***~~Chemistry~~***

# *Greenhouse Gases*

### *Importance of Greenhouse Gases*

* Greenhouse gases, such as carbon dioxide, methane, nitrous oxide, and certain synthetic chemicals, trap some of the Earth's outgoing energy, thus retaining heat in the atmosphere. This heat trapping causes changes in the radiative balance of the Earth—the balance between energy received from the sun and emitted from Earth—that alter climate and weather patterns at global and regional scales.

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| **Greenhouse gas** | Chlorofluorocarbon-12 (CFC-12) |
| Chemical formula | CCL2F2 |
| Hydrofluorocarbon-23 (HFC-23) | CHF3 |
| Sulfur Hexafluoride | SF6 |
| Nitrogen Trifluoride | NF3 |

## *Electricity Reductions (kilowatt-hours)*

The Greenhouse Gas Equivalencies Calculator uses the AVoided Emissions and geneRation Tool (AVERT) U.S. national weighted average CO2 marginal emission rate to convert reductions of kilowatt-hours into avoided units of carbon dioxide emissions.

* ***Emission Factor***

**1,562.4 lbs CO22/MWh × (4.536 × 10-4 metric tons/lb) × 0.001 MWh/kWh = 7.09 × 10-4 metric tons CO2/kWh**  
(AVERT, U.S. national weighted average CO2 marginal emission rate, year 2019 data)

* **Notes:**

1. This Calculation Does Not Include Any Greenhouse Gases Other Than CO2.
2. This Calculation Includes Line Losses.
3. Regional Marginal Emission Rates Are Also Available On The [AVERT](https://www.epa.gov/statelocalenergy/download-avert) Web Page.

### *Calculation*

**8,887 grams of CO2/gallon of gasoline = 8.887 × 10-3 metric tons CO2/gallon of gasoline.**