Calculating CO_2 Emissions from Combustion

Mass CO_2 emissions from general stationary combustion units are generally determined using one of four calculation methodologies (tiers) discussed below. Use of the four methodologies is subject to certain restrictions based on unit size and fuel combusted, such that each fuel combusted in a unit may potentially use a different tier to calculate emissions.

- The Tier 4 methodology employs a continuous emission monitoring system (CEMS). The system continuously monitors both the stack gas CO_2 concentration and the stack gas flow rate. Mass CO_2 emissions are determined using these two values, along with the appropriate conversion factors. For heterogeneous fuels such as municipal solid waste, CEMS are generally considered the most accurate emissions estimation method.
- The Tier 3 methodology generally uses fuel-specific data. Measured fuel characteristics, such as carbon content and molecular weight, are used in conjunction with the measured fuel quantity to calculate mass CO_2 emissions. The fuel quantity is measured with flow meters, tank drop measurements, weigh scales, etc.
- The Tier 2 methodology uses a mix of default and fuel-specific data. An emission factor and a measured high heating value are used in conjunction with the estimated fuel quantity to calculate mass CO_2 emissions. The fuel quantity estimate is based on company records (e.g., fuel purchases).
- The Tier 1 methodology uses default values to calculate CO_2 mass emissions. An emission factor, default high heating value, and estimated fuel quantity are used together to calculate emissions. The fuel quantity is based on company records (e.g., fuel purchases).

The emission factors used in Tiers 1 and 2 and the default high heating values used in Tier 1 are representative averages based on multiple fuel samples taken across the country. For homogeneous fuels, such as pipeline-quality natural gas, these methodologies often provide a very accurate emissions estimate.

In addition to the four calculation methodologies described above, a small number of units that are subject to 40 CFR part 75 but not required to monitor and report CO_2 mass emissions to EPA year-round (according to part 75) may determine CO_2 mass emissions using part 75 calculation methods and monitoring data that they already collect under part 75 (e.g., heat input and fuel use).

Calculating CH_4 and N_2O Emissions from Combustion

Most units use an emission factor that is multiplied by annual fuel use and the high heating value of the fuel (either a default or measured high heating value is used, depending on the circumstances). Units that monitor and report annual heat input according to part 75 requirements use an emission factor and the measured annual heat input.

Calculating CO_2 Emissions from Sorbent Use

For units that use acid gas emission controls and do not measure emissions with a CEMS, CO_2 emissions created by the reaction of the sorbent with the acid gas must also be determined, using the quantity and chemical properties of the sorbent.

More information is available here:

https://www.epa.gov/sites/production/files/2015-02/documents/stationaryfuel_infosheet.pdf