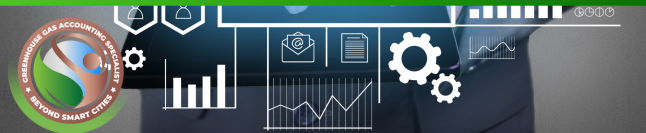




FUNDAMENTALS OF ORGANIZATIONAL GHG ACCOUNTING

FOR ENVIRONMENTAL AND GHG SPECIALISTS

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP
ENVIRONMENTAL SPECIALIST CURRICULUM





DATA COLLECTION & CALCULATION

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LEARNING OBJECTIVES



- Estimate GHG emissions based on activity data and emission factors
- Identify sources of activity data and emission factors
- Develop a data collection and management system
- Avoid common pitfalls in calculating GHG emissions



DATA AND GHG INVENTORIES

The next step in developing your GHG inventory will be to identify exactly what information you need to calculate your organization's GHG emissions, and where you can find these data. You may also need to develop an efficient data collection and management system, if your organization does not have one already.



THE BASIC EQUATION

✓ While it is possible to measure GHG emissions from certain sources directly, in nearly every case, you will be estimating emissions based on activity data and emission factors.

✓ The basic equation looks like this: activity data x emission factor = emissions For example: (100 km) x (0.18 kg CO₂/km) = 18 kg CO₂



ACTIVITY DATA

Activity data quantify an activity, such as air travel, in units that will help you calculate the emissions generated. Each activity is presented in a specific unit, for example:

- ✓ Cubic meters, cubic feet, or therms of natural gas
- ✓ Liters or gallons of heating oil
- ✓ Liters or gallons of jet fuel
- ✓ Kilowatt hours (kWh) or megawatt hours (MWh) of electricity
- ✓ Air kilometers or miles traveled



EMISSION FACTORS

✓ Emission factors convert activity data to emission values. They are published by various entities, including local, state, and national government agencies as well as intergovernmental organizations.

✓ Emission factors are presented in specific units, for example:

- Kilograms of CO₂ per air kilometer traveled
- Pounds of CO₂ per kWh of electricity
- Kilograms of CO₂ per liter of petrol/gasoline

✓ Emission factors convert activity data to emission values. They are published by various entities, including local, state, and national government agencies as well as intergovernmental organizations.

✓ Emission factors for most sources can be found in units of CO₂ or CO₂-equivalent. When dealing with non-CO₂ gases that you will need to convert emission estimates from units of mass (e.g., kg of CH₄) to CO₂-equivalents using Global Warming Potential (GWP) values in order to aggregate all GHG emissions in your inventory.

FINDING ACTIVITY DATA – DIRECT EMISSIONS

Direct emissions:

✓ Direct emissions are often the result of fuel combustion in company- owned or controlled equipment. In this case, the preferred method of data collection is from fuel purchase or fuel use records, since these are likely to be the most accurate data sources.

✓ In certain sectors, direct emissions can also come from non-fuel- combustion-related industrial processes, or from leakage of GHGs (e.g., fugitive emissions of methane). For tips on collecting data from these sources, consult the guidance to the relevant GHG Protocol calculation tools.

FINDING ACTIVITY DATA – PURCHASED ELECTRICITY

✓ Collecting data for indirect emissions is more difficult than for direct emissions because fuel use/purchase records may not be available. You may need to consult a third party for your data, or estimate them.

✓ Finding activity data for purchased electricity, however, is usually fairly straightforward. There are four methods, described in order of preference:

1. Actual electricity use – Simply track your facility's monthly electric bill or meter reading.

2. Building-specific data estimation – Useful for facilities shared by more than one organization. Use the following equation: (Area of your company's space) x (Total building electricity use) ÷ (Total building area) = Estimated electricity use of your organization

3. Similar building estimation – Extrapolate based on buildings that are similar to yours in location, size, efficiency, use, and hours of operation.

4. Generic building data – Attempt to find default data on kWh used per square foot or square meter of space.

COLLECTING EMISSION FACTORS

✓Emission factors are typically published by government agencies, and are frequently updated, so it is important to make sure you are using the most recent ones available.

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✓It is important to remember that emission factors must be expressed in the same units as your activity data. If they are not, convert the activity data to the unit used in the emission factor, or vice-versa. Common conversion factors are available in Appendix 1 of Hot Climate, Cool Commerce [insert link to unit conversion factors for lesson 6].

CALCULATING EMISSIONS

✓Once you have collected your activity data and emission factors, calculating emissions is simply a matter of applying the basic formula: activity data x emission factor = emissions

✓You will probably use an automated calculation tool to use this. The GHG Protocol has published several cross-sectoral and sector-specific Excel-based calculation tools

Cross-sectoral Tools

- ✓Allocation of GHG emissions from a combined heat and power (CHP) plant
- ✓CO₂ emissions from mobile combustion
- ✓Indirect CO₂ emissions from the consumption of purchased electricity, heat, and/or steam Measurement and Estimation Uncertainty for GHG Emissions
- ✓Revised tool for direct emissions from stationary combustion

SECTOR-SPECIFIC TOOLS

- ✓CO₂ emissions from the production of ammonia
- ✓CO₂ emissions from the production of cement (US EPA)
- ✓CO₂ emissions from the production of cement (WBCSD CSI, version 2.0)
- ✓CO₂ emissions from the production of iron and steel
- ✓CO₂ emissions from the production of lime
- ✓CHG emissions from pulp and paper mills
- ✓CHG emissions from the production of Aluminum
- ✓CHG emissions from Wood Products Facilities (english units)
- ✓CHG emissions from Wood Products Facilities (SI units)
- ✓HFC and PFC emissions from the manufacturing, installation, operation and disposal of refrigeration and air-conditioning equipment
- ✓HFC-23 emissions from the production of HCFC-22
- ✓N₂O emissions from the production of adipic acid
- ✓N₂O emissions from the production of nitric acid
- ✓PFC emissions from the production of semi-conductor wafers

CALCULATING EMISSIONS +

Calculation tools for GHG emissions from service sector companies and office-based organizations

✓Emissions from Business Travel

✓CO₂ Emissions from Employee Commuting

✓CO₂ Emissions from Fuel Use in Facilities

✓Indirect CO₂ Emissions from Purchased Electricity

✓Working 9 to 5 on Climate Change (for use by small office-based organizations only)

DATA COLLECTION AND MANAGEMENT SYSTEMS

Collecting and managing data for a GHG inventory can be a big task. Establishing a data collection and management system can improve the efficiency of the data collection, reduce costs, and help maintain data consistency. Some considerations in establishing such a system are:

✓Which data need to be collected?

✓What are the sources of data?

✓Who will collect the data?

✓Making sure staff is adequately trained.

✓Maintaining data quality.

✓Designing and implementing the data system.

DATA COLLECTION AND MANAGEMENT SYSTEMS+

✓Which data need to be collected? – Once you have identified your company's emission sources, you must determine the relevant activity data and emission factors, as well as the appropriate units of measure.

✓What are the sources of data? – Activity data may be collected from a variety of sources, such as fuel purchase records and utility bills. Your company may have direct access to some sources; it may need to obtain others from third parties, or estimate them.

✓Who will collect the data? – A person or team should be assigned to collect and manage the data. It may be a good idea to write this task into the job description of the staff involved. You will also need to decide at which point in the process to calculate your emissions – at each facility, or at headquarters.

DATA COLLECTION AND MANAGEMENT SYSTEMS+



- ✓ Making sure staff is adequately trained. - Once a data team has been chosen, you should make sure that they understand what data need to be collected, where to find it, and on what schedule it should be reported. You will need to ensure that procedures are in place to ensure that company's data are collected smoothly each year despite any staff changes.
- ✓ Maintaining data quality. - In addition to regular staff training, you will need to incorporate internal quality controls into your company's data collection system to catch errors. Some common errors are incorrect units, incorrect emission factors, and mistakes in data entry.
- ✓ Designing and implementing the data system. - Large companies with numerous facilities need sophisticated data management systems. One solution may be to develop an online database via your company's Intranet. Another solution may be to hire a third party to manage your data.



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