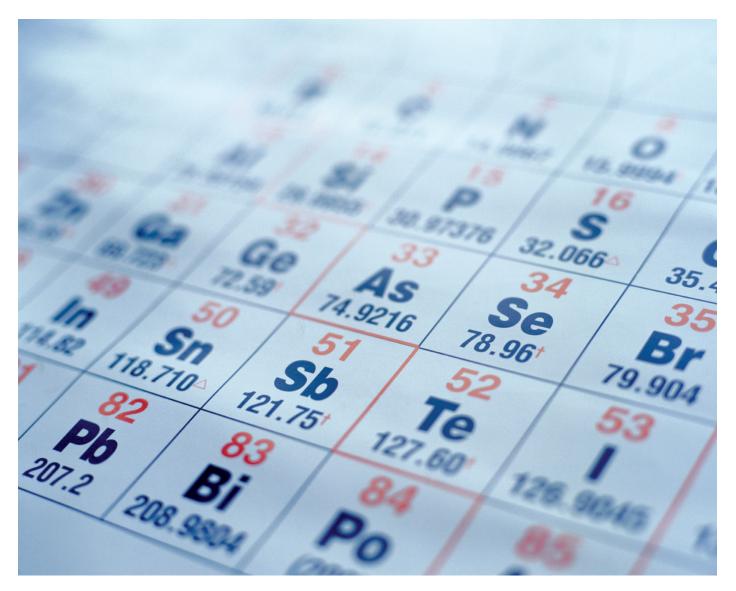## Global Warming Potential (GWP) and Carbon Dioxide Equivalents (CO$_2$e)
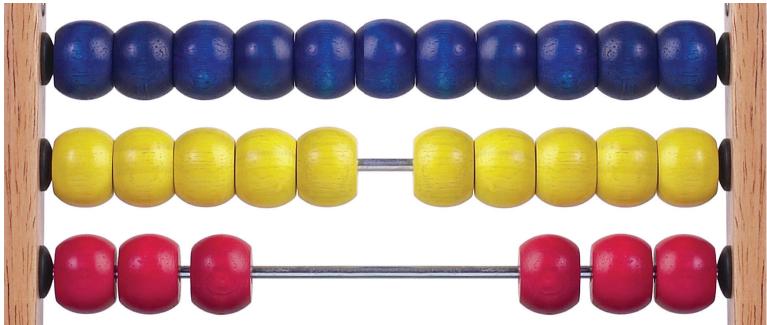
The concept of global warming potential (GWP) was invented to allow comparisons of the total cumulative warming effects of different GHGs over a specified time period. The warming effect of CO$_2$ is assigned a value of 1, and the warming effects of other gases are calculated as multiples of this value. Therefore, GWPs are used to convert emissions of non-CO$_2$ gases into their CO$_2$ warming equivalents (CO$_2$es). The CO$_2$e of a non-CO$_2$ gas is calculated by multiplying the mass of the emissions of the non-CO$_2$ gas by its GWP.

A 100-year GWP of 21 for CH$_4$ means that each gram of CH$_4$ emitted is considered to have cumulative warming effects over the next 100 years equivalent to emitting 21 grams of CO$_2$. Using the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR) 100-year GWP of 21 for CH$_4$, the CO$_2$e of 310 tons of CH$_4$ is 310 tons x 21 = 6,510 tons CO$_2$e. Emitting 310 tons of CH$_4$ would thus be considered to result in the same cumulative warming over the next 100 years as emitting 6,510 tons of CO$_2$.

Emissions Factors

Fuel Type		CO$_2$e Emissions Factor		Source
UNL	mpg	21.5	lbs CO$_2$e/gal	Obtained by entering 1,000,000 gallons of UNL into STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software, Version 1.1, June 2005 under Passenger Vehicle
	VMT	1.21	lbs CO$_2$e/mi	Obtained by entering 1,000,000 vehicle miles traveled in STAPPA/ALAPCO AND ICLEI'S CLEAN AIR AND CLIMATE PROTECTION SOFTWARE, VERSION 1.1, JUNE 2005 under UNL and Passenger Vehicle
DSL	Stationary	21.2	lbs CO$_2$e/gal	Obtained by entering 1,000,000 gallons of Stationary DSL in STAPPA/ALAPCO AND ICLEI'S CLEAN AIR AND CLIMATE PROTECTION SOFTWARE, VERSION 1.1, JUNE 2005 under Buildings
	Mobile	21.3	lbs CO$_2$e/gal	Obtained by entering 1,000,000 gallons of DSL in STAPPA/ALAPCO AND ICLEI'S CLEAN AIR AND CLIMATE PROTECTION SOFTWARE, VERSION 1.1, JUNE 2005 under Passenger Vehicles
NG	Stationary	12.4	lbs CO$_2$e/therm	Obtained by entering 1,000,000 therms in STAPPA/ALAPCO AND ICLEI'S CLEAN AIR AND CLIMATE PROTECTION SOFTWARE, VERSION 1.1, JUNE 2005 under Residential Sector
Electricity	SERC	1.23	lbs CO$_2$e/kWh	Obtained by entering 1,000,000 kWh in STAPPA/ALAPCO AND ICLEI'S CLEAN AIR AND CLIMATE PROTECTION SOFTWARE, VERSION 1.1, JUNE 2005 under 08 - Southeastern Electric Reliability Council