



Getting the Numbers Right on Your Greenhouse Gas Report

Are you responsible for greenhouse gas (GHG) accounting and reporting on behalf of your organization? Are you finding yourself hopelessly confused when it comes to making sure you have the numbers exactly right? If so, you might take consolation in the fact that many of your peers are struggling with the same issue, understandably.

GHG accounting is nascent—consider that financial accounting standards have been developing for 150 years and are still somewhat subject to interpretation. It's hardly surprising then to find ambiguities in GHG accounting.

In our work with many different types of reporting organizations¹ we see certain ambiguities arise again and again. One set of very specific ambiguities includes:

- Ambiguity in choosing the right emissions factors to use
- Ambiguity in choosing the right GWPs (global warming potentials) to use

These lead to quite a bit of concern among our reporters, often distracting from more material issues. The purpose of this whitepaper is to support those of you who are engaged in GHG reporting by placing these ambiguities in perspective and suggesting a strategy that focuses on immediate priorities.

¹ Scope 5's customers include medium to large enterprises spanning a range of industries including consulting firms, logistics, hospitals, retail, manufacturing and others. We also serve public enterprises such as municipalities and utilities.

PREPARING FOR REGULATION

We envision a future in which externalities such as GHG emissions are priced and clear accountability standards (such as carbon pricing of some sort) are broadly established. Such standards may come at different times for different organizations—a small number are regulated now, most are not yet.

In order to prepare for regulation, it's important that organizations start implementing accounting methodologies immediately. These methodologies will evolve over time but they should reflect our best guess at how the evolving standards will eventually take form. As a specific example, we know today that emissions will likely be classified into one of 3 *Scopes*. We also know that a majority of accountable emissions will likely result from a combination of certain categories of activity, including *Electricity*, *Stationary Combustion* and *Mobile Combustion*. These established parameters enable us to get a great head start on forming our accounting methodologies.

As discussed earlier, we don't know at this time, which emissions factors to use and what global warming potentials to use. These are clouded in ambiguity.

This leads us to drawing a clear distinction between establishing methodologies on the one hand, and accuracy and precision on the other hand. While the methodologies we develop must support accuracy and precision, we cannot expect to report actual emissions numbers that are universally considered accurate and precise until the ambiguities with which this paper is concerned are resolved. The immediate focus should therefore be on establishing methodologies. The precise numbers can be plugged into those methodologies as they become available.

THE GOALS OF GHG REPORTING

Let's step back and take a look at the goals of GHG reporting from an organization's perspective. Ultimately, organizations will likely have to engage in GHG reporting to be in compliance with the law. However, until the kinds of regulations discussed are in place, to what end are organizations engaging in GHG reporting? What outcomes are they seeking?

We see organizations seeking one or more of the following outcomes in the short term:

- Being prepared for a world in which GHG emissions are regulated.
- Demonstrating corporate social responsibility (CSR) to stakeholders (in order to maintain or improve their top line).
- Identifying opportunities for efficiencies that lead to reductions in carbon emissions and related costs (in order to maintain or improve their bottom line).

Getting Back to the Numbers

Now that we've painted the landscape, let's get back to the original subject of this paper—emissions factors and GWPs. It turns out that getting the numbers accurate and precise is not necessary to achieve any of the three outcomes listed. That's not to say that we need not be concerned with accuracy and precision. These are extremely important. But they do not serve the short-term outcomes. In fact, a focus on precise numbers distracts from them.

Let's look at the significance of the numbers in the specific context of the outcomes listed.

Preparing for Regulation

Being prepared requires that organizations develop the data collection, maintenance, accounting and analysis methodologies. It should then be easy to plug any set of emissions factors or GWPs into these methodologies.





Demonstrating Corporate Social Responsibility

In the interest of demonstrating CSR, it's important that reporting organizations are able to transparently explain and defend the numbers that they use, whatever they may be.

This amounts to:

- Showing that the organization made a reasonable effort to collect reliable activity data for those of the organization's activities that are material.
- Showing that the organization used emissions factors and GWPs from recognized authorities (or went through a reasonable process to calculate their own).

Identifying Opportunities for Efficiency

In order to find opportunities for efficiency, the numbers need to be *relatively* correct, used consistently in calculations and compiled at a level of [granularity](#) that enables smart decision-making.

Now that we've looked at the relevance of the numbers to meeting the outcomes sought, we'll take a look at the myriad decisions that must be made in choosing and applying emissions factors and GWPs.

EMISSIONS FACTORS

Emissions factors quantify the translation of emissions generating activities to the resulting emissions. Several highly reputed authorities publish emissions factors.

Choosing a source for Emissions Factors

Most of these authorities don't actually do the science themselves but rather aggregate data from various sources that do do the science. There are a small number of authorities that are close to the science, such as the Environmental Protection Agency (EPA) and the International Panel on Climate Change (IPCC) and many of the emissions factors that we see originate from these authorities. In many cases, authorities pick up some of the emissions factors or updates from a specific source, but not others.

So which emissions factors should a reporting organization use? In certain cases, the protocol under which the organization is reporting might dictate a source of emissions factors. However, in most cases, guidance will be ambiguous at best. Consider this statement from the [CDP's 2015 guidance](#):

Identifying the most appropriate and accurate emissions factors to use is one of the most challenging issues in GHG accounting. Therefore it is beyond the scope of CDP's work to provide advice on specific factors and how they should be applied.

At first glance, guidance from the Global Reporting Initiative (GRI) looks a little more promising. In the GRI's [G4 Sustainability Reporting Guidelines](#) they state that:

Reporting of GHG emissions is based on the reporting requirements of the WRI and WBCSD 'GHG Protocol Corporate Accounting and Reporting Standard' (GHG Protocol).

Looking at the WRI reporting requirements leads us to a set of tools that are based on [underlying emissions factor tables](#). In these tools, the WRI tabulates emissions factors collated from various sources, including the EPA and the IPCC. This looks promising—the WRI is a reputable authority and they seem to have collated select emissions factors from reputable sources. But then we're faced with the question of which *update* to use.

Emissions Factor Updates

Different authorities update the emission factors that they publish from time to time. The WRI released emissions factor tables once in 2012 and then again in 2014. While the EPA issued updates to many of their tables in the intervening period, the WRI picked up only a subset of these updates (the ones for electricity emissions factors). So—should an organization limit their emissions factors to the WRI updates or should they use the more frequently updated underlying numbers from the EPA?

Having chosen updated numbers, the question arises as to how to use them. Should organizations calculate all emissions (regardless of the date on which the activity was incurred) using only the latest set of emissions factors or using the emissions factors that were in effect at the time that the underlying activity was incurred? For that matter, when should those updated emissions factors be considered ‘in effect’—from the day they were published? From the beginning of the reporting year in which they were published? Should organizations go back and adjust previous reported emissions based on newly published emissions factors? Consider the following advice from [The Climate Registry’s March/April 2014 newsletter](#):

Additionally, on November 29th, 2013, the U.S. EPA updated several default emission factors for the Greenhouse Gas Reporting Program within the United States. However, these updated factors have not been incorporated in The Climate Registry’s 2014 Default Emission Factor tables or CRIS. TCR reporting Members can use the updated EPA emissions factors to report 2013 data to The Climate Registry if they choose.

‘Can’ use the updated factors ‘if they choose’? *Should* they be used or not? Obviously, these instructions leave the decision to the reporting organization².

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NPCC Long Island

Units of Measure: energy

Authority: WRI

Category: Environmental

Type: Electricity

Sub Type: eGrid

Activity Data Processing: Accruing, Summing

Conversion Factors

Effective Date	CH ₄	CO ₂	N ₂ O	CO ₂ e	
initial factors	115.4147 x21 lbs / GWh	1536.8038 x1 lbs / MWh	18.0922 x310 lbs / GWh	1.5448360907 lbs / kWh	?
01/01/2007	90.5044 x21 lbs / GWh	1418.7394 x1 lbs / MWh	13.1012 x310 lbs / GWh	1.4247013644 lbs / kWh	?
01/01/2009	96.8646 x21 lbs / GWh	1347.9882 x1 lbs / MWh	12.3733 x310 lbs / GWh	1.3538560796 lbs / kWh	?

WRI eGrid emissions factor updates from the Scope 5 resource library

GLOBAL WARMING POTENTIALS

The second ambiguity we listed is the variation in GWP numbers or global warming potentials³. These tend to come from the IPCC, which just recently released the *fifth* set of GWP numbers (updates to GWPs are released in numbered *assessment reports*), reflecting for the most part, improved science. Again, the question arises as to which set of numbers should an organization use? Those that were in effect at the time related activity was incurred or the latest set or some previous set? As is the case with emissions factors, the answer is not clear.



The Climate Registry states in their 2014 [Updates and Clarifications to the General Reporting Protocol 2.0](#):

When reporting emissions to The Registry, you may use GWPs from the Assessment Report that is most relevant to your operations

That leaves things pretty ambiguous with respect to GWPs. The EPA’s recommendations from [tables they released in their 2014 update](#) are:

While EPA recognizes that Fifth Assessment Report (AR5) GWPs have been published, in an effort to ensure consistency and comparability of GHG data between EPA’s voluntary and non-voluntary GHG reporting programs (e.g. GHG Reporting Program and National Inventory), EPA recommends the use of AR4 GWPs.

Uncertainty around which GWPs to use is summarized nicely in [this blog post from the GHG Management Institute](#) which states:

Since then the IPCC has updated its GWP values three times, in 2001, 2007, and 2013. The result has been a proliferation of GWP values out there that leads to a lot of confusion.

² We’re not picking on The Climate Registry here—they do great work and provide an important service. We’re just illuminating the complexity and ambiguity surrounding emissions calculations.

³ GWPs quantify the global warming impact of different emitted gases relative to emissions of a unit of carbon dioxide.

CONCLUSION

At this point, you're probably even more confused about which emissions factors and GWPs to use than when you first sat down to read this paper. You might find solace in the fact that, so long as your organization adheres to certain high level guidelines, the specific emissions factors and GWPs chosen do not materially affect the outcomes.

We've already established that preparing accounting mechanisms for GHG reporting can be pursued independently of choosing exact emissions factors and GWPs.

DRIVING CHANGE

Digging a little deeper, this outcome is about using the results of reporting work to identify and make changes that produce meaningful results. It follows that the reporting methodology should drive decision making first and then should support the validation of decisions made so that changes made can be adjusted as necessary.

Two methodological guidelines come to mind:

1. Separate what's material⁴ from what's not.
2. Apply emissions factors and GWPs in a consistent manner over time.

⁴ Materiality is a term of art in GHG reporting. In general, material activities are those that comprise a significant part of an organization's emissions impact.



Transparency and integrity are important in serving the outcome of establishing CSR. These are served by choosing numbers from any of the authorities mentioned and disclosing the sources of the numbers.

The final outcome sought was the identification of opportunities for increased efficiencies leading to reductions in emissions and associated costs. Here's where some methodological guidelines can be helpful.

MATERIALITY AND GRANULARITY

For different organizations, different activities will be material. For example, for an aluminum smelter (or most manufacturing organizations), electricity and stationary combustion emissions will be much more significant than travel related emissions. For a global consulting firm, travel related emissions will be much more significant than energy related emissions.

Materiality considerations mean first of all that an organization must look at its emissions activity at a level of granularity that can identify those activities that are material to GHG reporting. To this end, accurate and precise emissions factors or GWPs are rarely needed. Once an organization identifies those activities that are most material, that activity should be sub-categorized and scrutinized more closely and at a finer granularity.

So—the global consulting firm probably doesn't have to worry about picking up each and every update for electricity related emissions factors in each and every region, but should probably choose a source of emissions factors that differentiates between short, medium and long haul air travel (and other nuances of travel related emissions). The aluminum smelter on the other hand, should be concerned with the difference in electricity related emissions factors by region and should probably track updates to electricity and stationary combustion related emissions factors.

In the pursuit of reducing emissions and costs, organizations should adopt an iterative cycle of measuring material emissions, implementing changes and then measuring the results of the changes. The goal is to validate that the changes implemented are producing the expected reductions. If not, they can be adjusted.

This requires a consistent measurement methodology and informs the organization's decisions as to which updates to emissions factors and to GWPs should be adopted and which should be ignored.

Emissions factor updates are generally driven by two factors—on the one hand, the science gets better and we know more. On the other hand, the emissions factors actually change. (GWP updates are driven primarily by the science).

As an example of the first factor—due to recent advances in the science we may now know that the combustion of some type of fuel yields 19.53998 pounds of CO₂ per gallon rather than 19.53996 pounds of CO₂ per gallon. The fuel has not suddenly become more emissions intensive. It was always more emissions intensive—we just didn't realize it till now.

As an example of the second case, consider the emissions due to electricity generation in a certain region. Over the years, the majority of power plants in the region may have shifted away from coal generation towards natural gas generation. As a result emissions per kWh will actually diminish.

Science-Based Changes

In the first case, reporters should probably either ignore the update (assuming it was not significant) or should go back and apply the updated emissions factors and GWPs to all activity, regardless of the date in which it was incurred. Applying the same numbers consistently over time is important to assure that the organization doesn't mistakenly conclude that the changes implemented have or have not been effective in reducing emissions. For example, applying recent, lower numbers to recent activity while using older, higher numbers for less recent activity might suggest that the organization has successfully implemented changes that have led to reductions in activity and the resulting emissions while in-fact the changes implemented may have been ineffective.

If different numbers for the same activity reflect changes in scientific knowledge, applying them differentially over time obscures real change. On the other hand, science based changes in numbers might be important in those rare cases in which new discoveries are significant enough to reveal that a specific activity previously considered material is not actually material. These cases are rare because science based changes are usually quite small relative to the differences between emissions resulting from material vs. non-material activities.

Actual Changes

Recall the example of electricity plants changing the fuel mixes they use to generate electricity. These changes are behind most of the EPA's updates to eGrid emissions factors. If an organization's electricity activity is material and is geographically distributed, then such changes in emissions factors are important to apply and should be applied differentially over time, as appropriate. This approach might inform an organization's decisions to shift energy intensive operations from one region to another over time resulting in actual change.

Summary

In summary, we recommend that organizations choose emissions factors from a reputable source, use them consistently and adopt updates only when they are material (in the sense that they reflect actual change or in the rare cases that they reflect significant science-based changes).

Two reputable sources of emissions factors are:

- [The Greenhouse Gas Protocol](#)
- [The Climate Registry](#)

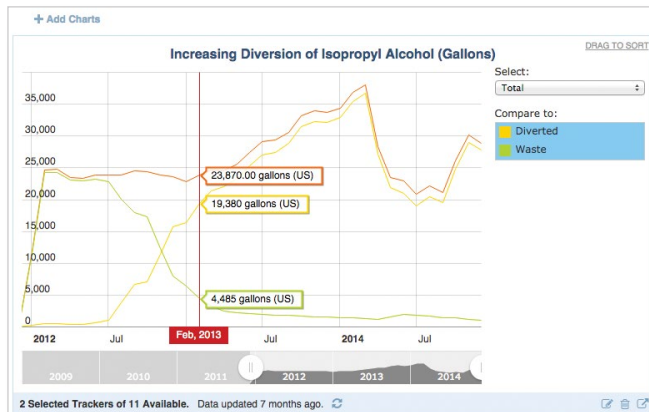
SCOPE 5

Scope 5 provides a cloud-based software service that helps organizations of all types collect, structure, track, analyze and communicate their sustainability data, benefitting their top and bottom lines. Many of our customers use our service to produce their GHG reports and to go beyond reporting to help them identify opportunities for increased efficiency and to communicate their progress to a variety of stakeholders.

The **Scope 5** service includes *resource libraries* that make up-to-date emissions factors from varied sources readily available and easily used in emissions calculations. Two of these libraries are the *WRI* library (which contains The Greenhouse Gas Protocol's emissions factors) and the *TCR* library (which contains The Climate Registry's emissions factors).

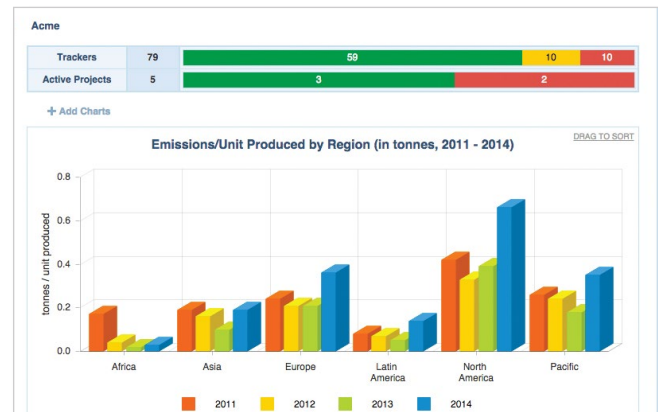
1

Capture and manage any activity data, whether environmental, social or governance.



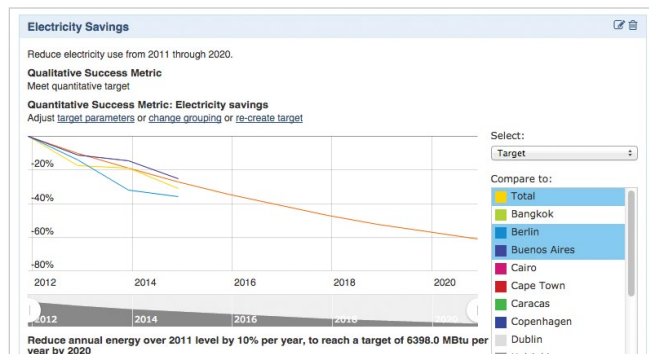
2

Calculate impacts of your activities such as greenhouse gas emissions, cost and other custom impacts.



3

Analyze your data to gain transparency and to identify opportunities to improve performance and save costs—demonstrate success!



4

Make reporting to the Carbon Disclosure Project, Global Reporting Initiative, B Corporation, and other reporting platforms easier.

Scope-1 Records

Trackers by Country	Activity	Emissions, All Gases (tonnes)			
		CO ₂	CH ₄	N ₂ O	CO ₂ e
Argentina	17,113,1367 gallons (US)	0.1221	0.0000	0.0000	0.1224
Australia	75,7803 gallons (US)	0.7676	0.0001	0.0000	0.7717
Brazil	62,9340 gallons (US)	0.6375	0.0001	0.0000	0.6409
Canada	274,0479 gallons (US)	2.7760	0.0004	0.0000	2.7909
China	4,219,1041 gallons (US)	4.6857	0.0006	0.0000	4.7107
Denmark	7,565,9190 gallons (US)	0.0540	0.0000	0.0000	0.0541
Finland	4,382,6326 gallons (US)	0.0313	0.0000	0.0000	0.0313
France	20,061,3090 gallons (US)	0.1431	0.0000	0.0000	0.1435
Germany	31,502,6482 gallons (US)	0.2248	0.0000	0.0000	0.2253
India	31,1408 gallons (US)	0.2969	0.0000	0.0000	0.2986
Ireland	30,350,8532 gallons (US)	0.2166	0.0000	0.0000	0.2171