



Additional Information on Carbon Calculators



OTHER FOOTPRINT CALCULATORS COVERING DIFFERENT ASPECTS

1. TRAVEL & CLIMATE CALCULATOR (SWEDEN)

Travel & Climate is an easy-to-use webtool calculating the carbon footprint from travel to global destinations including local accommodation. It's been developed by Chalmers University (Gothenburg/Sweden) and promoted by Swedish agencies. Where applicable, different travel modes and accommodation types are compared with each other. Non-CO₂ effects are roughly accounted for, but a uniform

emission factor is used independent of flight type (or its load factor), aircraft type (i.e. the efficiency) and distance (i.e. potential for high-altitude effects).

The results for the trip are compared to a sustainable carbon budget and other indicators.

<https://travelandclimate.org/>

1.1 CARBON FOOTPRINT LTD CALCULATOR DEVELOPED ON UK DATA

One (commercial) **carbon footprint** calculator offers a free webtool for households. It has a separate module for air travel calculation. This includes an uplift factor for non-CO₂ effects and the choice between four different classes, i.e. seating area occupation. This is a reasonable abbreviation. In addition, carbon emissions related to electricity and heating consumption (“house”) can be calculated, as well as other transport means, and material consumption (“secondary”) covering diet, textiles, electronic equipment, services, recreational activities, and many more. Secondary

emissions are calculated based on the value of the goods or service category consumed multiplied with an upstream emission factor derived from the national consumption in the UK.

There is a commercial webtool to calculate the carbon footprint for companies.

The individual results are displayed by activity and compared to the average carbon footprint in different world regions and to a sustainable goal.

<https://www.carbonfootprint.com/calculator.aspx>

The screenshot shows the 'Flight carbon footprint calculator' interface. At the top, there are navigation icons (info, lightning bolt, person) and a language dropdown set to 'English (United States)'. Below this is a social media section with a 'Like' button and text '9.2K people like this. Sign Up to see what your friends like.' The main navigation bar includes 'Welcome', 'House', 'Flights', 'Car', 'Motorbike', 'Bus & Rail', 'Secondary', and 'Results'. The 'Flights' section is active, featuring a green airplane icon and the title 'Flight carbon footprint calculator'. Below the title, it says 'You can enter details for up to 3 flight itineraries'. The form includes radio buttons for 'Return trip' (selected) and 'One-way flight'. Input fields for 'From:', 'To:', and 'Via (optional):' are present. The 'Class:' dropdown is set to 'Economy class', and the 'Trips:' input is '1'. A checkbox for 'Click to include radiative forcing' is checked, with a link 'what's this?'. A green button 'Calculate & Add To Footprint' is below the form. A summary box shows 'Total Flights Footprint = 0.00 metric tons of CO₂e' and an 'Offset Now' button. Navigation buttons '< House' and 'Car >' are at the bottom. A footer link reads 'add our CO₂ calculation tools to your website'.

1.2 AIRLINE/ICAO CALCULATOR

Airlines widely use the ICAO¹ calculator; it is often used for flight emission offsetting. The calculator is easy to use by entering origin and destination. However, its key deficit is that it only counts carbon dioxide (CO₂) emissions, and omits half or even two-thirds of the climate footprint by not accounting for and not even mentioning indirect and non-CO₂ effects. Moreover, the calculator assumes a full economy seating arrangement. This means that a flight's emissions are distributed on the maximum number of passengers, and thus become minimal on a per passenger

basis. However, airlines do have diverse seating arrangements with various seating classes and occupying spaces. Therefore, in reality, emission per capita will almost always be higher than assumed here.

WE DO NOT RECOMMEND USING THE ICAO CALCULATOR as its results are misleading.

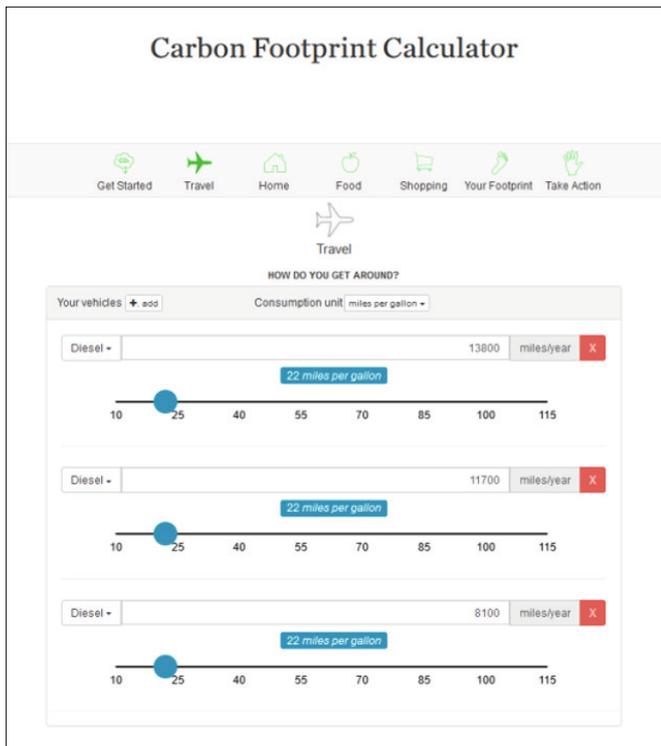
<https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>

One Way/Round Trip		Cabin Class		Number of Passengers
Round Trip		Economy		1
Leg	From City/Airport		To City/Airport	
1				
Delete All Location(s)	Delete Leg		Add New Leg	
Reset		Compute		
Metric (KG / KM)	Standard (LBS / MI)			

¹ ICAO: International Civil Aviation Organisation, a UN body for international flight agreements.

1.3 CARBON FOOTPRINT CALCULATOR FROM THE NATURE CONSERVANCY, DEVELOPED ON USA DATA

A carbon footprint calculator developed by The Nature Conservancy offers a similar scope with default data specific for the USA. It is useful for this country but hard to use outside. <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/>



1.4 NOS GESTES CLIMAT: CARBON FOOTPRINT CALCULATOR FOR FRANCE

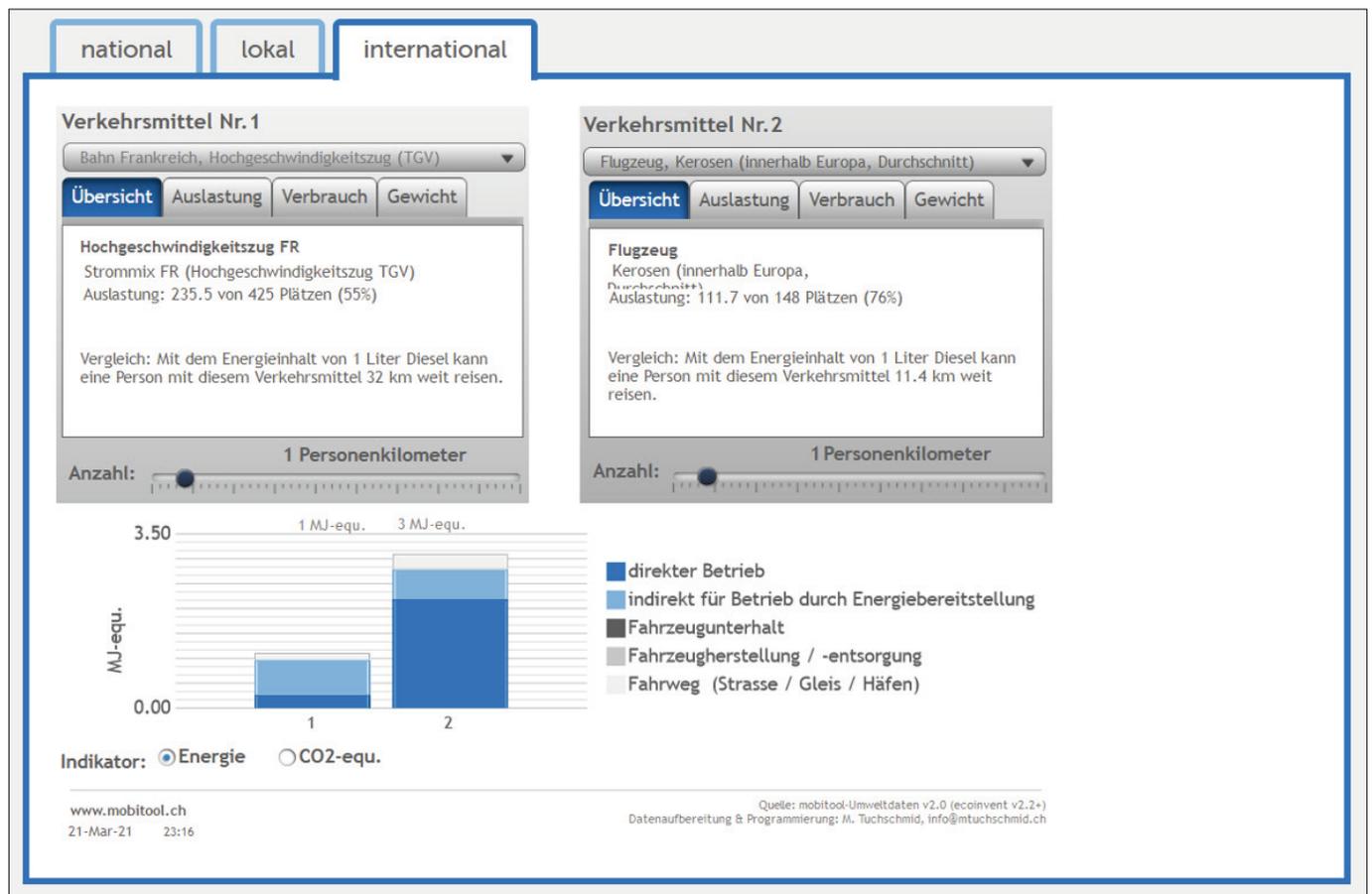
[nos_GESTes_climat](https://nosgestesclimat.fr) is a household footprint calculator developed by Avenir climatique and TaCa (a member of Stay Grounded) and now proposed by the French Agency for Environment and Energy Savings (ADEME). It is based on default values for France and comprises air travel (short-, medium- and long-haul) as part of the mobility assessment. Air travel includes a non-CO₂ uplift factor. <https://nosgestesclimat.fr/simulateur/bilan>



1.5 MOBITOOL: LIFE CYCLE TRANSPORTATION FOOTPRINT FOR COMPANIES (SWITZERLAND)

Mobitool has been developed for the travel management of companies notably in Switzerland (languages: German and French). Interestingly, this calculator not only includes emissions from the vehicles' operation, i.e. fuel consumption, but also from the production of the vehicle and infrastructure used. This is a unique life cycle approach.

<https://www.mobitool.ch/de/tools/vergleichsrechner-v2-0-15.html>



COMPARING RESULTS BETWEEN DIFFERENT CALCULATORS

The different calculators reviewed here operate on different assumptions. Important parameters are:

- The **fuel consumption** for the trip; here ICAO is often regarded as an authoritative source. Atmosfair and ICAO agree well for the medium haul flight. For the long-haul flight ICAO just assumes an unrealistically high seating density, ignoring anything else but economy seats. Atmosfair would return the same result with this same assumption; however, assuming an average seating arrangement with a mix of economy, business and first class seats results in almost twice as high emissions.
- **Ignoring the non-CO₂ effects** (as ICAO) leads to very low and potentially misleading results. This is particularly relevant for long-haul flights. The CO₂ emissions as calculated by ICAO are almost four times lower than the CO₂ plus non-CO₂ emissions as calculated by atmosfair. All but the ICAO calculator use an uplift factor of 1.9 to include non-CO₂ effects (in particular ozone and contrail formations) from high altitude flights.
- The **load assumption** is crucial. This is related to the assumed seating arrangement, i.e. the mix between economy and business class seats. In consequence it determines the number of passengers on which the flight's impact is distributed.
- **Other assumptions** refer to a prolongation of the flight distance due to detour from the great circle distance and possible holdings; there might be an add-on to account for emissions from the provision of fuels; assumptions between cargo and passenger loads. These effects typically affect the results by about 10% to 20%.

SUMMARY COMPARISON BETWEEN ATMOSFAIR AND ICAO CALCULATORS

	Atmosfair	ICAO
Destinations	Global	Global
One-way return	Yes Yes	Yes Yes
Intermediate stops	Yes	Up to 2
Non-CO ₂ effects	Yes	No
Choice of classes	4: first business premium economy economy	2: premium economy
Occupancy load factor	Seating & load factors differentiated by airline	Only economy seating; industry wide load average
Type of flight	Scheduled charter	Scheduled
Choice of aircraft type	Yes, >120	Default mix
Airline	Comparison of results	n.a.

COMPARISON OF RESULTS OF DIFFERENT CALCULATORS

	Medium haul: Frankfurt Rome	Long haul: London New York
km/nm (great circle)	2000 1250 kg CO ₂ kg CO ₂ -eq	11200 7000 kg CO ₂ kg CO ₂ -eq
atmosfair	214 529	1233 2346
ICAO	207 na ^a	671 ^b na ^a
ecopassenger (UIC)	158 273	na ^c na ^c
Carbon Footprint (UK)	140 270	860 1620
CO ₂ -Rechner (UBA DE)	na ^d 390	na ^d 2450
Travel & Climate (SE)	na ^d 313	na ^d 1816

Comparison of CO₂ and CO₂-eq emissions from a medium- and a long-haul flight between different footprint calculators.

Remarks: Direct CO₂ emissions stem from the combustion of the aviation kerosene. CO₂-eq emissions account for non-CO₂ effects contributing to global warming, notably through the formation of ozone, contrails and cirrus clouds.

a: ICAO does not consider other than direct CO₂ emissions.

b: ICAO assumes maximum seating and therefore returns least emissions per passenger. This result is the absolute minimum. All other calculators assume seating mixed between economy and premium class, and therefore have higher emissions per passenger.

c: Out of scope for **ecopassenger** which focuses on destinations in Europe.

d: Results only available with non-CO₂ effects included.



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Author: Jens Borken-Kleefeld

Editor: Michaela Leitner

Layout: Katharina Lutzky & Alexander Neubauer

c/o Kollektiv Periskop

Neustiftgasse 36

1070 Vienna, Austria

www.stay-grounded.org

info@stay-grounded.org

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