

Assessment Resource Guide:

Calculating Greenhouse Gas Emissions

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I. Definition: What Are Greenhouse Gas (GHG) Emissions?¹

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are: carbon dioxide, methane, nitrous oxide and fluorinated gases.¹

II. Why Calculate GHGs?²

Calculating GHGs allows a company to:

- **Identify opportunities for cost and energy savings.** Greenhouse gas emissions are closely linked to energy use, so measuring emissions can lead to identifying ways to reduce emissions, which can in turn lead to cost savings.
- **Ensure the company is functioning within regulatory requirements.** Accurate measurements, based on commonly agreed-upon standards, are a necessary first step towards such emissions trading and other regulatory changes. As government protocols emerge and develop, it becomes increasingly important for businesses to be aware of their emissions levels.
- **Aid protocol development.** By becoming involved, a company can influence protocol development and become familiar with measuring and reporting methods, processes and issues.

¹ <http://www.epa.gov/climatechange/emissions/index.html>

² <http://www.greenbiz.com/research/report/2007/11/20/measuring-reporting-verification>

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III. How to Calculate Company-wide GHGs³

GHG Protocol Tools

<http://www.ghgprotocol.org/calculation-tools>

Calculating emissions is a multi-step process. The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify and manage greenhouse gas emissions. The GHG Protocol Initiative provides the accounting framework for nearly every GHG standard and program in the world as well as hundreds of GHG inventories prepared by individual companies.

GHG Protocol's toolset enables companies to develop comprehensive and reliable inventories of their GHG emissions. Each tool comprises an Excel workbook and a PDF guidance document. Each PDF provides step-by-step guidance on the use of a tool. Most companies will need to apply more than one tool to cover their emissions.

For Small Businesses

Small business or small facilities, there are some simple first steps to take to calculate GHG emissions. The most important tools for small businesses to utilize in order to get a sense of their emissions include:

- Emission Factors from Cross-Sector Tools
- GHG emissions from purchased electricity
- GHG emissions from refrigeration and air-conditioning
- GHG emissions from transport or mobile services

All of these tools can be found under "Cross Sector Tools" at the following link:

<http://www.ghgprotocol.org/calculation-tools/all-tools>

In addition, tools related to specific industries are provided in the "Sector Specific Tools" at the link above, which give more detailed and relevant information by industry.

IV. What Are The Next Steps after Completing a GHG Assessment?

After completing a GHG assessment, a company can lessen the environmental impact of its business's greenhouse gas emissions in two ways:

1. Reduce the business's greenhouse gas emissions:

Most emissions are costly to a business, but implementing policies and procedures aimed towards reducing these emissions can minimize such costs while still achieving the same operational results. Some simple actions include increasing equipment efficiency, switching

³ <http://www.ghgprotocol.org/>

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to renewable energy whenever possible and reducing paper use. Many opportunities to reduce emissions can be found within the company, such as reducing travel, and these can be taken in increments, requiring little or no upfront investment.

Larger projects, such as replacing equipment with more efficient models, may take longer to implement. Actions that yield large benefits often require up-front investment and can have long payback periods – for example, incorporating energy efficiency, natural lighting and shading and other “green” elements into new buildings as they are built or retrofitted.

2. Consider carbon offsets:

‘Carbon offsets’ generally refer to voluntary acts by individuals or companies that are arranged by commercial or not-for-profit carbon-offset providers. A variety of offset methods are in use – while tree planting was initially a mainstay of carbon offsetting, renewable energy, energy conservation and methane capture offsets have now become increasingly popular.

V. Helpful Websites

Greenhouse Gas Emissions Reporting

- **The Carbon Disclosure Project**

<http://www.cdproject.net/>

CDP is a not-for-profit organization aiming to create a lasting relationship between shareholders and corporations regarding the implications for shareholder value and commercial operations presented by climate change. CDP provides a coordinating secretariat for institutional investors with a combined \$41 trillion of assets under management.

- **Global Reporting Initiative (GRI)**

<http://www.globalreporting.org/>

GRI provides the international standards (used by over 1200 companies) for corporate reporting on environmental, social and economic performance.

- **Climatebiz.com**

The Business Resource for Climate Management is a free, web-based resource to help companies of all sizes and sectors understand and address climate change in a way that aligns environmental responsibility with business success. It provides hands-on tools, action steps and other resources companies can use to understand the underlying issues, assess their climate footprint, and devise and implement a plan to significantly reduce their climate impacts throughout operations and supply chains.

Emissions Reduction

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The links below provide additional resources for companies wishing to learn more about reducing their emissions. The first two links include public resources such as research and case studies on companies that have successfully reduced emissions, while the second two links refer to consulting firms that can be hired to help companies reduce their own emissions.

- **Rocky Mountain Institute**

<http://www.rmi.org/>

RMI is a nonprofit organization that fosters the efficient and restorative use of resources so that companies, governments and organizations are more efficient, make more money, and do less harm to the environment. For more than two decades, Rocky Mountain Institute has been recognized as one of the world's foremost authorities on energy use, supply, policy and regulation. Their consultants help clients in a variety of industries develop financially and environmentally superior ways to produce, buy, sell and conserve energy.

- **Stonyfield Farm's Guide to Offsetting Carbon Dioxide Emissions**

<http://www.stonyfield.com/sites/default/files/attachments/environmental-cookbook.pdf>

Stonyfield Farm, a medium-sized organic dairy company, self-published this guide using itself as a case study. In the guide, they determined the company's carbon footprint, calculated their emissions, reduced emissions and chose offset partners. The guide may be especially helpful for companies with agricultural and light manufacturing operations.

- **ICF International**

<http://www.icfi.com/markets/climate>

ICF International helps public and private sector clients worldwide develop climate change policy, interpret and comply with regulations, reduce GHG emissions, evaluate risks and identify opportunities.

- **Eco Securities**

<http://www.ecosecurities.com/>

EcoSecurities Consulting is a leading group for GHG mitigation and accessing finance for adaptation to climate change. The firm's network of global offices works with companies, governments and international organizations around the world.

ⁱ Greenhouse gases in more detail:

Carbon Dioxide (CO₂): Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

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Methane (CH₄): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous Oxide (N₂O): Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

Fluorinated Gases: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases (“High GWP gases”).