

GREENHOUSE GASES INFORMATION FOR TRANSPORT SERVICES GENERAL METHODOLOGY

2022 VERSION



The GHG information (expressed in CO₂e, or CO₂-equivalent) is communicated to the passenger, before purchase, on the website: <https://www.sncf.com/en/booking-itinerary/itinerary>

The method used by SNCF complies with the methodology guide published by the French government for greenhouse gases information for transport services. This guide can be consulted at: <https://www.ecologie.gouv.fr/information-ges-des-prestations-transport>, reference of document : GHG information for transport services - Methodological guide (PDF - 17.87 Mo)

1. CALCULATION METHODOLOGY

A. Principles

1. Your journey carbon footprint is estimated by multiplying the distance travelled by the average amount of CO₂e emitted per traveller per kilometre according to the type of train you take. SNCF distinguishes 5 different types of train: **TGV INOUI**, **TGV OUIGO**, **Intercités**, **TER et Transilien**

For exemple, for a Paris-Strasbourg journey with TGV and suburban train, formula is:

journey distance by TGV INOUI x CO₂e emission per kilometre for a TGV INOUI passenger + journey distance by TRANSILIEN x CO₂e emission per kilometre for a TRANSILIEN passenger

- The distance is taken from the kilometric databases for the rail lines,
- For each type of train, the average amount of CO₂e emitted per kilometre is calculated each year by dividing the energy consumption for the previous year (applying a CO₂e 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 CO₂e 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 CO₂e/km**

$$\text{Traveller GHG emissions per type of train expressed in gCO}_2\text{e /km} = \frac{\sum \text{electricity consumption} \times \text{electricity emission factor} + \sum \text{diesel consumption} \times \text{diesel emission factor} + \sum \text{biodiesel consumption} \times \text{biodiesel emission factor}}{\sum \text{traveller. Kilometres}}$$

B. Methodological change for French electricity emission factor

Following a methodological change in French energy agency ADEME Base Carbone® for the electricity emission factor, SNCF has chosen to use the average national mix value and no longer a value per use for rail traction electricity. This choice allows us to harmonise with international practices. This results

in a 39% increase in the French emission factor (from 38.6 gCO₂e/kWh to 59.9 gCO₂e/kWh). For information, here are the values before/after recalculation:

	Intercités	TGV	Transilien	TER
2019 before electricity EF change	5,29 gCO ₂ e	1,73 gCO ₂ e	4,75 gCO ₂ e	24,81 gCO ₂ e
2019 after electricity EF change	6,73 gCO ₂ e	2,71 gCO ₂ e	7,04 gCO ₂ e	26,93 gCO ₂ e

C. Focus on sanitary crisis in 2021

Given the sanitary crisis in 2021, the traffic and energy consumption data for 2021 are not representative of SNCF activity.

For information, the global indicator for activity “Voyageurs” (traveller) per passenger-km decrease from 10 g CO₂e/pass.km to 9.2 g CO₂e/pass.km (-8%vs. 2019). This result is encouraging but the gap with 2019 remains significant (23% gap between 2019 and 2021)

So, in this note, we continue to use values relative to the year 2019.

D. upstream/manufacturing carbon impact

Between 2019 and 2021, French Energy Agency ADEME has set up a workgroup to calculate the carbon impact of vehicle manufacturing for inclusion in the transport emissions factors. SNCF has contributed to this workgroup. These factors are now available in ADEME's Base Carbone® in the “All data” category. However, these emission factors are not taken into account in the regulations of Article L1431.3 of the Transport Code and are therefore not applicable in the context of this "GHG Information".

E. Complementary 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:
 - o **Electricity for transport use** with an emission factor of 60.7 gCO₂/kWh in 2019 and 59.9 gCO₂e/kWh en 2020
 - o **Off road diesel** with an emission factor of 3.16 kgCO₂/Litre
 - o **Biodiesel B100** with an emission factor of 1.21 kgCO₂e/Litre

These emission factors are laid down by the order of 26 April 2017 implementing Decree No 2017-639 of 26 April 2017 concerning greenhouse gases information for transport services. They are updated on “Carbon database – Base carbone” in <http://www.bilans-ges.ademe.fr/> by French Energy Agency “ADEME” (English version of website is available).

2. EMISSIONS FOR A PASSENGER TRAVELLING ONE KILOMETRE

A. Emissions for SNCF passengers in 2019:

Type of train	Emissions for a passenger travelling 1 km
Intercités	6,73 gCO ₂ e
Trains Grande Vitesse (High-Speed Train)	2,71 gCO ₂ e
Whose TGV INOUI value	2,99 gCO ₂ e
Whose OUIGO value	1,15 gCO ₂ e
Transilien	7,04 gCO ₂ e
Train/RER (average value for IDF Mobilité)*	6,2 gCO ₂ e
TER	26,93 gCO ₂ e

Source : based on energy consumption (Source : Réseau de transport d'électricités (Rte), 2019) and 2019 passenger figures

* Weighted average of Ile de France Mobilité Trains managed by Transilien & RATP : values to use for all operators on Ile de France Territory

B. Emissions for passengers on SNCF's international trains in 2021 :

Type of train	Emissions for a passenger travelling 1 km
Thalys	7.32 gCO ₂ e
Eurostar	7,48 gCO ₂ e
LYRIA	3,23 gCO ₂ e
RENFE & SNCF in cooperation	6 gCO ₂ e
DB&SNCF in cooperation	5 gCO ₂ e
TGV InOui Italia	10,3 gCO ₂ e

Sources:

Actual passenger numbers and electricity consumption 2019 for each carrier;

Emission factor for transport electricity "France" (38,6 gCO₂e/kWh) for kilometres travelled in France

Emission factor for transport electricity are provided on <http://www.bilans-ges.ademe.fr/> by French Energy Agency "ADEME" or emission factors for railway electricity for the countries concerned when provided by traction electricity suppliers, for kilometres travelled in other countries or energy agencies ("[GOV.UK](http://gov.uk)" for United Kingdom) or on the basis of emission factors from International Energy Agency (IEA). For further details visit: www.thalys.com and www.eurostar.com.

C. Emissions for SNCF passengers on a road mode :

1. 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 is not available**, applying the methodology guide, these emissions are:

	Emissions for a passenger travelling 1 km
Coaches in France – Mixed value	29.5 gCO ₂ e

Source : Ademe carbon database Emission factor « Bus - Diesel »

	Emissions for a passenger travelling 1 km
Interurban coaches	146 gCO ₂ e

Source: ADEME Carbon database update of emissions factor for “City bus - average - Urban area, < 100 000 inhabitants” which is also reference for interurban coaches on Ministère du Développement durable et de l’énergie [Ministry of Sustainable Development and Energy] “CO₂e information for transport services – Methodology Guide” 2018

2. Taxis, chauffeur-driven car, 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 CO₂e 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 “CO₂e information for transport services – Methodology Guide” - Ministère du Développement durable et de l’énergie, 2018.

D. Emissions for « Ile-De-France Mobilité », RATP & SNCF Transilien passengers in 2021:

In accordance with L1431-1 article of French transportation Code, Ile-De France (IDF) Mobilités, SNCF Transilien & RATP make available at passenger disposal, Information about GreenHouse Gas (GHG) emissions produced during their travel.

Transilien provides passengers in the Île-de-France region with CO_{2e} information on their journeys, using any of the available transport means: Transilien, RER, Métro, Tram, Bus. This information is determinate by indicators yearly updated and in accordance to current regulatory (decree n° 2017-639). The figures used in our calculator for calculating CO₂ emissions for other transport modes are taken from RATP. For its part, SNCF provides Transilien figure to RATP. With these data, average values for IDF Mobilité are calculated.

You can find these figures on these websites:

<https://www.vianavigo.com>

<https://www.ratp.fr/itineraires>

<https://www.transilien.com/fr/itineraire>

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 _{2e}
Tramway	3.4 gCO _{2e}
Train/RER	6.2 gCO _{2e}
Whose Transilien Value	7.04 gCO _{2e}
Bus (with “Noctilien”)	104 gCO _{2e}
Whose RATP	98 gCO _{2e}
Whose other operators	110 gCO _{2e}

E. Emissions for other transport modes

1. Cars

Sources: Average car emission in France & associated car occupation rate (short distance, long distance, average) : **ADEME** – Carbon Database

	Average emissions for a car in France for 1 km per vehicle	Average number of passengers per car	Emissions for a passenger travelling 1 km	Used by:
Average	0.178 gCO _{2e}	1.6	111 gCO _{2e}	Transilien
Short distance	0.185 gCO _{2e}	1.4	134 gCO _{2e}	TER
Long distance	0.163 gCO _{2e}	2.2	75 gCO _{2e}	IC and TGV

2. Inter-urban coaches

	Emissions for a passenger travelling 1 km
Inter-urban coaches	146 gCO ₂ e

Source: Ademe Carbon database update of emissions factor for “City bus - average - Urban area, < 100 000 inhabitants” which is also reference for interurban coaches on **Ministère du Développement durable et de l’énergie** [Ministry of Sustainable Development and Energy] “CO₂e information for transport services – Methodology Guide” 2018

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 specific travel flight.

For example: the emissions for a passenger travelling 1 km on a 101-220-seats plane on an internal flight of less than 1000 km are:

	Emissions for a passenger travelling 1 km
Short-haul average	141 gCO ₂ e
< 500km	167 gCO ₂ e
500-1000km	126 gCO ₂ e

Source: **ADEME** (Carbone Database), Passengers aircraft - short-haul flight, <500kms, 500-1000kms, 101-220 places, 2018 - Without contrails.

3. CO₂e EMISSIONS FOR CERTAIN JOURNEYS (2021)

	Origine-Destination	Rail Distances* (km)	Emission factor (gCO ₂ e/km/voy)	Emission by train (kgCO ₂ e)	Alternative mode	Distances** (km)	Emission factor*** (gCO ₂ e/km/voy)	Emission by alternative mode (kgCO ₂ e)
TGV	PARIS - LYON	563	2.99	1.7	Voiture	466	75	35.0
	PARIS - LILLE	258	2.99	0.8	Voiture	226	75	17.0
	BORDEAUX - PARIS	617	2.99	1.8	Voiture	587	75	44.0
	PARIS - RENNES	374	2.99	1.1	Voiture	350	75	26.3
	MARSEILLE - PARIS	883	2.99	2.6	Avion	627	141	88.4
	PARIS - STRASBOURG	503	2.99	1.5	Voiture	488	75	36.6
	PARIS - NICE	978	2.99	2.9	Avion	674	141	95.0
	PARIS - TOULOUSE	713	2.99	2.1	Avion	571	141	80.5
OUIGO	LYON - MARSEILLE	381	2.99	1.1	Voiture	314	75	23.6
	LILLE - LYON	794	2.99	2.4	Avion	558	141	78.7
	NANTES - PARIS	385	1.15	0.4	Voiture	386	75	29.0
	LYON - MARSEILLE	320	1.15	0.4	Voiture	314	75	23.6
	AVIGNON - MARNE LA VALLEE	697	1.15	0.8	Voiture	702	75	52.7
LYRIA	PARIS - GENEVE	692	3.23	2.2	Avion	408	141	57.5
THALYS	PARIS - BRUXELLES	314	7.32	2.3	Voiture	312	75	44.0
INTERCITES	CLERMONT FERRAND GARE - PARIS BERCY	420	6.73	2.8	Voiture	425	75	31.9
	LIMOGES - PARIS	400	6.73	2.7	Voiture	394	75	29.6
	BAYONNE - TOULOUSE	199	6.73	1.3	Voiture	300	75	22.5
TER	PARIS - TROUVILLE DEAUVILLE	281	26.93	7.6	Voiture	199	111	22.1
	GRENOBLE - LYON	131	26.93	3.5	Voiture	113	111	12.5
	MARSEILLE - NICE	218	26.93	5.9	Voiture	205	111	22.8
	GENEVE - LYON	129	26.93	3.5	Voiture	150	111	16.7
	ARCACHON - BORDEAUX	59	26.93	1.6	Voiture	72	111	8.0
Transilien	PARIS-GARE DE LYON - JUVISY (RER D)	20.3	6	0.1	Voiture	21	134	2.8
	PARIS-MONTP – VERSAILLES-CHANTIERS	14.5	6	0.1	Voiture	26	134	3.5
	PARIS-NORD - ERMONT-EAUBONNE	13.7	6	0.1	Voiture	14	134	1.9
	PARIS-ST-LAZARE - LA DÉFENSE	6.45	6	0.0	Voiture	8	134	1.1
	MAGENTA – CHELLES-GOURNAY	17.5	6	0.1	Voiture	21	134	2.8

* Values from OUI.SNCF comparator & Open data SNCF

** Mappy for cars, DGAC for planes

*** GHG Emission factors from ADEME database

4. FURTHER INFORMATION

Further information on this methodology can be obtained by emailing engagementsocietal-transitionecologique@sncf.fr.

5. AUDITORS' MODERATE ASSURANCE REPORT

The method for calculating gCO₂e/voy.km received a moderate assurance report from an independent third party organisation as part of the verification of SNCF's Extra-Financial Performance Statement in February 2022:

⇒ <https://www.sncf.com/en/finance/financial-publications-sncf>

⇒ SNCF Group Financial Report - 31 December 2021

⇒ Consult page 117 of this report