passengers transported	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)	Correction factor	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)
150 633 384	9,95	0,441	0,051	1,055	0,465	0,054

Class 3 networks

	Gross rates (before correction)			Corrected rates		
No. of kilometres	Average No. of passengers transported	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)	Correction factor	Consumption rate per km 1 (diesel in litres)	Consumption rate per km 2 (NGV in litres)
83 862 248	7,94	0,421	0,021	1,026	0,432	0,021

Table 47: diesel and NGV consumption rates for the three classes of town

Electricity-powered modes of transport

Similarly, to cover all electricity-powered modes of transport in town classes 1 and 2, a theoretical electricity-powered vehicle is defined. The same type of calculation is performed to determine the average number of passengers transported and an electricity consumption rate.

Class 1 networks

No. of kilometres	Average No. of passengers transported	Consumption rate per km (electricity in kWh)
74 760 356	46,64	5,874

Class 2 networks

No. of kilometres	Average No. of passengers transported	Consumption rate per km (electricity in kWh)
4 452 047	20,10	2,597

Table 48: electricity consumption rate for class 1 and 2 town networks

e. Passengers - Ski lifts

The values presented are derived from a brochure entitled "Les points forts du transport par câble" published by the association "Le chaînon manquant".

f. Passengers - Trains

Data regarding TGVs, mainline trains and regional TER trains is provided by the SNCF.

g. Passengers - Ferries

Data regarding ferries is derived from the ADEME-MEDDTL-MLTC-Tecnitas study entitled "Efficacité énergétique et environnementale du transport maritime" (2009).

	Consumption (tonnes)		Journey		Outward journey (with load)	Unladen journey ("ballast condition", outward or return journey)	Return journey (with load)	Rate per kilometre (kg/km)	
	HFO	MDO	Miles	Km	Miles	Miles	Miles	HFO	MDO
NIGHT FERRY	23,3	15,2	191	354	92	-	99	66	43,0
DAY FERRY	10,2	1,3	46	85	23	-	23	120	15,3
ROPAX	37,9	0,0	178	330	89	-	89	115	0,0
RORO	268,4	6,7	2 668	4 941	1 334	-	1 334	54	1,4

Table 49: HFO and MDO consumption rate per kilometre for ferries

	Outward tonnage with load	Return tonnage with load	Outward passengers	Return passengers	Outward vehicles	Return vehicles	Dead-weight indicated	Loading rate (with load) freight	"Loading rate (with load) passengers"	"Loading rate (with load) vehicles"	Rate of unladen journeys
	Tonnes	Tonnes	Number	Number	Number	Number	Tonnes	%	%	%	%
NIGHT FERRY	1 161	1 433	423	423	159	155	3 832	34 %	38 %	58 %	0 %
DAY FERRY	2 470	2 223	300	300	300	300	5 700	41 %	16 %	43 %	0 %
ROPAX	1 729	1 729	485	485	224	224	6 300	27 %	23 %	74 %	0 %
RORO	1 976	1 976	-	-	-	-	5 928	33 %	-	-	0 %

Table 50: freight, passenger and vehicle loading rate and rate of unladen journeys for ferries

	Distribution key		
	Trucks	Cars	Passengers
NIGHT FERRY	28 %	18 %	54 %
DAY FERRY	24 %	16 %	60 %
ROPAX	32 %	14 %	54 %

Table 51: keys for distributing emissions between trucks, cars and passengers for ferries

6.3. Legal and regulatory texts

Article L. 1431-3 of the French transport code of February 24th 2011

"All persons organising or selling transport services for passengers, goods or moving purposes, must provide the beneficiary of the service with information regarding the quantity of carbon dioxide emitted by the mode(s) of transport used to perform this service.

The field and conditions for applying this provision, in particular the schedule for their implementation according to the size of the transport company concerned, the methods used to calculate the carbon dioxide emissions and the manner in which the beneficiary is informed of this information, are set by regulatory text.

The conditions for implementation of the obligation defined at the first paragraph, for journeys that depart from or travel to a location are out national territory, are explained when dispositions as part of competent european and international organisations will have been adapted."

25th October 2011 OFFICIAL JOURNAL OF THE FRENCH REPUBLIC Text 2 of 110

Decrees, Orders, Instructions

GENERAL TEXTS

MINISTRY OF ECOLOGY, SUSTAINABLE DEVELOPMENT, TRANSPORT AND HOUSING

Decree n° 2011-1336 of October 24th 2011 on information on the quantity of carbon dioxide emitted during transport services

NOR: *TRAT1112306D*

Publics affected: *public or private persons organising or selling a transport service (particularly transport firms, moving firms, taxis, hire firms for chauffeur cars or powered two- or three-wheeled vehicles, regional authorities providing transport services directly or groups thereof, messenger services, travel agencies); beneficiaries of such services.*

Purpose: *informing the beneficiary of the transport service of the quantity of carbon dioxide emitted by the means of transport used.*

Date of effect: *information must be provided from a date to be defined in an order by the Minister of Transport, depending on the means of transport and the size of the company, between 1st July and 31st December 2013.*

Notice: *the decree applies for 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 on their own behalf.*

The decree defines the principles of a common calculation method for all means of transport (rail or guided, road, inland, maritime, air). The decree specifies the procedure for informing the beneficiary. Orders by the Minister of transport shall provide details of specific elements for the method and particularly define the reference values to be used in calculations.

References: *this decree, enforcing article L. 1431-3 of the transport code, based on article 228 of law no 2010-788 of 12th July 2010 as a national commitment to the environment, can be viewed on the Légifrance site (http://www.legifrance.gouv.fr).*

The Prime Minister,

On the report by the Minister of Ecology, Sustainable development, Transport and Housing,
Having regard to directive 2008/101/EC of the European Parliament and the Council of 19th November 2008 modifying the directive 2003/87/EC in order to integrate air operations in the community greenhouse gas emission quota exchange system;
Having regard to the transport code, particularly article L. 1431-3;
Having regard to the environment code, particularly articles L. 229-5 to L. 229-19 and R. 229-37;
Having regard to the opinion of the Higher council of the merchant navy dated 17th March 2011;
Having regard to the National chamber of inland waterway artisan shipping companies dated 25th March 2011;
Having regard to the advisory commission for the assessment of standards dated 7th July 2011,

Declares the following:

Chapter I:
Scope

Article 1 - According to this decree, the term:
1° «Service provider»: refers to any person subject to the obligation mentioned in article 2;

2° «Beneficiary»: refers to the person purchasing the ticket for the transport of passengers, or, should no ticket exist, the passenger; refers to the co-contractor of the service provider for the transport of goods;

3° «Means of transport»: refers to any powered device used to transport passengers or goods using rail or guided, road, inland, maritime or air means of transport;

4° «Segment»: refers to any part of the route taken or to be taken by a transport service over which the person or goods is/are carried by the same means of transport;

5° «Source of energy»: refers to any fuel, electricity or any other type of energy used to run a means of transport.

Article 2 - Any private or public person organising or selling a transport service for passengers, goods or moving purposes carried out using one or several means of transport, departing from or travelling to France, shall be subject to the provisions of article L. 1431-3 of the transport code, with the exception of services organised on behalf of the private or public person.

Article 3 - I. — The information mentioned in article L. 1431-3 of the transport code relates to the quantity of carbon dioxide emitted in both the period of use of the means of transport and the upstream phase during which the energies required for the use of the means of transport are produced.

II. — The period of use includes all transport operations between the point of departure and destination of the transport service, and emissions during repositioning legs, empty legs and periods stopped with the engine running, in relation to these operations.

Secondary operations for transport services such as handling operations for goods or shortterm assistance for the means of transport, using devices other than the means of transport, the construction and maintenance of means of transport, and the construction and maintenance of infrastructures.

III. — The upstream phase includes extraction, biofuel production, refining, transformation, transport and the distribution of sources of energy.

Emissions in relation to the construction and maintenance of production equipment for sources of energy are not taken into consideration.

Chapter II:
Calculation method

Article 4 - The service provider shall identify the different segments for the transport service, assess the quantity of carbon dioxide for each segment and calculate the total of the values obtained in this way to prepare information on the quantity of carbon dioxide emitted in a transport service.

Article 5 - The service provider shall determine the quantity of the source of energy consumed for the service during the period of use to assess the quantity of carbon dioxide for one segment, by allocating one part to the beneficiary of the service, if several beneficiaries exist, and multiplying this part by the emission factor of the source of energy in question.

Emission factors can be used to convert a quantity of the source of energy into a quantity of carbon dioxide emitted for both the period of use and upstream phases, for each source of energy. The values of emissions factors are defined in an order by the Minister of Transport.

Service providers using a source of energy for which no emission factor is mentioned in the aforementioned order must justify the special value of the emission value applied. In this case, the service provider shall inform the beneficiary of the special nature of the calculation carried out in accordance with the provisions of article 11.

Article 6 - I. — The service provider shall multiply the amount of energy consumed per kilometre for the means of transport by the distance in question to assess the quantity of the source of energy consumed by a means of transport during the period of use.

II. — The service provider shall multiply the quantity of the source of energy consumed by the means of transport by the ratio between the number of units transported for the service and the number of units transported in the means of transport to allocate the appropriate part to the beneficiary for the service if several beneficiaries exist.

III. — The service provider shall use the following references to quantify the units transported:

1° For the transport of passengers: passengers;

2° For the transport of goods: mass, volume, surface area, linear metres or packages.

The gross mass of the goods should be considered.

For the mixed maritime transport of passengers and goods, the references indicated above are used after breaking down the consumption of the source of energy for the ship between passengers and goods based on the number of decks reserved for each category.

For the mixed air transport of passengers and goods, the service provider shall use mass as the reference value. Passengers are considered as a set mass per passenger. This set mass is defined in an order issued by the Minister of Transport.

Article 7 - The service provider may adapt the method indicated in article 6 if necessary and use one of the following references:

1° For the transport of passengers: the number of passengers multiplied by the distance, or journey;

2° For the transport of goods: mass multiplied by distance, or volume multiplied by distance, or surface area multiplied by distance, the number of linear metres multiplied by the distance or the number of packages multiplied by the distance.

The service provider may select other references in order to better reflect the particularities of its transport operations. In this case, the service provider shall inform the beneficiary of the special nature of the calculation carried out in accordance with the provisions of article 11.

Article 8 - I. — The service provider shall determine, on the one hand, the rate of consumption of the source of energy for the means of transport and, on the other hand, the number of units transported in the means of transport, according to the levels classified below in increasing order of precision:

Level 1: values defined in an order by the Minister of Transport;

Level 2: values calculated by the service provider as the mean for operations by its fleet of means of transport;

Level 3: mean values calculated by the service provider for sub-groups based on a complete breakdown of operations per logistics organisation, type of route, type of means of transport or any other appropriate complete breakdown;

Level 4: values measured or recorded by the service provider during the execution of the transport service.

II. — The service provider shall determine the procedure for integrating repositioning legs, empty legs, and emissions while stopped with the engine running.

III. — Mass transport services may, according to the conditions defined in the order of the Minister of Transport and for a limited period from the start of use, apply an objective value for the number of units transported using the means of transport. In this case, the service provider shall inform the beneficiary of the special nature of the calculation carried out in accordance with the provisions of article 11.

IV. — The service provider shall determine the period over which level 2 and level 3 mean values are calculated. This period may not exceed three years. The service provider shall update these mean values at the same intervals.

V. — Level 1 values may only be used:

1° By service providers with less than fifty employees;

2° By service providers with fifty or more employees, up to 1st July 2016;

3° By any service provider in the situations described in article 9.

Article 9 - I. — The information provided by the sub-contractor of a service provider and prepared in accordance with the provisions of this decree and its enforcement orders shall be included in the calculation method of the service provider without modification.

Should this information not be provided within the period ensuring compliance with the provisions of article 12 or should this information clearly be incorrect, the service provider shall recreate the information based on the level 1 values mentioned in article 8. The service provider shall inform the sub-contractor of this point.

II. — Should a service provider use a means of transport for which it has not yet recorded consumption of the source of energy, the service provider may:

1° Use data on the rate of consumption of the source of energy mentioned by the supplier of the means of transport;

2° Maintain the rate of consumption of the source of energy used prior to the arrival of the new means of transport in the fleet;

3° Use the level 1 values mentioned in article 8 for calculations specifically relating to this new means of transport.

The provisions of II apply for the period required for the service provider to measure and integrate consumption for the source of energy of the new means of transport into its calculation method. This period may not exceed the duration of the updating intervals for the mean values mentioned in point IV of article 8.

Article 10 - The conformity of the method implemented by a service provider with the provisions of this decree and its enforcement orders may be certified by an agency approved for this purpose by the French accreditation committee (COFRAC) or any other accreditation body having signed the multi-lateral European agreement in the context of the European cooperation for Accreditation (EA). An order by the Minister of Transport shall specify the procedure for the enforcement of this article.

Chapter III:
Informing the beneficiary

Article 11 - The information provided to the beneficiary includes the quantity of carbon dioxide expressed as a mass, corresponding to both the period of use and upstream phases. Providing information on the quantities of carbon dioxide emitted during the upstream phases and the period of use is optional.

If the method implemented by the service provider uses a source of energy for which the emission factor is not included in the ministerial order mentioned in article 5, or references other than those indicated in article 7, or an objective value of the number of units transported in the means of transport during the initial period of use of a mass transport service in application of point III of article 8, the «Special method» mention is notified to the beneficiary.

Article 12 - The service provider shall provide the beneficiary with sincere, clear and unambiguous information, by any means considered appropriate.

With goods transport services, the service provider shall provide the information on the date agreed between parties, or, failing this, within two months of the completion of the execution of the service.

With passenger transport services, the service provider shall provide the information prior to the purchase of the ticket, and if no ticket is issued, at the completion of the execution of the service at the latest.

With passenger transport with no indicated point of departure or destination or subject to a subscription or with no ticket issued, the information can take the form of a quantity of carbon dioxide for the journey or distance covered and must be notified on the basis of a display onboard the means of transport or in stations where passengers board the means of transport.

Article 13 - The service provider may provide the beneficiary with information explaining the calculation method and sources of energy used by any means considered appropriate.

If this information is not made available, the beneficiary is accorded a period of one month from the receipt of the information mentioned in article 12 to submit any request to the service provider in relation to the method used by the service provider to calculate the carbon dioxide emissions and the sources of energy used. The service provider shall provide the information required within two months of the receipt of the request.

Chapter IV:
Final provisions

Article 14 - The orders mentioned in articles 5, 6 and 8 were to be issued by the Minister of Transport before 1st January 2012.

The parties mentioned in article 2 are required to provide the information described in this decree from a date between 1st July 2013 and 31st December 2013, defined in an order issued by the Minister of Transport based on the means of transport and the size of the companies, by 31st December 2013 at the latest.

The Minister of Transport shall establish a report on the implementation of this decree before 1st January 2016, particularly on the application of part 2° of V of article 8. This report shall be made public.

Article 15 - The Minister of Ecology, Sustainable development, Transport and Housing, the Minister of the Interior, Overseas, Regional Authorities and Immigration and the Minister of Transport within the Ministry of Ecology, Sustainable development, Transport and Housing, are responsible for the enforcement of this decree, each in their respective fields. This decree shall be published in the Official Journal of the French Republic (JORF).

On 24th October 2011.

François Fillon

By the Prime Minister:
Minister of Ecology,
Sustainable development,
Transport and Housing,
Nathalie Kosciusko-Morizet

The Minister of the Interior,
Overseas, Regional authorities
and Immigration,
Claude Guéant

The Minister of Transport
within the Ministry of Ecology,
Sustainable development,
Transport and Housing,
Thierry Mariani

Decrees, Orders, Instructions

GENERAL TEXTS

MINISTRY OF ECOLOGY, SUSTAINABLE DEVELOPMENT, TRANSPORT AND HOUSING

TRANSPORTS

Order of April 10th 2012 taken in application of articles 5, 6 and 8 of decree no. 2011-1336 of October 24th 2011 on information on the quantity of carbon dioxide emitted during transport services

NOR: *TRAT1209296A*

Groups concerned: *public or private persons organising or selling a transport service (particularly transport firms, moving firms, taxis, firms operating private hire vehicles, chauffeur-driven touring cars and powered two- or three-wheeled vehicles, regional authorities providing transport services directly or groups thereof, messenger services, travel agencies); beneficiaries of such services.*

Subject: *setting the reference values to be used when calculating carbon dioxide emissions.*

Entry into force: *the information is supplied starting from 1st October 2013.*

Notice: *this order sets the reference values to be used in calculations: the emission factor values (article 1), the fixed mass value to use for a passenger in mixed passenger and freight air transport (article 2), the level 1 values (article 3) and the target values for new mass transport services (article 4).*

References: *this order, in application of articles 5, 6 and 8 of decree no. 2011-1336 of 24th October 2011 on information on the quantity of carbon dioxide emitted during transport services, can be consulted at the Légifrance website (http://www.legifrance.gouv.fr).*

The Minister of Transport within the Ministry of Ecology, Sustainable Development, Transport and Housing,
Having regard to the transport code, particularly article L. 1431-3; Having regard to decree no. 2011-1336 of 24th October 2011 on information on the quantity of carbon dioxide emitted during transport services;
Having regard to the meeting of the advisory commission for the evaluation of standards on january 5th 2012;

Orders:

Article 1 - For the application of article 5 of the above-mentioned decree of 24th October 2011, the emission factor values of the energy sources used by the modes of transport are set out in the table in appendix 1 of this order.

Article 2 - For the application of clause III of article 6 of the above-mentioned decree of 24th October 2011, the fixed mass value to use for a passenger, including luggage, in mixed passenger and freight air transport is set at one hundred kilograms.

Article 3 - I. - The level 1 values provided for in clause I of article 8 of the above-mentioned decree of 24th October 2011, except for the cases mentioned in clauses II and III below, are set out in the table in appendix 2 of this order.

Where two energy sources are given for the same means of transport, 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 taken from appendix 1 of this order and then adding the two numbers thus calculated.

II. - The level 1 values for per-kilometre energy source consumption rates for taxis, chauffeurdriven touring cars and private hire vehicles are those of the most recent edition on the date when the information was prepared of the document "Véhicules particuliers vendus en France- Consommations conventionnelles de carburant et des émissions de GH_G – Guide officiel1" for the relevant zone of activity defined below, increased by 20% to take account of vehicle performance under real traffic conditions.

The relevant zone of activity is:

- «urban», «mixed» or «extra-urban» for taxis and chauffeur-driven touring cars, depending on their dominant activity;
- «extra-urban» for private hire vehicles.

This document can be viewed and downloaded free of charge at the Environment and Energy Management Agency (ADEME) website at this address:

http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=52820&p1=028&p2=12&ref=17597

or obtained by post from the ADEME (20, avenue du Grésillé, BP 90406, 49004 Angers Cedex 11).

III. - The level 1 values for air transport are those indicated on the date when the information was prepared by the aviation carbon dioxide emissions calculator accessible free of charge at the transport ministry website at the address www.developpement-durable.gouv.fr/aviation/ecocalculateur or by post from the Civil Aviation Department (Direction générale de l'aviation civile, 50 rue Henry Farman, 75720 Paris Cedex 15).

Article 4 - For the application of clause III of article 8 of the above-mentioned decree of 24th October 2011, the service provider may use a target value for the number of units of freight transported by the means of transport for a period limited to three years from the date when a new mass transport service enters operation or an existing service is significantly improved in terms of frequency or capacity.

This target value is set:

- for maritime transport at 40% of the maximum capacity of the vessel expressed as a deadweight tonnage;
- for rail transport at 50% of the maximum carrying capacity of the train expressed in tonnes;
- for river transport at 65% of the maximum capacity of the boat or barge expressed as a deadweight tonnage.

Service providers using a target value for the number of units of freight transported in the means of transport must inform the Minister of Transport in the General Administration and Strategy Department of the General Directorate of Infrastructure, Transport and the Sea (Arche Sud, 92055 La Défense Cedex). They must provide a description of the mass transport service concerned, indicate the planned duration of use of the target value and the prospects for filling the means of transport envisaged following this period.

The report provided for in the third paragraph of article 14 of the above-mentioned decree of 24th October 2011 includes a review of the use of target values for mass transport services.

Article 5 - The Director General of Civil Aviation and the Director General of Infrastructure, Transport and the Sea are responsible for the enforcement of this order, each in their respective fields. The order shall be published in the Official Journal of the French Republic (JORF).

Signed on April 10th 2012

THIERRY MARIANI

APPENDICES

APPENDIX 1

VALUES OF EMISSIONS FACTORS FOR THE ENERGY SOURCES USED BY THE MEANS OF TRANSPORT

(Article 5 of decree no. 2011-1336 of 24th October 2011)

(in kilograms of carbon dioxide per unit of measurement of the quantity of the energy source)

NATURE of the energy source	DETAILED TYPE of the energy source	UNIT OF MEASUREMENT of the quantity of the energy	EMISSION FACTOR		
			Initial phase	Operating phase	Total
Electricity	Consumed in mainland France (excluding Corsica)	kilowatt-hour	0,053	0,000	0,053

NATURE of the energy source	DETAILED TYPE of the energy source	UNIT OF MEASUREMENT of the quantity of the energy	EMISSION FACTOR		
			Initial phase	Operating phase	Total
	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 Guyana	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
Aviation fuel	Wide-cut jet fuel (Jet B)	litre	0,488	2,480	2,968
	Aviation fuel (avgas)	litre	0,488	2,480	2,964
	Kerosene (Jet A1 or Jet A)	litre	0,480	2,520	3,000
Automotive fuel	Pumped petrol (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	1,71
	Marine butane	kilogram	0,35	2,92	3,27
	Marine propane	kilogram	0,35	2,94	3,29

NATURE of the energy source	DETAILED TYPE of the energy source	UNIT OF MEASUREMENT of the quantity of the energy	EMISSION FACTOR		
			Initial phase	Operating phase	Total
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

APPENDIX 1

LEVEL 1 VALUES

(article 8 of decree no. 2011-1336 of 24th October 2011)

Goods transport

Rail transport (*)

DESCRIPTION (according to the density of the goods transported and the energy source used)	NUMBER OF UNITS TRANSPORTED by the means of transport(1)	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)(2)
Goods with density less than or equal to 249 kilograms per cubic metre		
Electricity	400 tonnes	16,60 kilowatt-hours/km
Non-road diesel		3,85 kg/km
Mixed: Electricity/non-road diesel		Electricity: 14,94 kilowatt-hours/km Non-road diesel: 0,38 kg/km
Goods with density between 250 and 399 kilograms per cubic metre		
Electricity	520 tonnes	16,74 kilowatt-hours/km
Non-road diesel		3,88 kg/km
Mixed: Electricity/non-road diesel		Electricity: 15,07 kilowatt-hours/km Non-road diesel: 0,39 kg/km
Goods with density greater than or equal to 400 kilograms per cubic metre		
Electricity	600 tonnes	16,68 kilowatt-hours/km
Non-road diesel		3,86 kg/km
Mixed: Electricity/non-road diesel		Electricity: 15,01 kilowatt-hours/km Non-road diesel: 0,39 kg/km

(1) The number of units transported takes empty trips into account.
(2) 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 the two numbers thus calculated.

(*) The level 1 values in this table apply regardless of the train's carrying capacity. They are determined based on a full train of 1 000 tonnes.

River transport

DESCRIPTION (according to the nature and capacity of the means of transport)	NUMBER OF UNITS TRANSPORTED by the means of transport (1)	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)
Self-propelled with capacity less than 400 tonnes of deadweight tonnage Non-road diesel	207 tonnes	6,30 litres/km
Self-propelled with capacity between 400 and 649 tonnes of deadweight tonnage Non-road diesel	331 tonnes	7,30 litres/km
Self-propelled with capacity between 650 and 999 tonnes of deadweight tonnage Non-road diesel	497 tonnes	8,30 litres/km
Self-propelled with capacity between 1 000 and 1 499 tonnes of deadweight tonnage Non-road diesel	773 tonnes	12,20 litres/km
Self-propelled with capacity greater than 1 500 tonnes of deadweight tonnage Non-road diesel	1 214 tonnes	19,90 litres/km
Pusher tug with barge(s)(2) with capacity less than 590 kW Non-road diesel	1 214 tonnes	9,40 litres/km
Pusher tug with barge(s)(2) with capacity between 590 and 879 kW Non-road diesel	1 270 tonnes	14,40 litres/km
Pusher tug with barge(s)(2) with capacity greater than or equal to 880 kW (excluding container transport) Non-road diesel	2 208 tonnes	28,40 litres/km
Pusher tug with barge(s)(2) with capacity greater than or equal to 880 kW (container transport) Non-road diesel	2 208 tonnes	28,40 litres/km
(1) The number of units transported takes empty trips into account, (2) The level 1 values in this line of the table apply regardless of the number of barges being pushed,		

Maritime transport

DESCRIPTION (according to the nature and capacity of the vessel)	NUMBER OF UNITS TRANSPORTED by the means of transport (1)	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)(2)
Handysize bulk vessel deadweight tonnage less than 40 250 tonnes	12 800 tonnes	Heavy fuel oil: 39,20 kilograms/km Marine diesel oil (3)
Handymax bulk vessel deadweight tonnage between 40 250 and 63 499 tonnes	24 700 tonnes	Heavy fuel oil: 39,70 kilograms/km Marine diesel oil (3)
Panamax bulk vessel deadweight tonnage between 63 500 and 127 500 tonnes	33 000 tonnes	Heavy fuel oil: 49,40 kilograms/km Marine diesel oil (3)
Capesize bulk vessel deadweight tonnage greater than 127 500 tonnes	79 600 tonnes	Heavy fuel oil: 79,80 kilograms/km Marine diesel oil (3)
Small product oil tanker deadweight tonnage less than 26 500 tonnes	7 990 tonnes	Heavy fuel oil: 55,00 kilograms/km Marine diesel oil: 0,50 kilograms/km

DESCRIPTION (according to the nature and capacity of the means of transport)	NUMBER OF UNITS TRANSPORTED by the means of transport (1)	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)
Handy product oil tanker deadweight tonnage between 26 500 and 68 499 tonnes	15 500 tonnes	Heavy fuel oil: 76,00 kilograms/km Marine diesel oil: 3,40 kilograms/km
Aframax oil tanker deadweight tonnage between 68 500 and 200 000 tonnes	48 700 tonnes	Heavy fuel oil: 72,50 kilograms/km Marine diesel oil (3)
VLCC oil tanker deadweight tonnage greater than 200 000 tonnes	144 000 tonnes	Heavy fuel oil: 133,00 kilograms/km Marine diesel oil (3)
Small LPG tanker	1 830 tonnes	Heavy fuel oil: 25,90 kilograms/km Marine diesel oil: 1,50 kilograms
VLGC gas tanker	22 300 tonnes	Heavy fuel oil: 90,00 kilograms/km Marine diesel oil (3)
Small bulk vessel/sea-river vessel	2 630 tonnes	Heavy fuel oil (3) Marine diesel oil: 12,80 kilograms/km
Container ship less than 1 200 TEU	3 650 tonnes	Heavy fuel oil: 32,30 kilograms/km Marine diesel oil: 0,80 kilograms/km
Container ship 1 200 to 1 899 TEU	11 000 tonnes	Heavy fuel oil: 66,30 kilograms/km Marine diesel oil (3)
Container ship 1 900 to 3 849 TEU	18 500 tonnes	Heavy fuel oil: 103,70 kilograms/km Marine diesel oil (3)
Container ship 3 850 to 7 499 TEU	46 400 tonnes	Heavy fuel oil: 174,00 kilograms/km Marine diesel oil (3)
Container ship greater than 7 500 TEU	74 900 tonnes	Heavy fuel oil: 210,50 kilograms/km Marine diesel oil (3)
Night ferry	1 290 tonnes	Heavy fuel oil: 18,45 kilograms/km Marine diesel oil: 12,04 kilograms/km
Day ferry	2 350 tonnes	Heavy fuel oil: 33,51 kilograms/km Marine diesel oil: 4,28 kilograms/km
Ro-Pax	1 730 tonnes	Heavy fuel oil: 32,20 kilograms/km Marine diesel oil (3)
Ro-Ro	1 970 tonnes	Heavy fuel oil: 54,30 kilograms/km Marine diesel oil: 1,40 kilograms/km

(1) The number of units transported takes empty trips into account.
(2) Where two energy sources are given, regardless of which are used for a particular service, 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 the two numbers thus calculated.
(3) Low indeterminate value, to be considered a null value.

Road transport

DESCRIPTION (according to the nature of the vehicle and the type of transport)(1) indicating the energy source(s) used	NUMBER OF UNITS TRANSPORTED by the means of transport(2)	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)(3)
light utility vehicle with GVWR(4) of 3,5 tonnes Express (letters, errands) Road diesel	0,26 tonnes	0,160 litres/km

DESCRIPTION (according to the nature of the vehicle and the type of transport)(1) indicating the energy source(s) used	NUMBER OF UNITS TRANSPORTED by the means of transport(2)	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)(3)
light utility vehicle with GVWR of 3,5 tonnes Express (parcels) Road diesel	0,46 tonne	0,160 litres/km
Straight truck with GVWR of 19 tonnes Express Road diesel	2,50 tonnes	0,270 litres/km
Tractor and semi-trailer with GCWR(5) of 40 tonnes Groupage Road diesel	6,00 tonnes	0,342 litres/km
Straight truck with GVWR of 19 tonnes Groupage Road diesel	2,50 tonnes	0,270 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes (refrigeration) Road/non-road diesel	7,10 tonnes	Road diesel: 0,342 litres/km Non-road diesel: 0,070 litres/km
Straight truck with GVWR of 19 tonnes Groupage (refrigeration) Road/non-road diesel	3,30 tonnes	Road diesel: 0,270 litres/km Non-road diesel: 0,055 litres/km
Straight truck with GVWR of 7,5 tonnes Miscellaneous freight Road diesel	0,90 tonnes	0,220 litres/km
Straight truck with GVWR of 12 tonnes Miscellaneous freight Road diesel	1,80 tonnes	0,240 litres/km
Tractor and semi-trailer with GCWR of 26 tonnes High volume Road diesel	6,00 tonnes	0,305 litres/km
Tractor and semi-trailer with GCWR of 35 tonnes Car transporter Road diesel	6,00 tonnes	0,370 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes Miscellaneous freight/long distance Road diesel	12,50 tonnes	0,342 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes Miscellaneous freight/regional Road diesel	12,50 tonnes	0,338 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes High volume Road diesel	12,50 tonnes	0,379 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes With refrigeration unit Road/non-road diesel	12,50 tonnes	Road diesel: 0,332 litres/km Non-road diesel: 0,070 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes Dump truck Road diesel	12,50 tonnes	0,427 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes Grain dump truck Road diesel	12,50 tonnes	0,405 litres/km
Tractor and semi-trailer with GCWR of 40 tonnes Container truck Road diesel	12,50 tonnes	0,373 litres/km

DESCRIPTION (according to the nature of the vehicle and the type of transport)(1) indicating the energy source(s) used	NUMBER OF UNITS TRANSPORTED by the means of transport(2)	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)(3)
Tractor and semi-trailer with GCWR of 40 tonnes Tanker Road diesel	12,50 tonnes	0,353 litres/km
Van 8 cubic metres Removals Road diesel	2,80 cubic metres	0,160 litres/km
Straight truck 45 cubic metres Removals Road diesel	15,80 cubic metres	0,270 litres/km
Tractor and semi-trailer 90 cubic metres Removals Road diesel	31,50 cubic metres	0,342 litres/km
(1) Refer to the line in the table closest to the vehicle used and the type of transport provided. (2) The number of units transported takes empty trips into account. (3) 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 the two numbers thus calculated.		

Passenger transport

Rail 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(1)	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)
High-speed train Electricity	285 passengers	20,0 kilowatt-hours/km
Main line train Electricity	188 passengers	20,0 kilowatt-hours/km
Regional express train Electricity	80 passengers	13,5 kilowatt-hours/km
Regional express train Non-road diesel	68 passengers	1,7 litres/km
(1) The number of units transported takes empty trips into account.		

Rail transport

DESCRIPTION	NUMBER OF UNITS TRANSPORTED by the means of transport (1)	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 litres/km
(1) The number of units transported takes empty trips into account.		

Guided 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(1)	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 electric vehicles (metro, tram, bus, funicular) Urban and peri-urban transport in towns with over 250,000 inhabitants	47 passengers	5,87 kilowatt-hours/km
All electric vehicles (tram, bus, funicular) Urban and peri-urban transport in towns with fewer than 250,000 inhabitants	20 passengers	2,60 kilowatt-hours/km
Cable car (8 seats) Electricity	4 passengers	2,24 kilowatt-hours/km
(1) The number of units transported takes empty trips into account.		

Maritime transport

DESCRIPTION (according to the nature of the vessel and the type of transport provided)	NUMBER OF UNITS TRANSPORTED by the means of transport(1)	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)(2)
Night ferry(3)	418 passengers	Heavy fuel oil: 35,59 kilograms/km Marine diesel oil: 23,22 kilograms/km
	157 cars	Heavy fuel oil: 11,86 kilograms/km Marine diesel oil: 7,74 kilograms/km
Day ferry(3)	304 passengers	Heavy fuel oil: 64,64 kilograms/km Marine diesel oil: 8,26 kilograms/km
	301 cars	Heavy fuel oil: 21,55 kilograms/km Marine diesel oil: 2,76 kilograms
Ro-Pax(3)	483 passengers	Heavy fuel oil: 62,10 kilograms/km Marine diesel oil(4)
	224 cars	Heavy fuel oil: 20,70 kilograms/km Marine diesel oil(4)
(1) The number of units transported takes empty trips into account. (2) Where two energy sources are given, regardless of which are used for a particular service, 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 the two numbers thus obtained. (3) The mass of carbon dioxide emitted for a service transporting passengers with a car is obtained by adding the value calculated for the passengers and the value calculated for the car. (4) Low indeterminate value, to be considered a null value.		

Road transport (A)

DESCRIPTION (according to the nature of the vehicle)	TRAVEL OR DISTANCE (article 12, paragraph 4 of decree no. 2011-1336 of 24th 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, chauffeur-driven touring car, private hire vehicle	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.	See clause II of article 3

DESCRIPTION (according to the nature of the vehicle)	TRAVEL OR DISTANCE (article 12, paragraph 4 of decree no. 2011-1336 of 24th 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)
Motorcycle with cylinder capacity greater than or equal to 750 cm^3 Automotive fuel		0,070 litres/km
Motorcycle or scooter with cylinder capacity less than 750 cm^3 Automotive fuel		0,060 litres/km

Road transport (B)

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(1)	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)(2)
Urban and peri-urban transport in towns with over 250 000 inhabitants	11 passengers	Road diesel: 0,460 litres/km Compressed natural gas for road vehicles: 0,081 litres/km
Urban and peri-urban transport in towns with 100,000 to 250 000 inhabitants	10 passengers	Road diesel: 0,465 litres/km Compressed natural gas for road vehicles: 0,054 litres/km
Urban and peri-urban transport in towns with fewer than 100 000 inhabitants/inter-city transport	8 passengers	Road diesel: 0,432 litres/km Compressed natural gas for road vehicles: 0,021 litres/km

(1) The number of units transported takes empty trips into account.
(2) 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 the two numbers thus calculated.

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Decrees, Orders, Instructions

GENERAL TEXTS

MINISTRY OF ECOLOGY, SUSTAINABLE DEVELOPMENT, TRANSPORT AND HOUSING

TRANSPORTS

Order of April 10th 2012 taken in application of article 14 of decree no. 2011-1336 of October 24th 2011 on information on the quantity of carbon dioxide emitted during transport services

NOR: *TRAT1209371A*

Publics affected: *public or private persons organising or selling a transport service (particularly transport firms, moving firms, taxis, firms operating private hire vehicles, chauffeur-driven touring cars and powered two- or three-wheeled vehicles, regional authorities providing transport services directly or groups thereof, messenger services, travel agencies); beneficiaries of such services.*

Purpose: *setting the date from which the beneficiary of the transport service is informed of the quantity of carbon dioxide emitted by the means of transport used.*

Date of effect: *information must be provided from the 1st of October 2013 as set by this order.*

Notice: *the date of effect provided for herein applies regardless of the means of transport or size of the company.*

References: *this order, taken in application of article 14 of decree no. 2011-1336 of 24th October 2011 on information on the quantity of carbon dioxide emitted during transport services, can be consulted at the Légifrance website (http://www.legifrance.gouv.fr).*

The Minister of Transport within the Ministry of Ecology, Sustainable Development, Transport and Housing,

Having regard to the transport code, particularly article L. 1431-3;
Having regard to decree no. 2011-1336 of 24th October 2011 on information on the quantity of carbon dioxide emitted during transport services;
Having regard to the meeting of the advisory commission for the evaluation of standards on 5th July 2012;

Order:

Article 1 - The date provided for in the second paragraph of article 14 of the above-mentioned decree of 24th October 2011 is set as the 1st of October 2013 for all means of transport and all sizes of the company.
Article 2 - The Director General of Civil Aviation and the Director General of Infrastructure, Transport and the Sea are responsible for the enforcement of this order, each in their respective fields. The order shall be published in the Official Journal of the French Republic (JORF).

On 10th April 2012.

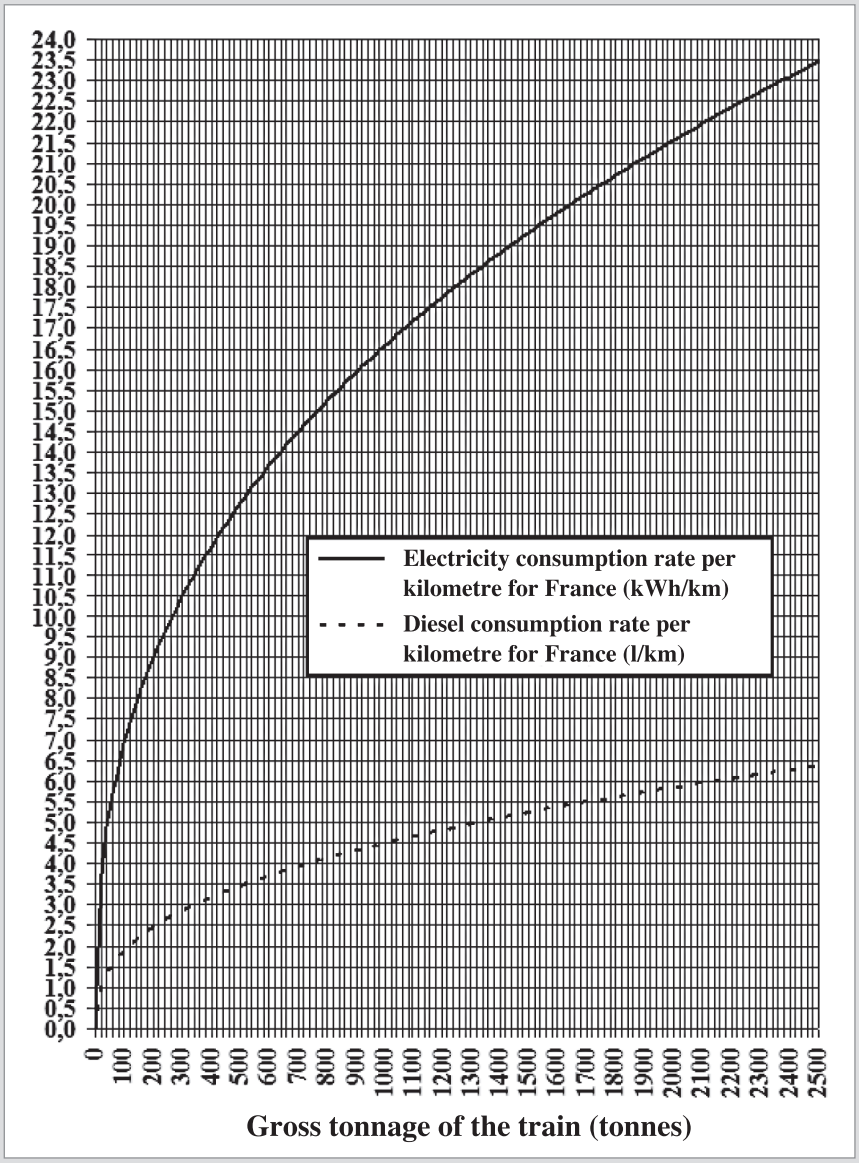
Thierry Mariani

6.4. Additional elements

6.4.1. Rail transport

Example of a consumption curve per weight

The illustration below is an example of execution (UIC) of an energy consumption curve (electricity and diesel) according to the gross weight of the train. This curve shows an energy consumption level according to the known total weight of the train (goods and light weight).



Glossary

Service provider (as defined in the French transport code)
Person providing transport services to a customer.

Beneficiary (as defined in the French transport code)
The person purchasing the ticket for the transport of passengers, or, should no ticket exist, the passenger; the co-contractor of the service provider for the shipment of goods.

Means of transport (as defined in the French transport code)
Any powered device used to transport passengers or goods using rail or guided, road, river, sea or air means of transport.

Leg (as defined in the French transport code)
Any part of the route taken or to be taken by a transport service over which the person or goods is/are carried by the same means of transport

Energy source (as defined in the French transport code)
Any fuel, electricity or other type of energy used to power a means of transport.

Twenty-foot equivalent unit (TEU)
Standardised unit (6,10 m) used to express a number of containers of various lengths and to describe the capacity of the terminals or container ships.

Orthodromic distance
The shortest theoretical distance between two points on the planet's surface, measured along a trajectory at the surface of the globe.

Shipping order
A shipping order is used for shipping goods. It represents the transport order executed between a beneficiary and a transport service provider. The shipping order more particularly defines the collection and destination point for the goods and the characteristics of the latter.

Energy source emission factor
An emission factor is a multiplier used to convert a quantity of energy into carbon dioxide or greenhouse gas emissions. The first part of the guide specifies the principles for producing greenhouse gases and associated principles for attributing values to the latter.

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