

US EPA ARCHIVE DOCUMENT

US EPA's Greenhouse Gas Equivalencies Calculator

September 2008



Greenhouse Gas Equivalencies Calculator | Clean Energy | US EPA - Windows Internet Explorer

http://www.epa.gov/cleanenergy/energy-resources/calculator.html

U.S. ENVIRONMENTAL PROTECTION AGENCY

Clean Energy

[Contact Us](#) Search: All EPA This Area

You are here: [EPA Home](#) » [Climate Change](#) » [Clean Energy](#) » [Clean Energy Resources](#) Greenhouse Gas Equivalencies Calculator

Greenhouse Gas Equivalencies Calculator

Did you ever wonder what reducing carbon dioxide (CO₂) emissions by 1 million metric tons means in everyday terms? The following equivalency calculator can help you understand just that.

For example, it can be difficult to visualize what a "metric ton of carbon dioxide" really is. This calculator will translate rather difficult to understand statements into more commonplace terms, such as "is equivalent to avoiding the carbon dioxide emissions of X number of cars annually."

This equivalency calculator may be useful in communicating your greenhouse gas reduction strategy, reduction targets, or other initiatives aimed at reducing GHG emissions.


Other Calculators

There are a number of other web-based calculators that can estimate greenhouse gas emission reductions for

- individuals and households
- waste, and
- transportation.

For basic information and details on greenhouse gas emissions, visit the Emissions section of EPA's climate change site.

[Clean Energy Home](#)
[Basic Information](#)
[Energy and You](#)
[Clean Energy Programs](#)
[Clean Energy Resources](#)
[Site Map](#)



Use EPA's Calculator to communicate the magnitude of GHG emission reductions

Enter Your Data Below

There are two options for entering data into this calculator.

Option 1:

1. If you are starting with data in units of "gallons of gasoline consumed," "kilowatt-hours of electricity," "therms of natural gas," or "passenger vehicles per year", use this option.
2. Enter a quantity and pick the desired unit below; and
3. Click on the "Calculate Equivalent**" button to convert your value to [Carbon Dioxide Equivalent](#).

- choose a unit -

[? Click Here fo](#) - choose a unit -
 gallons of gasoline consumed
 kilowatt-hours of electricity
 therms of natural gas
 passenger vehicles per year

Option 2:

If you have already estimated the quantity of avoided emissions reductions (e.g. amount of avoided emissions and select the appropriate units for the correspond

Amount	Unit	Gas
<input type="text" value="2000000"/>	Metric Tons	CO ₂ - Carbon Dioxide
<input type="text"/>	Tons	CH ₄ - Methane
<input type="text"/>	Pounds	N ₂ O - Nitrous Oxide
<input type="text"/>	Kilograms	HFC-23 - Hydrofluorocarbon gases
<input type="text"/>	Tons	CF ₄ - Perfluorocarbon gases
<input type="text"/>	Tons	SF ₆ - Sulfur Hexafluoride
<input type="text"/>	Tons	Carbon Equivalent

*If your estimated emissions of methane, nitrous oxide, or other non-CO₂ gases are already expressed in [CO₂ or carbon equivalents](#), please enter your figures in the row for CO₂ or carbon equivalent.

User Enters Data
(greenhouse gas emissions, gasoline, electricity, natural gas, vehicles)
Clicks "Calculate"



The sum of the greenhouse gas emissions you entered above is Metric Tons of Carbon Dioxide Equivalent.

This is equivalent to one of the following:

Equivalency Results

Click on the question mark ? link to read the explanation of that particular calculation. [Read about all calculations.](#)

The information you entered above is equivalent to one of the following statements:

Annual greenhouse gas emissions from passenger vehicles ? *(click to read more about this calculation)*

CO₂ emissions from gallons of gasoline consumed ?

CO₂ emissions from barrels of oil consumed ?

CO₂ emissions from tanker trucks' worth of gasoline ?

CO₂ emissions from the *electricity* use of homes for one year ?

CO₂ emissions from the *energy* use of homes for one year ?

Carbon sequestered by tree seedlings grown for 10 years ?

Carbon sequestered annually by acres of pine or fir forests ?

Carbon sequestered annually by acres of forest preserved from deforestation ?

CO₂ emissions from propane cylinders used for home barbeques ?

CO₂ emissions from burning railcars' worth of coal ?

Greenhouse gas emissions avoided by recycling tons of waste instead of sending it to the landfill ?

Annual CO₂ emissions of coal fired power plants ?

Equivalencies calculated immediately



Includes Peer reviewed Calculations and References

Passenger vehicles per year

Passenger vehicles are defined as 2-axle 4-tire vehicles, including passenger cars, vans, pickup trucks, and sport/utility vehicles.

In 2005, the weighted average combined fuel economy of cars and light trucks combined was 19.7 miles per gallon (FHWA 2006). The average vehicle miles traveled in 2005 was 11,856 miles per year.

In 2005, the ratio of carbon dioxide emissions to total emissions (including carbon dioxide, methane, and nitrous oxide, all expressed as carbon dioxide equivalents) for passenger vehicles was 0.971 (EPA 2007).

The amount of carbon dioxide emitted per gallon of motor gasoline burned is 8.81×10^{-3} metric tons, as calculated in the "Gallons of gasoline consumed" section.

To determine annual GHG emissions per passenger vehicle, the following methodology was used: vehicle miles traveled (VMT) was divided by average gas mileage to determine gallons of gasoline consumed per vehicle per year. Gallons of gasoline consumed was multiplied by carbon dioxide per gallon of gasoline to determine carbon dioxide emitted per vehicle per year. Carbon dioxide emissions were then divided by the ratio of carbon dioxide emissions to total vehicle greenhouse gas emissions to account for vehicle methane and nitrous oxide emissions.

Calculation

Note: Due to rounding, performing the calculations given in the equations below may not return the exact results shown.

$$8.81 \times 10^{-3} \text{ metric tons CO}_2/\text{gallon gasoline} * 11,856 \text{ VMT}_{\text{car/truck average}} * 1/19.7 \text{ miles per gallon}_{\text{car/truck average}} * 1 \\ \text{CO}_2, \text{ CH}_4, \text{ and N}_2\text{O}/0.971 \text{ CO}_2 = \mathbf{5.46 \text{ metric tons CO}_2\text{E /vehicle/year}}$$

Sources

- EPA (2007). [Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005](#). U.S. Environmental Protection Agency, Washington, DC. [USEPA, Table 3-7 \(p.3-9\) \(PDF\)](#) (59 pp, 1.47MB, [About PDF](#)) and [Table A-108 \(p.A-127\) \(PDF\)](#) (169 pp, 1.27MB, [About PDF](#))
- FHWA (2006). [Highway Statistics 2005](#). Office of Highway Policy Information, Federal Highway Administration. [Table VM-1](#).