CO_2 INFORMATION FOR TRANSPORT SERVICES
GENERAL METHODOLOGY

VERSION DATED 2016 July 8th

1. CALCULATION METHODOLOGY

A. How to estimate the carbon footprint for your journey

1. Multiply the distance travelled by the average amount of CO_2 emitted per traveller per kilometre according to the type of train you take:
   - The distance is taken from the kilometric databases for the rail lines,
   - SNCF has four types of trains: **TGV, Intercités, TER and Transilien**; the type of train you use depends on your journey and departure time,
   - For each type of train, the average amount of CO_2 emitted per kilometre is calculated each year by dividing the energy consumption for the previous year (applying a CO_2 emission factor according to the type of energy) by the number of passengers carried for the previous year and the distance they travelled. The following formula is used:

     (Electricity consumption x CO_2 emission factor for electricity for transport use + Diesel consumption x diesel emission factor) / Passengers x km = Emission for a passenger by type of train expressed in **grams of CO_2/km**

The CO_2 emission for your journey is therefore:

Journey distance x CO_2 emission per kilometre for a passenger on this type of train

2. If you need to use several types of train to make your journey (e.g. taking a TGV then changing onto a TER), the CO_2 emission for your journey is the sum of the emissions for your TGV journey and the emissions for your TER journey

The CO_2 emission for your journey is therefore:

(journey distance by TGV x CO_2 emission per kilometre for a TGV passenger) + (journey distance by TER x CO_2 emission per kilometre for a TER passenger)

3. If you are a season ticket holder or if SNCF does not know how many journeys are actually made by the passenger, the information is sent to you in the form of the **emission for a passenger by type of train expressed in grams of CO_2/km** as given on the website: http://www.sncf.com/fr/train-emission-co2

The method used by SNCF complies with the methodology guide published by the French government for CO_2 information for transport services. This guide can be consulted at: http://www.developpement-durable.gouv.fr/Information-CO2-des-prestations-de.html

B. additional information

In accordance with article 13 of French decree No 2011-1336, SNCF provides the following additional information on the method of calculation and energy sources:

- SNCF is engaged in the activity of **passenger rail transport**,
- **The values used** for energy consumption and the number of passengers carried are of **level 3.** This means they are average values calculated by type of transport (in our case the types of train - TGV, Intercités, TER and Transilien),
- The consumption used is the **total energy consumption** for the previous year**, including line losses and all empty journeys**,
- We use the following energy sources:
    - **Electricity for transport use** with an emission factor of 53 gCO_2/kWh
    - **Non-road diesel** with an emission factor of 3.07 $kgCO_2$/Litre

These emission factors are laid down by the order of 10 April 2012 implementing Decree No 2011-1336 of 24 October 2011 concerning CO_2 information for transport services

2. EMISSIONS FOR A PASSENGER TRAVELLING ONE KILOMETRE

A. Emissions for SNCF passengers in 2016*:

Type of train	Emissions for a passenger travelling 1 km
Intercités	10.8 gCO_2
TGV, Lyria, iDTGV, OUIGO	3.2 gCO_2
Transilien / RER	5.8 gCO_2
TER	29.7 gCO_2

**based on energy consumption (Source: Réseau de transport d'électricités (Rte), 2015) and 2015 passenger figures*

B. Emissions for passengers on SNCF's international trains in 2016 :

Type of train	Emissions for a passenger travelling 1 km
Thalys	11.6 gCO_2
Eurostar	8.2 gCO_2
Elipsos	27 gCO_2
Gala	12 gCO_2
Alleo	11.3 gCO_2

Sources:

Actual passenger numbers and electricity consumption 2015 for each carrier;

Emission factor for transport electricity "France" (53 gCO_2/kWh) for kilometres travelled in France

Emission factor for transport electricity "Europe" (420gCO_2/kWh) or emission factors for railway electricity for the countries concerned when provided by traction electricity suppliers, for kilometres travelled in other countries. For further details visit: www.thalys.com and www.eurostar.com.

C. Emissions for SNCF Auto-Trains for 2016:

Emissions for a car, motorbike or scooter on Auto-Trains are calculated annually **for each Origin/Destination offered**, using the Ecotransit calculator (www.ecotransit.org), and production data for the previous year:

- Average net weight of the load (wagons + vehicles),
- Average number of vehicles carried on this Origin/Destination,
- Distance travelled.

All Auto-trains use electric traction.

The emissions for each Origin/Destination available by Auto-Train are detailed in the printed guide also available from the website autotrain.voyages-sncf.com/.

D. Emissions for SNCF passengers using road transport in 2016:

1. iDBUS

	Emissions for a passenger travelling 1 km
iDBUS	44.4 gCO_2

**based on fuel consumption and passenger numbers for 2015 - iDBUS*

2. TER coaches

Emissions for a passenger travelling 1 km are **displayed in each vehicle.** These figures are calculated by the coach company on the basis of actual consumption and passenger numbers. **If actual data are not available,** applying the methodology guide, these emissions are:

	Emissions for a passenger travelling 1 km
Interurban coaches	171 gCO_2

*Source: **Ministère du Développement durable et de l'énergie** [Ministry of Sustainable Development and Energy] "CO_2 information for transport services – Methodology Guide" 2012*

3. Taxis, chauffeured cars, transport on demand

Emissions per kilometre for a trip are **displayed in the vehicles**

These are calculated by the owner or company using:

- The consumption for the vehicle (make, model, year), the fuel used and the type of journey (urban, non-urban or mixed). Consumption figures for vehicles are available in the guides "**Conventional fuel consumption and CO_2 emissions** "produced by the ADEME each year and available on their website.
- The emission factors for the various types of road fuel including actual conditions of use of the vehicle and empty journeys, provided in the "CO_2 information for transport services – Methodology Guide" - Ministère du Développement durable et de l'énergie, 2012.

E. Emissions for RATP passengers in 2016 :

The website www.transilien.com provides passengers in the Île-de-France region with CO_2 information on their journeys, using any of the available transport means: Transilien, RER, Métro, Tram, Bus.

The figures used in our calculator for calculating CO_2 emissions for other transport modes are taken from the RATP methodology available on www.ratp.fr.

These figures are given here for information:

Other urban modes in Île-de-France	Emissions for a passenger travelling 1 km
Métro	3.8 gCO_2
Tramway	3.3 gCO_2
Bus	96.5 gCO_2

F. Emissions for other transport modes

1. Cars (2013 figures)

Sources:

Average car emission in France: ***ADEME*** *– Carbon Base*

Car occupation rates: ***STIF and DRIEA*** *– "Global Transport Survey in Île-de-France" 2010;* ***CGDD –*** *Mobility and the French, overview taken from the National Transport Survey", 2010*

Average emissions of a car in France	Average number of passengers per car		Emissions for a passenger travelling 1 km	Used by:
207 gCO_2/km	Île-de-France	1.28	162 gCO_2	Transilien
	Peri-urban journeys	1.4	148 gCO_2	TER
	Inter-urban journeys	2.3	90 gCO_2	IC and TGV

2. Inter-urban coaches

	Emissions for a passenger travelling 1 km
Inter-urban coaches	171 gCO_2

Source: Ministère du Développement durable et de l'énergie "CO_2 information for transport services – Methodology Guide" 2012

3. Domestic flights

The methodology guide recommends using the DGAC website (http://eco-calculateur.aviation-civile.gouv.fr/) to identify the emissions for a passenger on a particular route.

For example: the emissions for a passenger travelling 1 km on a 150-seat plane on an internal flight of less than 1000 km are:

	Emissions for a passenger travelling 1 km
Internal flights	168 gCO_2

Source: Ministère du Développement durable et de l'énergie "CO_2 information for transport services – Methodology Guide" 2012– For a 150-seat plane for a flight of less than 1000 km.

3. CO_2 EMISSIONS FOR CERTAIN JOURNEYS (2015 VALUES)

	Origin-Destination	**Rail distances* (km)**	**Emissions by train (kgCO2)**	**Alternative mode**	**Distances** (km)**	**Emissions (kgCO2)**
TGV	Paris - Lyon-Part-Dieu	512	1,64	Car :	466	41.5
	Paris – Marseille	863	2,76	Car :	776	69.1
	Paris – Bordeaux	581	1,86	Car :	583	51.9
	Paris – Lille	258	0,83	Car :	222	19.8
	Paris – Genève	503	1,61	Car :	540	48.1
	Paris – Strasbourg	503	1,61	Car :	489	43.5
	Paris – Nice	1108	3,55	Plane :	672	91***
	Paris – Rennes	372	1,19	Car :	350	31.2
	Paris – Toulouse	838	2,68	Plane:	571	87***
	Paris - Avignon	742	2,37	Car :	687	61.1
	Marseille – Lille	1165	3,73	Plane:	808	108***
	Lyon – Nantes	807	2,58	Car :	723	64.3
Intercités	Paris - Clermont-Ferrand	420	4,54	Car :	424	37.7
	Paris – Cherbourg	371	4,01	Car :	356	31.7
	Paris – Briançon	861	9,30	Car :	687	61.1
TER	Marseille - Toulon	67	0,39	Car :	33	4.9
	Poitiers - La Rochelle	147	0,85	Car :	109	16
	Bourgoin-Jallieu - Lyon-Part-Dieu	41	0,24	Car :	80	11.8
	Valencienne - Lille	48	0,28	Car :	52	7.6
	Caen - Bayeux	30	0,17	Car :	58	8.5
Transilien	Paris-Gare de Lyon - Juvisy (RER D)	20.3	0,60	Car :	21	3.4
	Paris-Montp – Versailles-Chantiers	14.5	0,43	Car :	26	4.2
	Paris-Nord - Ermont-Eaubonne	13.7	0,41	Car :	14	2.3
	Paris-St-Lazare - La Défense	6.45	0,19	Car :	8	1.3
	Magenta – Chelles-Gournay	17.5	0,52	Car :	21	3.4

* Ticket kilometres for TGV and IC; TER-SNCF.com and Transilien.com
** Mappy for cars, DGAC for planes
*** Emissions supplied by the DGAC calculator - August 2013

4. FURTHER INFORMATION

Further information on this methodology can be obtained by emailing developpement-durable@sncf.fr.

5. AUDITORS' REASONABLE ASSURANCE REPORT

This methodology received a reasonable assurance report from the auditors of PricewaterhouseCoopers in the Audit of may 2016.