Pollution Prevention Greenhouse Gas (GHG) Calculator
Frequently Asked Questions
March 2014

1) What is the unit of measurement?

Metric tons of carbon dioxide equivalent or MTCO2e is the unit of measurement in this tool. The unit "CO2e" represents an amount of a GHG whose atmospheric impact has been standardized to that of one unit mass of carbon dioxide (CO2), based on the global warming potential (GWP) of the gas. Tool formulas convert standard metrics for electricity, green energy, fuel use, chemical use, water use, and materials management into MTCO2e. For the aggregate tab, the tool uses million MTCO2e or MMTCO2e due to the quantities involved.

2) Should entities measure their activity results on an annual basis or longer-term basis?

Entities should report to EPA on an annual basis. EPA will apply a consistent factor to reported annual results to calculate continuing results in years two and three for purposes of documenting full results from EPA program participants.

3) Which chemicals with notable global warming potential are included in the Calculator?

The Greening Chemistry tab allows a user to determine the CO2 equivalency of more than 200 chemicals. The chemicals include those listed by both the International Panel on Climate Change (IPCC) and EPA's GHG Reporting Rule. The chemicals include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), chlorofluorocarbons (CFCs), numerous hydrofluorocarbons (HFCs), numerous perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). The tool also provides the CAS numbers and global warming potentials for each of these chemicals.

4) What is global warming potential (GWP)?

"Global warming potential" describes the ability of a unit of gas emitted in the present to trap heat in the atmosphere over a certain timeframe, indexed relative to a reference gas, CO2, which is assigned a GWP value of 1. The Calculator uses 100 years as the timeframe, with values from the IPCC's Fifth Assessment Report (2013). The tool calculates the GWP (the CO2 equivalency) of various GHGs using the standard reporting procedures of the United Nations Framework Convention on Climate Change (UNFCCC). These procedures account for the fate of the emitted gas and the amount that remains in the atmosphere over time.

5) What emission factor does the calculator use to measure reduced demand of grid electricity?

The calculator uses a non-baseload output emissions factor (or emissions rate) to measure reduced demand of grid electricity. The user can apply the national version of this factor or the state version of this factor.

"Non-baseload" refers to generators that operate during peak demand. Some generators run at 100 % capacity for baseload (ordinary) demand, and have no extra capacity to contribute at times of peak demand. Baseload generators generally include all nuclear, hydro, solar, geothermal, and wind generators (as well as some but not all combustion generators). It is commonly perceived that, overall, energy efficiency and clean energy projects affect peak demand, not baseload demand. At times of peak demand, then, it is the generators who do not run at 100 % capacity ordinarily that have excess capacity to contribute. It is the non-baseload output emissions factor that captures this situation. The non-baseload output emissions factor is the output emissions rate of GHG gases (CO2, CH4, and N2O) from combustion generators, weighted towards those that operate during peak demand. The source for the non-baseload output emissions factor is eGRID (EPA's Emission and Generation Resource Integrated Database).

eGRID's national non-baseload factor uses emission rates from all relevant generators in the United States. The state versions of the eGRID non-baseload factor use emission rates for relevant generators per state. Though all states belong to a multi-state grid (known as North American Electric Reliability Corporation (NERC) regions), state-level emission rates are used for simplicity and because it is not possible to precisely determine to which NERC region a particular project belongs.

To review, the non-baseload output emission rate captures just about everything desired – it simulates which generation sources are displaced due to changes in energy demand, and accounts for seasonal and daily variations in energy use, based on current operating scenarios. The only thing this rate does not capture is the 7-9% loss of energy that occurs during transmission, making this emission factor marginally less than it would otherwise be.

6) How is renewable energy accounted for?

On the Green Energy tab, the P2 GHG calculator allows users to input the amount of renewable energy purchased from green suppliers that meet several criteria; it also allows the input of the amount of Renewable Energy Certificates (REC) purchased. The GHG savings from these P2 activities are calculated in relation to the emissions that would be produced from conventionally produced electricity. The P2 GHG calculator calculates these emissions using the same nonbaseload output emissions factor that is used to calculate avoided emissions from electricity conservation. This factor is expected to decrease over time, as a greater percentage of the national energy grid becomes fueled by renewable resources.

Renewable Energy Certificates. Renewable energy certificates, or RECs, represent indirect emission reductions and can be applied to neutralize other indirect emissions, characterized as Scope 2 emissions under the 1997 Kyoto protocol. Under Kyoto, Scope I direct emissions are produced on site (e.g., a boiler or a generator at a facility). Scope II indirect emissions are produced off-site for something used by an organization or facility, such as electricity consumption. Scope III indirect emissions are for other things such as company travel, paper use, or contractor activities.

RECs are market-based instruments designed to facilitate transactions between buyers and sellers of renewable electricity. Known also as green tags, green energy certificates, or tradable renewable certificates, RECs convey the right to the environmental, social, and other non-power qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. A REC provides exclusive proof that one megawatt-hour (MWh) of renewable energy has been generated, which is equal to a MWh reduction in fossil-fuel GHG emissions.

7) What is the data source for fuel emission factors?

The tool uses the Climate Registry as the primary data source for fuel emission factors. The Climate Registry provides the most comprehensive, user-friendly source for emission factors for a variety of GHG-emitting fossil fuels. Data from The Climate Registry is obtained primarily from *US Inventory of Greenhouse Gas Emissions and Sinks 1990-2009 (April 2011)*, which in turn was derived directly from the IPCC. To the extent possible, the emission factors used for fuels incorporate the GHG savings of not only CO2, but also CH4 and N2O. In such cases, emission factors may be slightly higher than those published by other sources that express emission factors in terms of CO2 alone.

8) Do I enter in fuel reduced or vehicle/air miles avoided?

Users should enter either fuel reduced or vehicle/air miles avoided, but not both. They are mutually exclusive. If air travel is selected, the tool offers three categories for calculating the length of flights: (1). Short haul or <300 miles per one way flight; (2). Medium Haul or 300-700 miles; and, (3). Long Haul or >700 miles.

9) How are bio-fuels accounted for?

There is no consensus emission factor for biofuels, and not all biofuels are the same. Some sources claim zero emissions, others, including publications in Science magazine, have claimed that lifetime GHG intensities may even be higher than conventional gasoline. The tool uses a middle-of-the-road approach to recognize differences in various types of biofuels and to strive for consistency across the Agency. The tool uses data from EPA's Office of Transportation and Air Quality on the lifecycle GHG-emission intensities of several alternative fuels (indexed to

gasoline), and Climate Registry emission factors for other fuel types, to calculate emission factors for corn-based ethanol, cellulosic ethanol, and biodiesel.

10) How were GHG benefits derived from water conservation?

A significant amount of energy is required to pump, treat, and transport water. The P2 program relied on the survey-based water conversion factors used in the report "*Water and Sustainability: U.S. Electricity Consumption for Water Supply & Treatment—the Next Half Century," EPRI, Palo Alto, CA: 2000 1006787*, the most comprehensive and recent report found. There are two factors involved. One is a national average of 1,500 kWh per million water gallons for pumping surface water to the drinking water treatment plant, treating it, and distributing it. The second is a national average of 1,800 kWh per million gallons of water treated at the sewage treatment plant. Therefore, the tool applies the combined formula of 3,300 kWh per million gallons to quantities of water conserved. Users can choose either a national or state grid emission factor, which applied will convert kWH of energy used to MTCO2e emissions.

11) Did the P2 program look at other GHG calculators in developing this calculator?

Yes, the P2 program evaluated calculators inside and outside the Agency.

12) Is the P2 Program's GHG calculator consistent with other GHG calculators?

For consistency, the P2 program assessed the accounting principles and emission factors used in other calculators, and suggested by the IPCC and used in the *US Inventory of Greenhouse Gas Emissions and Sinks 1990-2009 (April 2011)*. The P2 GHG calculator is generally consistent with the latter. There are a few differences over emission factors, such as this tool's inclusion of CH4 and N2O emissions, rather than covering CO2 only.

13) Can I use another calculator to compute performance results?

Those grantees that have identified that they have used EPA calculators do not have to describe the calculators. A grantee will need to describe the type of data (electricity, fuel, etc.) they transformed to GHG and dollars. If grantees rely on other calculators such as those in the "Cross-References" tab they must cite the calculator used and the type of data they transformed.

14) Will references and data sources cited in this calculator be updated over time?

Yes, the P2 Program will review all references and data sources on an annual basis to assess if updates are necessary.

15) How do I use the Aggregate Cost Savings tab in the GHG calculator?

While it is not mandatory to use this tab when reporting cost savings from lowered GHG emissions, EPA encourages grantees and other users to use this tab in conjunction with the Aggregate CO2e tab. Together they show GHG reductions and related cost savings. The direct

comparison of GHG savings and cost savings is a feature not offered on the P2 Cost Savings Calculator, which only compares cost savings with, for example, reduced electricity use or fuel use. This special feature on the GHG Savings Calculator is complementary to and consistent with the P2 Cost Savings Calculator. It is designed to help users get more acquainted with a direct GHG-to-cost savings relationship.

P2 tools were last updated: March 2014

Note: The materials management tab is still under construction.