How to Select the Best Greenhouse Gas Calculator for Your GHG Inventory

With an increased focus on the role that greenhouse gas (GHG) emissions play in climate change, ensuring your emissions reporting is accurate is more important than ever. Choosing the right GHG calculator, or calculation engine for your organization's GHG inventory plays a crucial part in remaining compliant with rapidly evolving requirements and regulations.

Corporate GHG Accounting

What is a GHG emissions inventory?

A greenhouse gas (GHG) emissions inventory describes the total greenhouse gases attributed to a facility, business, or organization's activities. Activities could include direct emissions such as burning natural gas for office heating, and indirect emissions such as emissions associated with producing the electricity used to light a building, emissions associated with business travel, or emissions associated with oil and gas upstream or downstream activities. Understanding a company's GHG inventory is crucial to managing climate change strategies. GHG inventories may be the result of mandatory state, regional, or national reporting programs such as California Air Resource Board (AB32), U.S. EPA Mandatory Reporting Rule, or European Union Emissions Trading Scheme (EU ETS). However, many inventories may be the direct result of investment due diligence, stakeholder communication, or other marketing strategies.

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The importance of a calculation engine

The requirements and procedures for GHG reporting are complex and rapidly evolving. In order to ensure compliance, you need a calculation engine that can handle complex equations using appropriate emission factors, conversion factors, and calculation methodologies for each reporting program. The right calculation engine can reduce the stress, time, and potential inaccuracies found in home-grown accounting methods such as spreadsheets, silo databases or hand-written notes.

Industry Assessment of Calculation Engine Tools

A rise in software solutions to calculate and report carbon inventories has accompanied the growth of interest in this emerging field. At the core of GHG accounting are concerns of data control, data accuracy, and the appropriate calculations within inventory analysis. Output emissions from the GHG accounting system may have a direct or indirect financial or brand impact on reporting entity. In the case of emissions trading programs (e.g. cap & trade) such as those in Europe, California, and parts of Canada, emissions credits essentially have a cash value. Because of the direct financial impact, each of these programs implements requirements for auditing or verification of emissions. In that case, the derivation of a company's emissions is scrutinized in a similar manner as a company's financial records, because there is a direct connection. Financial impact means that emission calculations are also subject to the Sarbanes-Oxley Act (SOX) of 2002. For other reporting programs (e.g. The Climate Registry) the cost of emissions is not direct, but emissions may still be subject to verification or auditing.

Because of the increased attention and scrutiny on GHG emissions requirements, a key requirement for most GHG accounting tools is transparency of how the emissions are calculated. A GHG verifier must be able to see exactly how the calculations are performed, and determine the source of each of the inputs. For this reason, calculation engines that operate as a "black box" to users are largely unusable for GHG accounting.

The software tools to simplify calculations are variable, with some methods providing a range of Excel spreadsheet tools covering different sectors and others not providing any tools at all. Many of these calculation engines are proprietary to software vendors and are not transparent. Some of these tools have not been stress-tested in the market and are generating errors that cause enterprises to fail their verifications.

Stand-alone proprietary GHG management software has been developed by a number of software vendors to facilitate the process of corporate GHG data management and reporting across a wide range of facilities, regions, sectors and GHG emission sources. However, these software tools are often complex, lack transparency, or even contain errors. Some sectors have unique GHG emission sources (e.g. mine methane leakage; methane from landfilling of waste; adipic acid manufacture N2O emissions; aluminum sector PFC emissions; cement kiln CO2 emissions) which have led to the development of specific reporting guidelines and use of tailored calculation methods and non-standard emission factors. These unique, sector-specific emission sources generally require a separate approach to the usual, more generic methodologies.

GHG Inventory Reporting

The complexity of GHG reporting is approaching the same level as financial reporting. Many of the calculation methods are elaborate and require significant technical knowledge to understand and apply the principles. Often they are presented in long guidance documents that are time-consuming to read and difficult for the non-technical reader to understand. Typically, the standards involve many pages of documentation and contain a number of associated documents, software tools, guiding principles, nuances, exceptions and worked examples. Carbon accounting tools have both a variety of calculation methodologies and also a wide range of applications. They require complex, nested, and iterative calculations with many dependencies.

Because it is impossible to evaluate the accuracy of a calculation engine when its workings are not transparent, the calculation methodology and dynamic dependencies must be visible and easily traceable. The accuracy of calculations is affected by the factors used and the calculations and assumptions used to link them in the enterprise rollup.

Many calculation engines today suffer from the following issues:

- A lack of readily available summaries of each method/initiative and/or limited statistical data on coverage and uptake: It is difficult and time consuming to review and compare each method/initiative, and for a user to determine which method or initiative would best meet their needs.
- Important issues of coverage and key calculation and reporting requirements are often not clearly stated or are hidden within the main software and not transparent to the end user (e.g. which GWPs are used? is verification required?).
- Most GHG calculation methods and reporting initiatives are aimed at covering emissions sources for energy-intensive operations, typically found in large private sector companies (e.g. the EU ETS MRV guidelines and the WBCSD/WRI GHG Protocol): These methods may not be best for every organization.

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What to Look for in a Calculation Engine

Organizations need a GHG calculation engine that has the capability to automatically and accurately calculate GHGs from all emission producing activities at all of their facilities anywhere in the world. In order to accomplish this, a calculation engine must provide calculation of any Key Performance Indicator (KPI) or management metric. This should incorporate the ability to forecast future behavior; a number of calculation tools in different formats to cover different sectors and emission sources; and methodologies such as the California AB32, WBCSD/WRI GHG Protocol and The Climate Registry General Reporting Protocol that are available to support accounting and reporting processes.

When evaluating carbon management software with built-in calculation engines, do not underestimate the importance of being able to personally define both the calculation rules and display of calculated data for the purpose of multidimensional reporting, data editing, and analysis. With this capability, domain experts, users, and verifiers can create analytic models to define the rules that are used to calculate GHG emissions data. When looking at calculated data, it can be helpful to use different display options such as forms, pages, and workflow processes, as well as make formulae used in calculations visible and color-coded to users.

Giving end users the power to view, analyze, and make changes to analytic model data will accentuate how this particular process plays a part in overall organizational programs and strategies. By applying these methodologies you will ensure that your calculations are correct and that you pass verification the first time.

Essential characteristics of a calculation engine are:

- **Database Driven:** Supported by a SQL Server database
- **Data Integrity:** Raw data is stored in the database and is accessible to anyone with the appropriate privileges and an Internet connection. This data remains intact throughout the calculation process and is never altered
- **Flexible Data Input:** Data can be uploaded/gathered in different time intervals specific to a particular business's processes and/or reporting requirements
- **Full Audit Trail:** All calculation methods and values are stored and time-stamped in the database. If data are revised, the calculation is refreshed and the system creates a new calculation value with a new time-stamp for comparison. Only the current value is used for reporting.
- **Verified Factors:** Emissions factors are categorized by reporting program and year so that the appropriate factor is always used in calculations
- **Formulae Visibility:** All formulae are visible to end users and can be verified by approved verifiers

Benefits of a competent calculation engine:

- Users with appropriate privileges can edit calculations or raw data without programming knowledge
- Calculations are completed automatically upon entering new data or revising existing data
- Supports data input in many different formats
- Natively supports and applies any required unit conversions
- Supports complex and nested calculations (formulae can link to other calculated values)
- Can link to data gathered using other software or systems
- Customizable to a specific company's needs such as time intervals
- Instantly creates separate reports to each specified reporting program
- Organizes emissions by type (biogenic, fossil fuel-based, scope 1, scope 2, scope 3, etc.)
- Generates report-quality tables and charts for boardroom and regulatory reporting

GHG emissions reports are coming under increased scrutiny from stakeholders, regulators, and financial auditors. The right calculation engine should be able to assist you with ensuring accuracy and making emissions calculation methods and reporting formats transparent simultaneously. The process of selecting carbon accounting software and a calculation engine should not be taken lightly, as it will play a crucial part in determining the overall success of your GHG emissions inventory management.

About Locus

Locus Technologies is a leading provider of web-based GHG emissions data management software. Since 1999 Locus' software has been helping companies track, analyze, and report their data in order to surpass organizational efficiency targets, improve operations and data quality, save time, and lower costs.

For more information, please visit www.locustec.com.