

Accounting of Scope 2 emissions

Technical Note for reporting to CDP Climate
Change and Supply Chain programs in 2017

Version Control

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Glossary

This terminology was sourced from the *GHG Protocol Scope 2 Guidance – An amendment to the GHG Protocol Corporate Standard* published in January 2015.

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| Activity data | A quantitative measure of a level of activity that results in GHG emissions. Activity data is multiplied by an emissions factor to derive the GHG emissions associated with a process or an operation. Examples of activity data include kilowatt-hours of electricity used, quantity of fuel used, output of a process, hours equipment is operated, distance traveled, and floor area of a building. |
| Additionality | A criterion often applied to GHG project activities, stipulating that project-based GHG reductions should only be quantified if the project activity “would not have happened anyway”—i.e., that the project activity (or the same technologies or practices that it employs) would not have been implemented in its baseline scenario. |
| Attribute | Descriptive or performance characteristics of a particular generation resource. For Scope 2 GHG accounting, the GHG emission rate attribute of the energy generation is required to be included in a contractual instrument in order to make a claim. |
| Certificate | See energy attribute certificate |
| Contractual instrument | Any type of contract between two parties for the sale and purchase of energy bundled with attributes about the energy generation, or for unbundled attribute claims. Markets differ as to what contractual instruments are commonly available or used by companies to purchase energy or claim specific attributes about it, but they can include energy attribute certificates (RECs, GOs, etc), direct contracts (for both low-carbon, renewable or fossil fuel generation), supplier-specific emission rates, and other default emission factors representing the untracked or unclaimed energy and emissions (termed the residual mix) if a company does not have other contractual information that meet the Scope 2 Quality Criteria. |
| Double counting | Two or more reporting companies claiming the same emissions or reductions in the same Scope, or a single company reporting the same emissions in multiple Scopes. |
| Emission factor | A factor that converts activity data into GHG emissions data (e.g., kg CO ₂ e emitted per liter of fuel consumed, kg CO ₂ e emitted per kilometer traveled, etc.). |
| Emissions | The release of greenhouse gases into the atmosphere. |
| Energy | Formally, energy is defined as the amount of work a physical system can do on another. In this Guidance, energy refers to electrical energy generated by power plants and delivered to energy users over a power grid, or from a third party owned onsite power plant or offsite power plant through a dedicated power transmission line. |

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| Energy attribute certificate | A category of contractual instruments used in the energy sector to convey information about energy generation to other entities involved in the sale, distribution, consumption, or regulation of electricity. This category includes instruments that may go by several different names, including certificates, tags, credits, etc. |
| Fuel mix disclosure | A report by energy suppliers to their consumers disclosing the generation resources and associated attributes (such as GHG emissions and nuclear waste quantities) provided by that supplier. Disclosure laws often aim to enable informed customer choice in deregulated or liberalized markets |
| Generation | The electrical energy produced by a power plant or project activity. |
| Green electricity/power | A generic term for renewable energy sources and specific clean energy technologies that emit fewer GHG emissions relative to other sources of energy that supply the electric grid. Includes solar photovoltaic panels, solar thermal energy, geothermal energy, landfill gas, low-impact hydropower, and wind turbines. Resources included in a given certification, reporting, or recognition program may vary. |
| Green power product/ Green tariff | A consumer option offered by an energy supplier distinct from the “standard” offering. These are often renewables or other low-carbon energy sources, supported by energy attribute certificates or other contracts. |
| Greenhouse gas (GHG) inventory | A quantified list of an organization’s GHG emissions and sources. |
| Greenhouse gases (GHG) | For the purposes of this standard, GHGs are the seven gases covered by the UNFCCC: carbon dioxide (CO ₂); methane (CH ₄); nitrous oxide (N ₂ O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulphur hexafluoride (SF ₆), and nitrogen trifluoride (NF ₃). |
| Guarantee of Origin (GO) | A type of energy attribute certificate used in Europe. |
| Grid | A system of power transmission and distribution (T&D) lines under the control of a coordinating entity or “grid operator,” which transfers electrical energy generated by power plants to energy users—also called a “power grid.” The boundaries of a power grid are determined by technical, economic, and regulatory-jurisdictional factors. |
| Indirect GHG emissions | Emissions that are a consequence of the operations of the reporting company, but occur at sources owned or controlled by another company. This includes Scope 2 and Scope 3. |
| International REC (I-REC) | A type of energy attribute certificate intended for regions without an existing or reliable energy attribute tracking, currently limited to locations outside the US, EU/EEA, or Australia. |
| Location-based method | A method to quantify Scope 2 GHG emissions based on average energy generation emission factors for defined locations, including local, subnational, or national boundaries. |
| Market-based method | A method to quantify Scope 2 GHG emissions based on GHG emissions emitted by the generators from which the reporter contractually purchases electricity bundled with instruments, or unbundled instruments on their own. |

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| Megawatt (MW) | A unit of electrical power. One megawatt of power output is equivalent to the transfer of one million joules of electrical energy per second to the grid. |
| Megawatt-hour (MWh) | A unit of electrical energy equal to 3.6 billion joules; the amount of energy produced over one hour by a power plant with an output of 1 MW. |
| Offset credits (offsets) | Offset credits (also called offsets, or verified emission reductions) represent the reduction, removal, or avoidance of GHG emissions from a specific project that is used to compensate for GHG emissions occurring elsewhere, for example to meet a voluntary or mandatory GHG target or cap. Offsets are calculated relative to a baseline that represents a hypothetical scenario for what emissions would have been in the absence of the mitigation project that generates the offsets. To avoid double counting, the reduction giving rise to the offset must occur at sources or sinks not included in the target or cap for which it is used. |
| On-site generation | Electricity generated by a generation facility located where some or all of the energy is used. If the generation facility is owned and operated by the consuming company, it can be called “self-generation.” On-site generation is a form of distributed energy generation. |
| Renewable energy | Energy taken from sources that are inexhaustible, e.g. wind, water, solar, geothermal energy, and biofuels. |
| Renewable Energy Certificate (REC) | A type of energy attribute certificate used in Australia, Canada, India and the USA. |
| Residual mix | The mix of energy generation resources and associated attributes such as GHG emissions in a defined geographic boundary left after contractual instruments have been claimed/ retired/canceled. The residual mix can provide an emission factor for companies without contractual instruments to use in a market-based method calculation. |
| Scope 1 emissions | Emissions from operations that are owned or controlled by the reporting company. |
| Scope 2 emissions | Indirect emissions from the generation of purchased or acquired electricity, steam, heat or cooling consumed by the reporting company. |
| Scope 2 Quality Criteria | A set of requirements that contractual instruments shall meet in order to be used in the market-based method for Scope 2 accounting. |
| Scope 3 emissions | All indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. |
| Supplier | An entity that provides or sells products to another entity (i.e., a customer). For this guidance, refers to electricity supplier. |
| Supplier-specific emission factor | An emission rate provided by an electricity supplier to its customers, reflecting the emissions associated with the energy it provides. Suppliers offering differentiated products (e.g. a renewable energy product) should provide specific emission rates |

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| | for each product and ensure they are not double counted with standard power offers. |
| Tracking system | A database or registry that helps execute energy attribute certificate issuance and cancellation/retirement/claims between account holders in the system. It can track information on certificates or generation occurring throughout the defined system. They are typically tied to geopolitical or grid operational boundaries. |
| Tradable Instruments for Global Renewables (TIGRs) | A type of energy attribute certificate intended for regions without an existing or reliable energy attribute tracking, currently limited to locations outside the US, EU/EEA, or Australia. |
| Unbundled | An energy attribute certificate or other instrument that is separate, and may be traded separately, from the underlying energy produced. |
| Vintage | The date that electric generation occurs and/or was measured, from which an energy attribute certificate is issued. This should be distinguished from an energy facility's age (e.g. date that a generating unit commenced operation). |

Introduction

This Technical Note has the objective of explaining how to report Scope 2 emissions to CDP in line with the updated 2015 version of the “*GHG Protocol Scope 2 Guidance – An amendment to the GHG Protocol Corporate Standard*”. The intended reader of this document is anyone looking to obtain how to report their Scope 2 emissions to CDP in the current disclosure cycle.

This 2017 version is a minor update to the 2016 notes, but includes some important new elements:

- New countries adherent to the International REC Standard (I-REC Standard);
- New global instrument, Tradable Instrument for Global Renewables (TIGR), launched and available in Asia, Africa, North and South America.
- A note on green gas certificates, a contractual instrument for Scope 1 accounting.

This Technical Notes is comprised of five main sections.

Section 1: Accounting and reporting Scope 2 emissions offers and overview of principles and definitions useful for scope 2 accounting and CDP’s requirements for the 2017 disclosure cycle.

Section 2: Explaining market-based and location-based reporting guides companies in determining when to use a market-based method and a review of the hierarchy of Scope 2 emissions factors.

Section 3: Country and regional guidance and resources presents a non-exhaustive collection of information and resources useful for Scope 2 reporting, organized by region and country.

Section 4: Frequently Asked Questions (FAQ’s) is a collection of common questions and answers regarding requirements and best practice in reporting Scope 2 emissions to CDP.

Section 5: Worked examples presents examples of how to answer the questions related to Scope 2 emissions in the CDP Climate Change questionnaire 2017.

If you have any questions, comments or suggestions about the content of this document please contact CDP at respond@cdp.net.

1. Accounting and reporting Scope 2 emissions

This section presents the basics of Scope 2 accounting, the recommendations of the GHG Protocol, and how to report Scope 2 emissions for CDP's Climate Change questionnaire.

1.1 Definitions

The *GHG Protocol Corporate Standard* divides a company's GHG emissions inventory into direct and indirect emissions [11, pp. 33]:

- **Direct emissions** are emissions from sources that are owned and controlled by the reporting company. These emissions are considered **Scope 1**.
- **Indirect emissions** are emissions that are a consequence of the activities of the reporting company, but occur at sources owned or controlled by another company. These include **Scope 2** and **Scope 3** emissions.
 - **Scope 2** includes emissions from energy purchased or acquired and consumed by the reporting company.
 - **Scope 3** emissions include upstream and downstream value chain emissions and are an optional reporting category in the Corporate Standard.

This document focuses on accounting and reporting Scope 2 emissions to CDP. Companies should refer to the complete definition of Scope 2 in chapter 5 of the *GHG Protocol Scope 2 Guidance* [11].

The accounting approach recommended by the *GHG Protocol* has two important consequences:

- Emission reductions are presented and calculated by comparing changes in a company's GHG inventory over time relative to a base year.
- Emissions reduction in a corporate GHG inventory does not always reflect physical emissions reduction, specifically in the case of indirect emissions (Scope 2 and Scope 3) [7, pp. 59]¹.

1.2 Scope 2 accounting: the emission rate approach

Calculating Scope 2 emissions require "allocating" the GHG emissions created by electricity generation to the end consumers of a given grid. Scope 2 allocation is through emission factors applied to units of energy consumption (activity data).

This "emission rate" approach uses the following calculation expression:

$$\text{Emissions [tCO}_2\text{e]} = \text{Activity data [MWh]} * \text{Emission factor [tCO}_2\text{e/MWh]}$$

Where:

- Activity data is the amount of electricity purchased and consumed in megawatt-hours (MWh). This value will generally be directly measured, specified in purchase contracts or estimated;
- Emission factor represents an average value, for a given period of time, of emissions per MWh, for either a specific grid, supplier or energy generation source. The emission factors reflect emissions assessed at the point of energy generation and do not include T&D losses or upstream lifecycle emissions associated with the technology or fuel used in generation.

¹ "Reductions in indirect emissions (changes in Scope 2 or 3 emissions over time) may not always capture the actual emissions reduction accurately. This is because there is not always a direct cause-effect relationship between the activity of the reporting company and the resulting GHG emissions."

Renewable energy purchases in Scope 2 GHG inventories shall be calculated using an emission factors approach² and should not be treated as “avoided emissions”³.

1.3 Scope 2 reporting recommendations

CDP encourages its reporting companies to follow the accounting and reporting recommendations of the updated *GHG Protocol Scope 2 Guidance* published in January 2015. These recommendations can be summarized in three main elements, briefly explained below:

- Dual Scope 2 reporting requirements
- Quality criteria for contractual instruments used to document Scope 2 emissions
- Additional disclosure recommendations

Dual Scope 2 reporting requirements

The *GHG Protocol Scope 2 Guidance* introduces “dual reporting” duties for companies that operate in markets where contractual instruments are available. These companies shall report Scope 2 figures in two ways, using both the location-based method and the market-based method. These methods are defined in section 1.4 below.

Note: As per 2016, CDP recommends that all companies perform dual reporting of Scope 2 emissions, following the CDP Climate Change questionnaire guidance document.

Quality criteria for contractual instruments

The GHG Protocol Scope 2 Guidance also specifies quality criteria for contractual instruments used to document Scope 2 emissions. The purpose of introducing the quality criteria is to help companies navigate whether the information they have is usable for credible and accurate market-based claims.

For contractual instruments, the GHG Protocol Scope 2 quality criteria require that they:

1. Convey GHG information;
2. Be an exclusive claim;
3. Be retired;
4. Match up to inventory period; and
5. Be sourced from same market as the company.

Note: CDP does not require that companies provide evidence of verification that their contractual instruments meet these quality criteria and this aspect has no impact on CDP scoring. However, if the verification statement states the GHG inventory is done according to the GHG Protocol standard, CDP expects that the checking of quality criteria has been considered in the verification procedures.

Additional disclosure recommendations

The GHG Protocol Scope 2 Guidance recommends that companies disclose additional information to distinguish differences in purchases between markets, and enhance transparency. This additional information concerns instrument labels, power plant features and the policy context (for example, about whether a power generating facility has received public subsidies).

² An attributional accounting is practiced when calculating emissions per average unit of production, such as with grid electricity emission factors. When a grid average emission factor is used for a calculation of a Scope 2 figure, one is using an attribution rule that allocates emissions proportionally to physical consumption.

³ Working in practice as a “Scope 2 offset”. Please see ¹ for more information.

1.4 Location-based and market-based Scope 2 accounting

Historically, companies, programs and policy makers have used two main methods for accounting Scope 2 emissions: a **location-based method** and a **market-based method**. These methods differ in respect to the choice of emissions factor used for the allocation. Both methods, further defined below, are recognized and required by the GHG Protocol, and required for reporting Scope 2 emissions to CDP's Climate Change and Supply Chain programs from 2016 onward.

The location-based method

The **location-based method** reflects the average emissions intensity of grids on which energy consumption occurs. This method applies to all locations where grids are used for the distribution of energy, where electricity demand causes the need for energy generation and distribution.

The location-based method follows the basic allocation approach (section 1.2) and uses mostly grid-average emission factors that are based on statistical emissions information and electricity output aggregated and averaged within a defined geographic boundary and a defined time frame. This includes regional/subnational grid averages and national production grid averages.

Note: Additional reporting recommendations and sources of grid-average emission factor data useful for reporting to CDP are covered in the next chapters.

The market-based method

The **market-based method** reflects emissions from the electricity that companies have chosen in the market or their lack of choice. Markets differ as to what contractual instruments are commonly available or used by companies to purchase energy or claim its specific attributes, but can include:

- Energy attribute certificates (RECs, GOs, I-REC, etc.)
- Direct contracts (for both low-carbon, renewable, or fossil fuel generation)
- Supplier specific emission rates
- Regional emission factors representing the untracked or unclaimed energy and emissions in a market with choice for consumers, differentiated products and supplier specific data (termed the "residual mix")

This method can only be used in and is required for locations where the type of contracts, instruments and information listed above **are available to corporate purchasers and they meet the GHG Protocol's quality criteria** [11, pp. 63].

If a company either **does not have any such contracts or its instruments do not meet the quality criteria**, then it should use the residual mix. If the residual mix is not available, then the location-based method may be used and companies can calculate their Scope 2 emissions with either regional/subnational grid averages or national grid averages.

Note: Additional reporting recommendations for choosing an emission factor in market-based accounting are given in section 1.6 of this chapter.

1.5 Reporting Scope 2 to CDP

The GHG Protocol Scope 2 Guidance has specific reporting requirements which were first reflected throughout CDP's Climate Change questionnaire in 2016.

Pages in the Climate Change questionnaire that are relevant for Scope 2 accounting are:

| Key: | Irrelevant | Relevant | |
|---------------------------|-----------------------|------------------|--------------------------|
| 0: Introduction | 1: Governance | 2: Strategy | 3: Targets & initiatives |
| 4: Communications | 5: Risks | 6: Opportunities | 7: Methodology |
| 8: Emissions | 9: S1 Breakdown | 10: S2 Breakdown | 11: Energy |
| 12: Emissions performance | 13: Emissions Trading | 14: Scope 3 | 15: Sign off |

Question specific guidance

- **CC3.1a: Please provide details of your absolute target**
 - Please note that this refers to CC3.1b as well.
 - As some companies will be now calculating two Scope 2 figures (market-based and location-based), they may wish to set specific targets for each figure. For example, a company may intend to reduce their market-based figure through the purchases of renewable energy certificates, which would decrease that figure, but would not impact their location-based figure. But this is just one approach to reducing emissions, and so may also decide to set a location-based target focusing on decreasing energy consumption and improving energy efficiency. Thus a company can set targets for just a location-based figure, a market-based figure, or potentially both of them.
- **CC7.1: Please provide your base year and base year emissions (Scopes 1 and 2)**
 - Companies should ensure that the base year inventory includes both a location-based and market-based Scope 2 total, if applicable and feasible. This ensures “like with like” comparison over time. If the Scope 2 base year chosen was calculated only according to the location-based method, then you should also recalculate a market-based total if contractual information or residual mix totals are available for the base year. If not, you should state that the location-based result has been used as a proxy since a market-based result cannot be calculated.
- **CC8.3⁴: Please describe your approach to reporting Scope 2 emissions**
 - Please see the decision tree in section 2.1.
 - Question CC8.3 allows a company to report their Scope 2 emissions using both the location-based and market-based approach, in accordance with the GHG Protocol's

⁴ Changed in 2017 to better understand how and why a company has adopted its Scope 2 reporting.

Scope 2 Guidance. Question CC8.3 allows a company to explain why they may not be providing a market-based emissions figure.

- Most companies purchasing renewable energy would answer both location-based and market-based Scope 2 reporting approach to this question. The exception would be a company with operations entirely in countries that offer no opportunity to obtain product- or supplier-specific data or to purchase contractual instruments such as RECs or GOs.
- **CC8.3a: Please provide your gross global Scope 2 emissions figures in metric tonnes CO₂e**
 - Companies are asked to provide both of their Scope 2 figures (if applicable). Where a company responds 'We have no operations where we are able to access electricity supplier emissions factors or residual emissions factors and are unable to report a Scope 2, market-based figure' or 'We have operations where we are able to access electricity supplier emissions factors or residual emissions factors, but are unable to report a Scope 2, market-based figure' to CC8.3, they will only be expected to report location-based figures.
 - CDP has also introduced a comment column to help companies describe more context to their response, particularly in cases where a company does have operation in regions where there are contractual instruments, but are not yet able to calculate a market-based Scope 2 figure. For example, if a company is unable to provide both figures in the follow-up question, it can use the comment column to provide context, such as the fact that they are still in the process of adapting to the new Scope 2 requirements.
- **CC8.5: Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations**
 - Companies will likely be at different stages with the certainty of the calculation of both their Scope 2 figures. Companies are asked to calculate the level of uncertainty for both the location-based and market-based Scope 2 figures. For example, a company may be very mature on how to calculate a location-based figure, and therefore would disclose a lower uncertainty range. However, this may be the first time they have calculated a market-based figure, and therefore may disclose a higher level of uncertainty for this question.
- **CC10.1a: Please break down your total gross global Scope 2 emissions and energy consumption by country/region**
 - Please note that this refers to CC10.1a, CC10.2a, CC10.2b, and CC10.2c as well.
 - CDP ask companies to provide a breakdown of Scope 2 figures. For example, companies are asked to breakdown their Scope 2 figures down by country, business activity, facility and emissions be activity. As such, each of these questions have had a column added for companies to provide a breakdown of their Scope 2 market-based emissions. The purpose of CDP requesting these breakdowns is to increase transparency on how they were calculated. E.g. a company may be required to provide both a market-based and location-based Scope 2 figure, but may also have operations in a country where there are no contractual instruments. By providing a country specific breakdown, a company can increase transparency on where there are contractual instruments.
- **CC11.4: Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a**
 - In order to increase transparency, companies are asked to break down which Scope 2 emission sources were accounted for at a low carbon emission factor, and what

emissions factor was used for the calculation. Furthermore, companies are asked to specify the amount of energy consumed with each reported source in MWh.

- **CC12.1b: Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?**
 - In question CC12.1a, companies are asked to compare their combined Scope 1 and 2 emissions to the previous reporting year. Companies are only required to compare their Scope 2 emissions for just one Scope 2 figure (either location-based or market-based). In the interest of transparency, companies are required to be transparent about which figure they use.
 - A company may not have calculated a market-based figure in the previous reporting year. In this case, a company can recalculate the previous year figure according to the market-based principles, and then compare it with the current reporting year's market-based figure.
- **CC12.2: Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO₂e per unit currency total revenue**
 - Please note that this refers to CC12.2 and CC12.3 as well.
 - Companies are required to disclose their emissions intensity for combined Scope 1 and 2 emissions against their total revenue for the reporting year, as well as at least one other metric of their choice. To ensure the reporting burden does not increase, companies are only required to provide one figure for both revenue and other intensity metric. However companies are required to be transparent about which Scope 2 figure they use. Companies should disclose this information in the column entitled 'Scope 2 figure used'.

1.6 How can companies go further?

How can companies go beyond with their Scope 2 reduction action? Section 11.4 of the GHG Protocol Scope 2 Guidance presents a range of procurement choices that companies can bring to bear their financial resources, creditworthiness, scale of consumption, technical knowledge, collaboration, or other approaches in order to help overcome traditional barriers to scaling the development of low-carbon energy.

These include a) Direct contracting with new low-carbon energy projects, b) working with electricity suppliers for new projects, c) establishing "eligibility criteria" for corporate energy procurement, relating to specific energy generation features or policy interactions that align with new low-carbon energy projects, and d) incremental funding or donations.

Ecolabels are a way for companies to do more with their purchases. The GHG Protocol Scope 2 Guidance mentions that EKOenergy label as an option, as it is a mark of quality which comes on top of tracking certificates. Electricity sold with the EKOenergy label fulfills strict environmental criteria and raises funds for new renewable energy projects. Involvement, transparency and 'deeds not words' are important principles of EKOenergy's work.

Another example is Gold Standard, an international standard for climate security and sustainable development. Gold Standard has developed an ecolabel for attribute tracking systems including for use in combination with the I-REC Standard, EECS-GOs in Europe and other national/regional systems adherent to their quality standards. The Gold Standard REC label includes stringent requirements to ensure renewable energy projects meet highest safeguards, are inclusive of stakeholders, contribute to sustainable development priorities, and generate new renewable energy that could not have otherwise been realized.

Leadership with EKOenergy

Who is behind the label

The EKOenergy label is a not-for-profit initiative of the EKOenergy Network, a group of 40 (and counting) environmental organizations from 30 countries. EKOenergy started in 2013 in Europe and is now gradually increasing its global reach. Every member organization appoints one person to the EKOenergy Board, the Network's highest governing authority. The Board takes decisions in consultation with the Advisory Group, which consist of experts from different stakeholder groups, including electricity industry, consumers and environmentalists, among others.

A global label

EKOenergy is the only international ecolabel for renewable electricity. It is available all over the world and its material is available in more than 30 languages.

EKOenergy Climate Fund

For each MWh of EKOenergy sold, the seller pays a minimum of €0.10 to EKOenergy's Climate Fund. This money is used to finance climate projects that would not have happened without the contributions. These projects are managed by experienced organisations. In 2015, EKOenergy financed [solar panels on schools](#) in Tanzania, Cameroon and Indonesia. All projects have been selected in an open process, with sellers, buyers and independent experts actively involved.

EKOenergy and biodiversity

EKOenergy takes into account the impacts of electricity production on ecosystem services, habitats and the biodiversity of species. Firstly, it does this by excluding the most environmentally degrading and problematic electricity production methods. Secondly, it finances river restoration through an Environmental Fund. Whenever hydropower is sold with the EKOenergy label, €0.10/ MWh go to the Environmental Fund, to finance river restoration projects.

Communication

Companies that buy EKOenergy electricity can use the EKOenergy logo in their offices, buildings and products. This way, they can show that they use the best available renewable electricity, and encourage others to do the same.

Contact

www.ekoenergy.org | info@ekoenergy.org

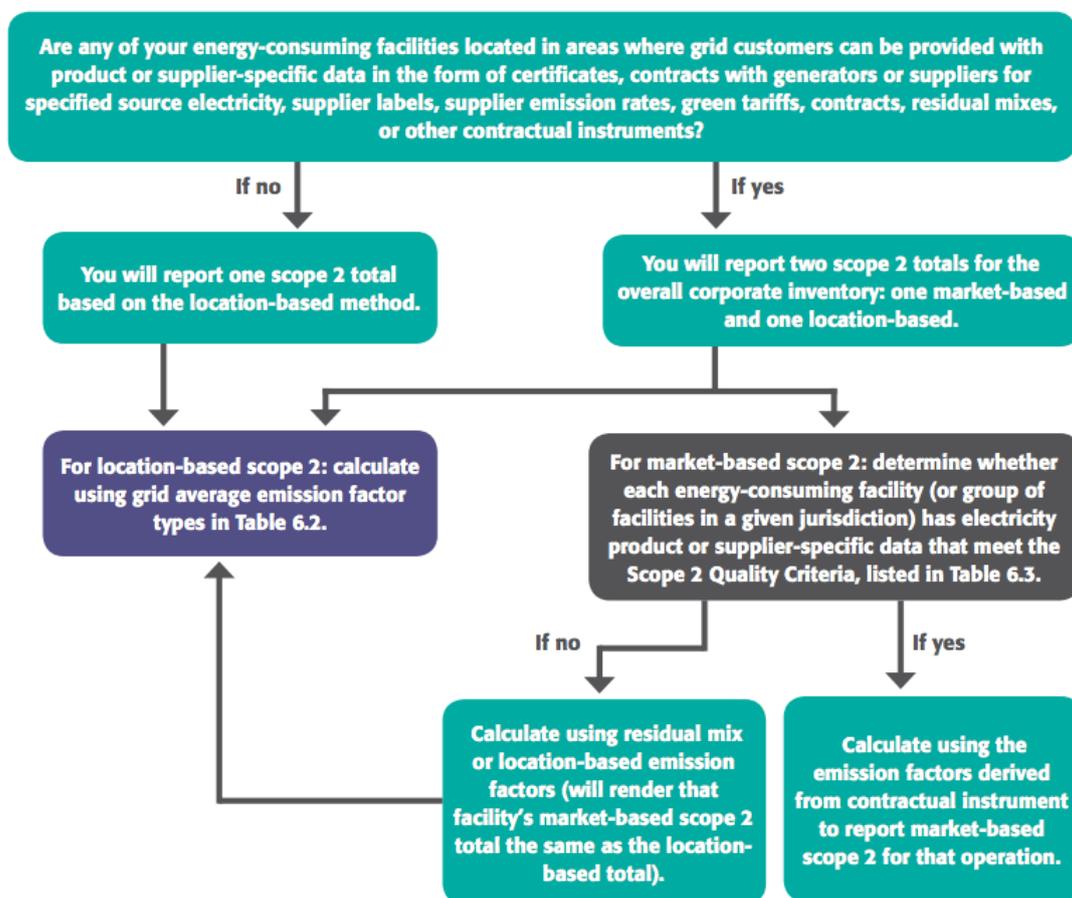
See also the course "Green Power for LEED and Carbon Accounting", produced by EKOenergy and the German Green Building Association for the USGBC.

2. Explaining market-based and location-based reporting

The determination of whether the market-based method applies is made at the company level. If a company has any operations in any country where market-based options are available, it must report market-based emissions for all of its operations in all countries. This section aims to help companies understand whether or not they should use a market-based approach to Scope 2 accounting and in the choice of emissions factor.

2.1 Determining the applicable Scope 2 methods

A company will need to determine if it must report a market-based Scope 2 figure in addition to a location-based figure in question 8.3a. The GHG Protocol provides the decision tree below to help companies make this determination.



Determining which accounting methods to use for Scope 2. Source: GHG Protocol Scope 2 Guidance p. 45.

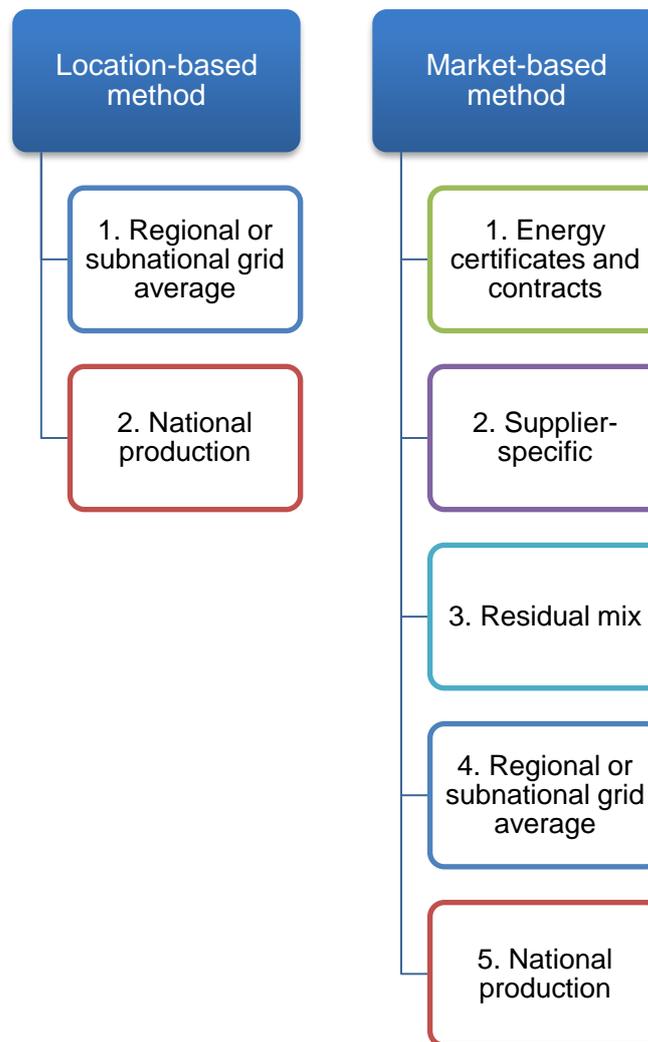
Companies are invited to read Chapter 6: Calculating Emissions of the GHG Protocol Scope 2 Guidance in full, for a comprehensive overview of key requirements, steps, and procedures involved in calculating Scope 2 emissions according to each method.

2.2 Choosing the right Scope 2 emission factors

After determining whether it needs to report only one location-based total, or both location-based and market-based totals, the company must select an emission factor for every emission source that is part of each total.

For both approaches, the GHG Protocol recommends a hierarchy of emission factors that should convey combustion-only (direct) GHG emission rates, expressed in metric tons per MWh or kWh. This is explained in sections 2.3 and 2.4.

The figure below presents the emission factor hierarchy for both methods, and lists all applicable source emissions factors along with a number reflecting the order in which they should be used.



In a location-based calculation, the emission factor of each source of Scope 2 emissions in a country shall be the grid average emission factor, every time this data is available. Only when grid average data is not available the national production emission factor shall be used instead.

Accordingly, in a market-based calculation, the highest order emission factors of each source of Scope 2 emissions are source-specific emission factors such as those conveyed by energy attribute certificates, Power Purchase Agreements or other contracts with sources, and so on until order no. 5.

Case study

Company A is a globally integrated business that has operations in four different countries. To develop their Scope 2 emissions inventory, they have collected data from each of the different global offices. As there are contractual instruments available in some countries in which the company operates, we are required to report both market-based and location-based Scope 2 figures for all our operations.

USA: Our US global office consumed 20,000MWh in the reporting year. We also purchase 20,000 RECs (1 REC=1MWh) from a solar farm. Because solar electricity generates no emissions, for our market-based figure we have used a zero emissions factor. For our location-based figure we have used the eGRID sub-region average factor multiplied by our purchased and consumed electricity.

UK: Our UK office consumed 2,000MWh in the reporting year. For our location-based figure we used the grid average factor, while for our market-based figure we used the residual mix. This explains why our market-based figure is higher than our location-based figure.

China: Our China office consumed 30,000MWh in the reporting year. We have purchased no contractual instruments, but the company is still required to produce two Scope 2 figures, our location-based and market-based figures are the same.

India: Our India office consumed 38,000MWh during the reporting year. Since 2012 we have had a collaborative partnership with a renewable energy company which provides a direct line from their solar panels to our office. In the reporting year this was 50% of our total consumption. Our location-based figure was calculated with the grid average factor. Our market-based figure was calculated by including the renewable energy purchased directly (19,000 *0) while the remaining electricity calculated with the grid average factor as no residual mix is available.

| Country | Electricity consumed | Location-Based Total (mtCO ₂ e) | Market-Based Total (mtCO ₂ e) | Instrument Types |
|--------------|----------------------|--|--|--|
| USA | 20,000 | 650 | 0 | RECs to cover 100% of consumption |
| UK | 2,000 | 100 | 500 | Residual mix |
| China | 30,000 | 800 | 800 | N/A |
| India | 38,000 | 850 | 400 | Collaborative direct-line solar to cover 50% consumption |
| TOTAL | | 2,800 mtCO₂e | 1,750 mtCO₂e | |

2.3 Emission factors for location-based accounting

This section introduces types of location-based emission factors available, listed in order of preference based on the precision of the factors.

2.3.1 Regional or subnational grid emission factors

Grid average factors reflect the physical GHG intensity of the grid, which is essential information for the climate mitigation policies and initiatives. For this reason, the use of grid average factors is well known and accepted by the international GHG accounting community.

Scope 2 accounting that uses grid average emission factors however has a number of limitations:

1. The time lag in the publication of this type of data is usually over one year.
2. Methodologically, there is great deal of variation in how this data is produced, depending:
 - a. Whether GHG emissions from fuel combustion besides CO₂ are accounted for or not;
 - b. Whether transmission and distribution losses are included or not⁵;
 - c. Whether heat-related emissions are incorporated into the emission factor or not;
 - d. How the electricity grid is defined; and
 - e. National policies: in some jurisdictions renewable electricity and its associated emissions attributes are counted within the grid average emissions factor used by other end-users, leading to double-counting of the benefits.
3. The use of grid average factors gives companies little flexibility in Scope 2 emissions action. Individual consumers have limited influence on the grid average value and, in practice, can only act to reduce the amount of electricity they purchase and consume. This system is not conducive to individual accountability and broader-ranging change in purchasing practices.
4. If the grid average produced is not corrected for the tracking instruments associated with electricity that have been sold separately, then it can lead to double counting of Scope 2 emissions⁶; The corrected value is the so-called residual mix (see section 2.4.4).
5. The concept of what constitutes a “grid” is not properly defined at an international level for the purposes of producing emission factors. In Europe, for example, country based emission factors are often called “grid average” when in reality the grid for that country is much broader and can span several countries.

Grid average factors are usually available for most countries or grids and are published by several organizations and government bodies, such as countries’ ministries of environment and/or energy. When a grid emissions factor is corrected to take into account the allocation of renewable energy traded through attribute certificates, then it is referred to as **residual mix** (see section 3.4).

A [useful source of grid average emission](#) factor information is the **Institute for Global Environmental Strategies**, which has compiled [grid emission factors utilized for registered CDM project activities](#) from publicly available sources on the UNFCCC website.

Please read chapter 4 for additional up to date sources of grid average emissions factors and residual mix figures for different countries and regions.

2.3.2 National production emission factors

⁵ This may lead to double-counting. Under the GHG Protocol Corporate Standard, utility companies should report T&D losses within their Scope 2 figure. The end-user should report these losses under Scope 3.

⁶ To avoid this type of double counting corrected emission factors need to be in place or pragmatic considerations need to be taken in account. Corrected emissions factors are currently being investigated in Europe under the REDISS project (<http://www.reliable-disclosure.org/>) and in the USA it has been estimated that the error from double counting when considering the e-GRID emission factors “is less than one half of one percent” [8, pp. 14].

The emissions intensity of overall national energy (or electricity) production is a data source of last resort for the calculation of Scope 2 emissions for a particular country or region, when regional or subnational emissions factor information is not available.

The **International Energy Agency (IEA)** publishes national production-based emission factors. To see IEA's most recent publications, click [here](#).

2.4 Emission factors for market-based accounting

This section introduces types of market-based emission factors available, listed in order of preference based on the precision of the factors. A company should determine which of these emission factors are appropriate for each facility, and research and obtain the appropriate emission factors.

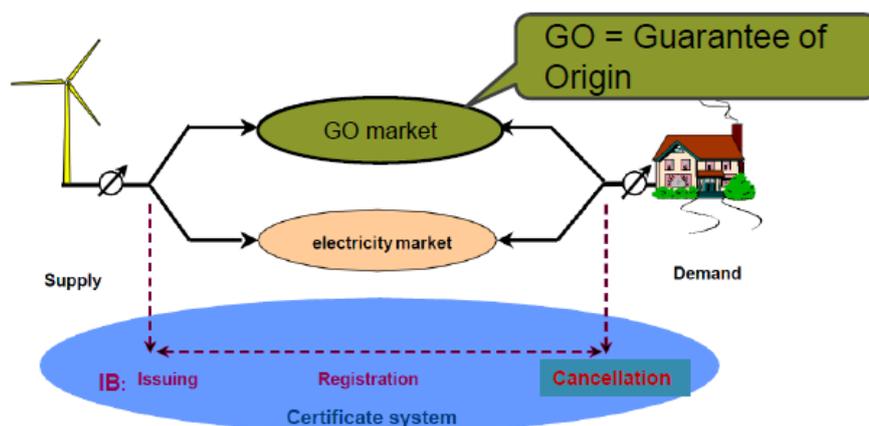
2.4.1 Energy attribute certificates and contracts

Energy Attribute Certificates

The GHG Protocol Scope 2 Guidance requires that the emissions factors from Energy Attribute Certificates (certificates) that a company has retained or acquired be the first choice in market-based Scope 2 accounting.

It is best practice to use certificates that rely on robust energy tracking and auditing systems that enable a link to be established between the energy production at a given source (with its specific attributes), and its sale through a network of suppliers, until it reaches the final consumer who will claim the specific characteristics of the original source. This tracking system does not aim to track the physical flow of electricity on the grid (which is not feasible). Instead, it aims to track the contractual relationships of the electricity purchase in a robust and auditable form.

An example of how tracking systems work is exemplified in the figure below, which represents how Guarantees of Origin, a type of certificates, are generated and traded in Europe.



Such systems provide the ability to document and track the entire chain of custody, and have already been implemented for carbon markets, forest products, marine products and the electricity market. For electricity markets there are two prominent established systems, the Renewable Energy Certificate systems (RECs) in USA and the European Energy Certificate System (EECS) system in Europe.

The use of such systems provide full tracking and auditing of the electricity custody chain, allowing the delivery of source-specific emission factors provided that any entity claiming certain characteristics of its electricity can point to appropriate certificates retired in the system, by the entity itself or by someone on their behalf.

2.4.2 Examples of reliable tracking systems

Reliable tracking systems are independent, transparent and robust. From a CDP perspective, there are four criteria that need to be fulfilled:

- There is an entity responsible for the instruments' generation (issuing body) that issues the instrument in a publicly available registry(ies) against renewable energy delivered by a generator. Only one instrument is issued per unit of energy (e.g. MWh) and this link is properly audited.
- A set of attributes are present in the instrument or can be legitimately inferred from it, namely:
 - Name of producer;
 - technology type;
 - year of installation;
 - year of production;
 - state support/aid; emission rate;
 - other environmental characteristics.

Properties should not be disaggregated, e.g. it is not allowed for one party to count for the GHG emission factor and another party to count for the fact that it is renewable in origin.

- There is an auditable chain of custody, that is, all information can be verified or audited by users in the system and the whole system is audited by external parties, guaranteeing that the link between generation, distribution and final consumption is effectively established and that there is a permanent retirement/cancellation mechanism within the system.
- The information in the system can be used to avoid the double counting of attributes.

These systems have taken different forms to adhere to the different regulatory obstacles in each country or region where they are active. The three tracking systems described below, and their subsequent energy attribute certificates, are examples of reliable mechanisms for attribute delivery and individual consumer claims.

In addition to the issuance, tracking of properties and guarantee of the chain of custody, there can be **certification** schemes that will testify for the appropriate use of an instrument for a given purpose. These certification systems (or labels) can be based on appropriate tracking systems and add important assurances and quality criteria. An example of certification is the Green-e energy program in the USA.

North American REC Tracking Systems

Electricity markets in the United States, Canada and Northern Baja California are served by a variety of geographically-defined tracking systems.⁷ These systems were developed primarily to meet the needs of state-level renewable energy programs (renewable portfolio standards or RPS), and to facilitate electricity supply disclosure information (proof of sources of power) for load serving entities in deregulated (competitive) electricity markets. They also serve voluntary renewable energy market participants. All of the systems, with one exception⁸, were developed and originally funded by governmental or quasi-governmental agencies interested in using the systems for regulatory compliance. North American tracking systems can be differentiated as either all-generation certificate tracking systems or systems that limit participation to renewable energy generation, RECs. There are three all-generation tracking systems, all in the Northeast United States (NEPOOL GIS, NYGATS and PJM-GATS). The rest are renewable energy only. Some of the systems in the US track generation within a single state (e.g., North Carolina and Texas), but most states using tracking systems participate in tracking systems designed to cover a multi-state footprint.

European Energy Certificate System Guarantee of Origin (EECS-GO)

⁷ See a map of North American tracking systems here: <http://www.etnna.org/images/PDFs/ETNNA-Tracking-System-Map.pdf>.

⁸ The North American Renewables Registry is a privately developed and administered tracking system that offers certificate tracking to generators in regions where there is not a tracking system established by state agencies or a regional transmission or system operator.

Guarantee of Origin certificates are a European-wide requirement used to prove the share of energy from renewable sources to the final consumer. The mandate for national GO tracking system implementation is embedded in European law. This requirement however does not mandate the necessary technical systems to ensure that the GO is a reliable energy attribute certificate. National adoption of the European Energy Certificate System or EECS Standard by national GO issuers ensures the standardization of consumer claims and the robustness of the energy attribute certificate. EECS-adherent countries represent a large majority of the European Member States. Within EECS countries certificates can be electronically transferred to any other EECS country for subsequent cancellation and proof of electricity consumption in that area. Most European countries, and all EECS-adherent countries, mandate that consumer electricity usage claims be verified by GO cancellation. These countries ensure electricity supplier products are factual through frequent audits of their delivered electricity products. In Switzerland and Austria, the verification of consumer claims with the GO is mandated for all supplier-delivered electricity products, regardless of if it is a renewable or non-renewable product. This increasingly popular policy trend is called full-disclosure and is being discussed in a number of other European member states.

The International REC Standard (I-REC Standard)

The International REC Standard is a stakeholder-led organization that provides a list of rules, regulations and best practices which together form the I-REC Standard. The I-REC Standard provides the blueprints for a standardized tracking system that can be easily implemented in any country or region. An I-REC standardized tracking system will provide an internationally recognized method for electricity attribute allocation in regions that lack this reliable or transparent tool. Together with governments, policy makers and informed stakeholders the I-REC Standard provides a simple method for the voluntary or compliance implementation of a tracking system, depending upon the needs of the local authorities. It is also possible to voluntarily implement an I-REC standardized tracking system in regions without an available system, assuming the I-REC Standard organization can provide reliable attribute transfers and claim exclusivity. For this reason, the legislative basis for I-REC certificate issuance will be different in each country where an I-REC standardized tracking system is active.

To make a reliable and cost-efficient system, a central registry system is used by all I-REC standardized tracking systems. This ensures the system is easily understood by its users and claims can be easily audited by third-parties. Local issuance of I-REC certificates is administered by an independent local issuer preferably acting with the recognition or support of local governmental authorities. The issuer controls the registration of electricity production facilities while verifying the reporting of electricity production data, issuing I-RECs based on the verified production.

Tradable Instruments for Global Renewables (TIGR Registry)

In 2016 the registry for Tradable Instruments for Global Renewables, TIGRs, was launched by APX, the company that operates the tracking systems in the United States, to meet demand for energy attribute tracking in Asia and beyond. The TIGR RegistrySM (the Registry) collects and tracks information regarding renewable energy generation originating within supported countries. The Registry is designed to provide a policy-neutral, market-driven, electronic system for participants in renewable energy markets. By creating a reliable process to evidence verification, issuance and Retirement of TIGRsSM the Registry brings increased levels of integrity and trust to purchasers, sellers and regulators in the market. The Registry tracks and displays the attributes, certifications and program eligibilities associated with each TIGR, as established by documentation and/or third-party verification during the Asset registration process. Assets can be registered in the Registry based on ownership of the Asset or, if authorized, based on acting as the Responsible Party for the Asset.

The Registry provides Account Holders and the public with reports on activity within the system. The public reports are accessible to anyone via the public page on the Registry website. These public reports are designed to ensure Registry transparency as to TIGRs issued and Retired as well as providing visibility to the TIGR attributes and program eligibilities.

A note on tracking systems

The I-REC and TIGR system are currently working to ensure harmonization between their efforts to track renewable electricity in the voluntary market in a robust way. CDP seeks to work with both systems to articulate how they are both compatible with Scope 2 guidance tracking requirements and explain their differences and similarities. CDP believes that electricity tracking systems is necessary for functioning of RECs markets and should be an area of pre-competitive collaboration between all interested stakeholders in the market. Furthermore, CDP does not see the proliferation of standards as beneficial, as it has the potential to undermine clarity, lead to duplication of efforts and wasted money, can lead to reputational issues due to different standards competing and ultimately undermining trust in the very market fundamentals. CDP's preference is that both systems converge to a single standard with an open governance model in which all interested stakeholders can participate.

Other contractual instruments

In markets where certificates are not available, companies may rely on the emissions factor of the contracts that it signs with suppliers and projects. It is recommended by the GHG Protocol Scope 2 Guidance that these contractual instruments meet the Quality Criteria to be reliably used in market-based Scope 2 accounting.

2.4.3 Supplier-specific emission factor

An option when certificates and contractual instruments are not available is to use supplier-based average emission factors, as described in section 6.11.3 of the GHG Protocol Scope 2 Guidance:

“The emission factor must include all the electricity delivered by the supplier, including electricity it generates as well as electricity it purchases from others. Some supplier emission factors only include generation facilities owned by the supplier, which does not represent the full electricity delivered. In addition, it should only include renewables for which RECs have not been passed on to and retired by a third party.”

This can be a valid approach when electricity markets are liberalized and consumers have effective options of different suppliers and suitable tracking mechanisms and methodologies are in place for a harmonized approach on calculating the emissions factors for all suppliers in a given grid. This is largely the situation in Europe, where the RES Directive and the electricity labeling directive, provide a harmonized framework for tracking the electricity through Guarantees of Origin and a common obligation of disclosure to both national authorities and clients of the emission factor (fuel mix) of the electricity. However, European member states are in different stages of implementation of the EU obligations and there is still no full harmonization. Also, emission factors are provided with a delay of a year, which is an improvement in relation to “grid average” emission factors, but still leaves a gap between how the electricity emissions are estimated and the actual emissions. Additionally, if one company uses grid-average emission factors and another uses supplier-specific emission factors, there will be some degree of double-counting of renewable energy. Generally, one could say that whenever different emission factors are used that are not fully harmonized between them, there is potential for double counting of characteristics. Thus, part of the solution is to agree on what to use. For instance, Portuguese companies⁹ seem to have reached an agreement to use supplier specific emission factors reported within the frame of European disclosure obligation. In the absence of an authority calculating annually a grid average emission factor¹⁰, this seems to be an appropriate solution.

⁹ Communication to CDP in a country workshop and as observed through CDP disclosures.

¹⁰ Average emission factors are reported annually as part of countries' annual reporting obligations to the UNFCCC. However, these factors are methodologically closer to the IEA factors in the sense that they represent a “production country average” rather than a “consumption country average”.

In other jurisdictions, similar disclosure obligations from energy providers to their clients or similar tracking mechanisms for electricity do not seem to exist, so this option might not be available at all. Furthermore, with no harmonization of approaches, companies could create their own accounting methodologies, leading once again to inconsistent accounting.

Where regulation and harmonization is in place, as is the case in the European Union, the use of this type of emission factor seems to offer a robust alternative to the grid-average. Namely it adds clarity as to:

- The context and purpose for which the emission factors are produced - in this case disclosure of electricity characteristics to consumers;
- The methodology followed (usually published by the electricity regulator/supervisor of the member state);
- The tracking mechanisms used;
- More up-to-date emission factors; and finally:
- It can facilitate responsible consumer choices.

Supplier Mix Figures and Disclosure

Europe has instituted strong requirements on all electricity suppliers to provide their own independent supplier emission factor to all the consumers of their electricity products on a yearly basis. This allows all consumers, large or small, to know the exact quantity of carbon emissions and radioactive waste that they were responsible for in the previous year. These basic regulations, termed disclosure regulation, are elaborated on and further strengthened by many European member nations.

The legislation however remains unclear and varies by country with regards to the specific requirements for the CO₂ calculation, radioactive waste calculation and use of a production or consumption grid-mix calculation as the base figures. Until European disclosure rules address these issues there is the possibility of large variations between individual supplier mix figures.

2.4.4 Residual mix figures

A residual mix emission factor represents the emissions and generation that remain after certificates, contracts, and supplier-specific factors have been claimed and removed from the calculation. It can be a regional or national factor. Residual mix factors are the preferred market-based default emission factors for any of an organization's electricity for which it cannot apply one of the more-preferred emission factors above. This is because the use of residual mix emission factors avoids double-counting of the emissions attributes of contractual instruments.

Currently, residual mix factors are not widely available. Companies must disclose the lack of residual mix factors as part of their Scope 2 reporting. As with other emission factors, organizations are encouraged to check for available residual mix factors each year when they complete their GHG inventory.

Example of Carbon Accounting with a Residual Mix

A company based in Norway is interested in calculating their emissions inventory for the year 2014. In 2013 they instituted an electricity savings program that cut their electricity consumption to 1000-MWh per annum. The company purchased Guarantees of Origin (GOs) to account for 50% of their consumption. These GO came from Norwegian hydroelectricity and the company has chosen to account Norwegian hydroelectricity as 0 (zero) gCO₂/kWh. The remaining 50% of consumption needs to be accounted for with the grid emission factor. The company follows best practice and has decided to use the residual mix emission factor. After reviewing the NVE website they saw that after import, export and electricity trading the Norwegian grid-mix in 2011 was responsible for 353.0 grams of CO₂ per kWh. 500 MWh of electricity with an emission factor of 353 gCO₂/kWh results in emissions for the grid consumed electricity of 176.5 tCO₂. The combination of 500 MWh originating from a hydroelectric plant and 500 MWh originating from the grid-mix resulted in total Scope 2 emission of 176.5 tCO₂.

2.4.5 Other grid-average emissions factors

Following the hierarchy, when emissions factors from certificates, contracts, suppliers and residual mix are not available, it is recommended that companies use regional or subnational grid factors and, as an option of last resort, national production factors in market-based accounting.

A note on the use of green gas certificates for GHG and RE usage claims

Green gas certificates are a relatively new product, where certificates of origin for gas produced from biogenic sources can be purchased to match non-biogenic gas, and claim a zero-emission rate as a result of the application of such market-based method in the Scope 1 range.

Companies looking to purchase gas certificates ask whether:

- The purchase of green gas, where gas is combusted onsite and used for heat and steam generation, can be used to make the corresponding Scope 1 GHG claims;
- The purchase of green gas, where gas is combusted onsite for generation of electricity, can be used to make the corresponding claims to the renewable origin of such electricity.

Recommendations – in summary

- Green gas certificates need to be legitimate and legally enforceable means of transacting property rights and claims to biogenic or renewable fuel attributes of gas production in a specific market;
- Green gas schemes based on robust tracking systems would help with assurance around data quality and double issuance of certificates;
- The GHG Protocol's Scope 2 Guidance recommends considering and applying the Scope 2 quality criteria to green gas certificates (see Scope 1 GHG claims below);
- To make a renewable electricity usage claim valid for RE100, in addition to the above, a company still needs to produce and retain a renewable electricity attribute certificate.

Scope 1 GHG claims

Purchased contractual instruments (certificates) specifying the origin of gas as “biogenic” or “renewable”, may be used to account for and report the Scope 1 emissions of combustion, where the emission rate is the one specific to the fuel origin presented in the certificate. This however is not a zero emission rate.

The GHG Protocol recommends that companies purchasing this kind contractual instruments:

- a) Refer to the Scope 2 quality criteria for contractual instruments, and
- b) Apply the quality criteria to gas considering that this may require interpretation.

From Appendix A of the [GHG Protocol's Scope 2 Guidance](#) (p. 95):

If a company has a contractual instrument specifying its gas supply as “biogas” or “biogenic,” the company should report using the market-based method and refer to the Scope 2 Quality Criteria to evaluate whether its gas use should be reported as Scope 1 natural gas using a standard emission factor, or as biogenic CO₂ emissions reported separately from the Scopes. This evaluation requires some interpretation, since the Scope 2 Quality Criteria are specific to electricity and their guidance must be translated for use with gas. For instance, criterion 1 in relation to GHG emission rate claims should be also interpreted to include the emission rate specific to the biogenic fuel origin. The CO₂ emissions will be influenced by the heat rate / efficiency of the equipment used to consume the gas.

RE usage claims

The following applies when gas is sourced from a shared pipeline network with multiple sources including both renewable and non-renewable sources, so certificates are required to demonstrate the renewable origin of gas. To make a renewable electricity usage claim on electricity generated onsite from gas, when a company also purchases green gas certificates, the following conditions need to be met:

- The company combusts gas sourced from a shared gas pipeline network to produce electricity;

- It also owns or purchases green gas certificates that originated from one of the gas producers on the pipeline network – these need not necessarily be purchased directly from the biogas producers;
- The company permanently retains the environmental attributes of the electricity generation, including any electricity attribute certificates (e.g. RECs in the U.S.) for the electricity generated;

If the company is sourcing from a dedicated pipeline and the source is renewable, then they do not need certificates to prove the renewable origin, and if the source is non-renewable, then they cannot use certificates to claim a renewable origin.

Market boundary considerations

We recommend that use of gas certificates be limited to users on the same pipeline network who can physically receive gas from gas plants on that network.

Certificates can be purchased from either the same supplier as the gas or a different supplier, provided all supplier and the user are on the same pipeline.

Existing schemes and verification

It is recommended that green gas certificates used for GHG or RE usage claims be verified by an independent third party against the Scope 2 quality criteria. This effort would have to be undertaken by the purchaser. We do not know of any such verification standard or providers at this time.

3. Country and regional guidance and resources

This section presents a collection of additional notes and resources to guide companies in reporting about Scope 2 emissions in specific regions and countries. This section will be updated on an annual basis. CDP invites company and stakeholder inputs to keep this section up to date.

3.1 North and South America

3.1.1 United States of America

Grid average emission factors in the USA: the eGRID approach

eGRID is the US EPA initiative that calculates and reports electricity grid average emission factors for the USA. The eGRID is based on NERC (North American Electric Reliability Corporation) power grid regions, but further refines them in subregions of electricity distribution grids based on (distribution) companies. It attributes a specific power plant to a grid subregion (and not on a geographical boundary per state) considering the physical link between the plant and the distribution grid. It also takes into consideration the import-export of electricity between the several subregions defined.

eGRID does not consider the impact of the sales of Renewable Electricity Certificates in the published average emission factors of the eGRID subregions. Overall, for the US market this fraction is considered small and the overall impact on the emission factors calculated negligible [5, pp. 14]. However, CDP is unfamiliar with the actual data sources and methodology followed to conclude this and namely, if there are any eGRID subregions that could be more impacted than others.

eGRID and the emission factor data available for the US represents a considerable improvement to the information available for other parts of the world, namely Europe. It is interesting to compare

eGRID with the European case where there is no agreement on how to calculate emission factors from grids.

The methodological and terminology issues and uncertainties around “grid average” emission factors, are reinforced by the fact that in certain jurisdictions, there are obligations and instruments in place, that potentially allow or promote the use of supplier and source emissions factors.

Such is the case in Europe where there are “disclosure obligations” pending on electricity suppliers to disclose the characteristics of the electricity provided to their clients¹¹, as well as the existence of Guarantees of Origin that do the tracking of electricity characteristics from the source to the final consumer. Likewise, the Renewable Energy Certificate System (RECS) in USA allows the tracking of electricity in similar ways.

North America’s (US and Canada) Renewable Energy Certificate System (REC) system

Given the physical limitations of tracking electricity on the grid, in the US and Canada, the primary tool for assigning ownership of the attributes associated with renewable electricity generation is the renewable energy certificate (REC). A REC is a fungible commodity that represents the renewable attributes of one megawatt hour (MWh) added to the grid. In the US, RECs form the sole basis of all renewable electricity usage claims on the grid. They are used by utilities and other electric service providers to demonstrate compliance with state renewable portfolio standards (RPSs), and they are also the basis for all voluntary renewable energy transactions and product types, including power purchase agreements, utility green pricing products, competitive electricity products, and unbundled REC products.

In the voluntary market, RECs convey the rights to the generation attributes of renewable generation, including the GHG emissions per MWh of electrical output (emissions factor) of the renewable generator, which is typically zero. USA RECs also convey the avoided or displaced GHG emissions on the grid as a result of the generation. In areas where GHG emissions are not controlled (or capped) by regulation, or where an allowance/permit-retirement mechanism is in place for voluntary renewable energy purchasing within a capped area, these avoided grid emissions are not zero. This is an impact of generation that is conveyed as an attribute and included in the REC and which can be reported in “Further information” in CDP disclosure.

To convey these and other non-carbon attributes in the voluntary market, RECs must be fully aggregated (this is, no attributes can be sold separately), surplus to regulation and of eligible recent vintage (not banked). Also, contracts and purchases of renewable electricity, including RECs, must be substantiated to ensure exclusive ownership of generation and prevent double counting/claiming.

REC certification is available and widespread in the US and Canada through the Green-e® Energy program. For further information about the Renewable Energy Certificate System (RECS) in North America check the following references:

- “Guide to Purchasing Green Power: Renewable Electricity, Renewable Energy Certificates and On-Site Renewable Generation” (March 2010). Written by the US EPA, US DOE, World Resources Institute, and CRS, this comprehensive guide is recommended reading for anyone considering green power procurement.
- “Renewable Energy Certificates, Carbon Offsets, and Carbon Claims: Best Practices and Frequently Asked Questions” (April 9, 2012). Includes answers to many questions about renewable energy certificates, carbon offsets, and the relationship between renewable energy and greenhouse gas reductions.

¹¹ Electricity Market Directive (2009/72/EC, Article 3(9)), all suppliers of electricity are required to disclose their electricity portfolio with regard to energy source and environmental impact, specifying the emissions of CO₂ and the production of radioactive waste. This is different from country disclosing obligations as part of the Renewables Directive.

- “Quick Guide: Renewable Energy Certificates (RECs) (Fact Sheet)”. Federal Energy Management Program (FEMP). (2011). A brief from NREL on what RECs are and how they can also be used to help Federal agencies meet greenhouse gas (GHG) emissions reduction goals.

More information can also be found in the following websites:

- <http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=0>
- <http://www.green-e.org/>
- <http://www.etnna.org/>
- <http://www.epa.gov/greenpower/gpmarket/rec.htm>

3.1.2 Brazil

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Brazil. The issuer in Brazil is [Instituto Totum](#). For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Brazil: <http://tigrs.apx.com/>

3.1.3 Chile

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Chile. For more information, view the authorized issuer list [here](#).

The TIGR Registry

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3.1.4 Colombia

International REC Standard (I-REC)

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The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Colombia: <http://tigrs.apx.com/>

3.1.5 Guatemala

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Guatemala: <http://tigrs.apx.com/>

3.1.6 Honduras

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Honduras. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Honduras: <http://tigrs.apx.com/>

3.1.7 Mexico

Certificados de Energia Limpia (S-CEL)

The *Sistema de Certificados de Energia Limpia (S-CEL)* or System of Certificates for Clean Energy is currently under development by national authorities. For more information on the development of the S-CEL system contact the responsible authorities, the *Centro Nacional de Control de Energia (Cenace)*.

3.2 Asia

3.2.1 China (People's Republic of)

Grid average emission factor in China

In China, the Department of Climate Change, National Development and Reform Commission (NDRC) calculates grid emission factor for the electricity generation. NDRC use Clean Development Mechanism (CDM) methodologies, especially the methodological tool to calculate the emission factor for an electricity system¹².

National power grid in China is divided into Northeast China Grid, North China Grid, East China Grid, Central China Grid, Northwest China Grid and China Southern Power Grid, excluding Tibet Autonomous Region, Hong Kong Special Administrative Region, Macao Special Administrative Region and Taiwan Province.

The emission factors have been determined on the basis of Operating Margin (OM) as well as Build Margin (BM). Operating margin represents the weighted average emissions rate of all thermal stations currently operational in the regional grid whereas the build margin reflects the average CO₂ emissions rate of newly built power stations.

Latest China's Regional Grid Emission Factors is available for 2010. The Chinese version of the document is available [here](#).

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in China. Issuance in China is restricted to state-owned production devices. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in China: <http://tigrs.apx.com/>

3.2.2 India

Grid average emission factor in India

¹² <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

In India, Central Electricity Authority (CEA) calculates grid emission factor for the electricity consumption. CEA use Clean Development Mechanism (CDM) methodologies, especially the methodological tool to calculate the emission factor for an electricity system¹³. By 2015, CEA have published 10 versions of grid emission factor database. The most recent version has been released on Dec 2014. CEA update the database at the end of each fiscal year.

The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covers several states. As the grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with the neighboring countries Bhutan and Nepal.

CEA provide four different types of emission factors. These are weighted average, simple operating margin (OM), build margin (BM) and combined margin (CM) emission factors. The weighted average emission factor describes the average CO₂ emitted per unit of electricity generated and injected in the grid. It is calculated by dividing the absolute CO₂ emissions of all power stations in the region by the region's total net electricity generation including the generation from hydro and nuclear power stations (but excluding other non-conventional renewable energy stations such as hydro stations up to 25 MW, as well as all wind, biomass and solar photovoltaic stations).

Other three emission factors (OM, BM and CM) are specifically developed as per the requirement of GHG emission reduction projects under the CDM. Simple operating margin represents the weighted average emissions rate of all thermal stations currently operational in the regional grid whereas the build margin reflects the average CO₂ emissions rate of newly built power stations. The combined margin emission factor is a weighted average of the simple operating margin and the build margin.

Above grid emission factors are only for CO₂ emissions, and do not cover CH₄ and N₂O. It only reflects CO₂ emissions per kWh of electricity generated without taking account of transmission and distribution (T&D) losses.

CEA publishes all four emission factors for the NEWNE and the Southern Grids. As per GHG Protocol's Scope 2 Guidance, the weighted average grid emission factors can be used for the calculation of Scope 2 emissions. For more information on the calculation methodology and to know most recent emission factor, please check following document available [here](#).

India's REC system

Renewable Energy Certificate (REC) mechanism in India is developed to create a market-based instrument to promote renewable energy and facilitate compliance of Renewable Purchase Obligations (RPO) applicable on power distribution companies and captive electricity consumers (Obligated entities). As per the RPO target, obligated entities are mandated to purchase certain amount of energy from renewable energy sources. Electricity produced by renewable energy sources is conceptually split into the pure electricity component and the environmental component. The environmental component is called the Renewable Energy Certificates (REC).

A company engaged in generation of power from renewable energy sources is eligible to participate in the REC scheme provided that it meets certain terms and conditions set by central electricity regulatory commission. One REC is equivalent to one mega-watt hour (MWh) of electricity generated by renewable energy power plant. REC registry of India tracks the movement of RECs and keep the records of REC generation, trading and redemption/retiring.

Obligated entities can fulfil their RPO target either by purchasing (and retiring) RECs or by directly sourcing energy from renewable energy generator. Companies other than obligated entities can also claim the environmental benefits of renewable energy by acquiring RECs voluntarily.

¹³ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

There are two types of RECs in India, i.e. solar RECs and non-solar RECs. Solar RECs are issued for generation of electricity based on solar as renewable energy source, and non-solar RECs are issued for generation of electricity based on renewable energy sources other than solar. Both types of RECs are equivalent to renewable energy generation.

RECs are tradable on designated energy exchanges, i.e. Indian Energy Exchange (IEX) and Power Exchange India (PXIL). Obligated entities and voluntary REC buyers are required to be registered on any one of the exchange to do the transaction. Bilateral transaction of RECs is not permitted in India. Renewable energy generator is also permitted to retain REC for offsetting its own RPO target. Such transaction happens on REC registry of India.

More information is available at www.recregistryindia.nic.in, www.iexindia.com, and www.powerexindia.com.

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in India. Issuance in India has a number of restrictions to ensure there is no double attribute counting with the national RPO. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in India: <http://tigrs.apx.com/>

3.2.3 Indonesia

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in the Indonesia: <http://tigrs.apx.com/>

3.2.4 Malaysia

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Malaysia. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Malaysia: <http://tigrs.apx.com/>

3.2.5 Philippines

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in the Philippines: <http://tigrs.apx.com/>

3.2.6 Singapore

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Singapore. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Singapore: <http://tigrs.apx.com/>

3.2.7 Taiwan

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Taiwan. There are a number of restrictions with Taiwan to ensure there is no double counting with the national Green Purchase Program initiated by the national authorities. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Taiwan: <http://tigrs.apx.com/>

3.2.8 Thailand

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Thailand. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Thailand: <http://tigrs.apx.com/>

3.2.9 Vietnam

International REC Standard (I-REC)

At the time of publishing the I-REC Standard has authorized an issuer to conduct I-REC issuance in Vietnam. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Vietnam: <http://tigrs.apx.com/>

3.3 Europe

Europe's Grid Emissions and the Residual Mix

Europe has slowly been transitioning to a consumption-based calculation for grid average emission factors. These consumption-based grid average emission factors take the production mix of a given geographic location - in the case of Europe, a national boundary - and account for the physical flows of electricity with its neighbors. In addition, accounting is done for the use of European electricity tracking instruments such as the Guarantee of Origin (GO). In Europe the GO allocates the grid emission rights of renewable energy to a single end-user – for this reason the grid itself loses these attributes. After the private consumption of GO attributes has been calculated, as well as the physical imports/exports of electricity, one is left with the consumption-based grid emission average. This consumption average is termed a residual mix.

The use of a residual mix allows the end-user to obtain the highest possible accuracy when accounting for the grid-mix in one's carbon accounting. This represents a substantial improvement in the accuracy of accounting when compared with the emission figures of a production-based calculation for grid-mix emissions. The use of a residual mix ensures that renewable electricity attributes are not "double counted" to all the users of the grid. While most European member states do not force the use of a residual mix, it is increasingly apparent that this is the best practice.

Residual mix figures, like all grid emission factors, are calculated the year after the physical consumption of the electricity. This means that carbon accounting for 2012 will use residual mix emissions calculations from the prior year, 2011. Residual mix figures in Europe are calculated on a yearly basis by the [Reliable Disclosure Systems for Europe project \(RE-DISS\)](#). In their report, “RE-DISS Data Results for Residual Mix 2013”¹⁴, residual mix figures for all European countries are displayed. This report lays out the substantial differences between a grid-mix calculation based on the production of electricity and a grid-mix calculation based on the consumption of electricity, corrected for GOs (the residual mix). The significant improvements in a consumption-based grid mix calculation increase the accuracy of grid-emissions calculations and carbon accounting procedures.

Europe - Emission factors and sources of emission factors

The [RE-DISS project](#) has calculated residual mix emission factors for all European countries.

[Residualmix.org](#) is a new initiative started in 2016 to provide links to accurate and reliable residual mix information available from around the world. At the time of publication of this document, Residualmix.org included a collection of the residual mix calculations for the EU/EEA/Switzerland published by RE-DISS for 2010-2014. In 2015 the factors were calculated by Association of Issuing Bodies (AIB). European residual mix information is commonly reported in May of the following year. This means that residual mix calculations for 2016 are expected in May of 2017.

Renewable energy tracking systems in Europe - Guarantee of Origin and EECS

The Guarantee of Origin (GO) is the main electricity tracking instrument for Europe. Each European member state is mandated by European law to have a national GO certificate system to be used as proof of electricity origin. This GO, often referred to as a RES-GO (Renewable Energy Source Guarantee of Origin), is described in European Directive 2009/28/EC:15 as, “...proving to final customers the share or quantity of energy from renewable sources”. However, national regulations defining the specific use of the GO vary between many member states. To standardize national rules for GOs, the European Energy Certificate System, or EECS system, was created by an organization representing 14 national GO issuing bodies. This association is named the Association of Issuing Bodies (AIB).

GOs standardized via EECS are easily transferable to and from other EECS standardized member states and allow for the easy trade of renewable energy attributes. Every year there are additional national GO issuing bodies that join the EECS system. This helps to make European renewable attribute trading more reliable, efficient and trustworthy. A GO standardized by EECS is often termed as an EECS-GO. The EECS system also allows for the issuance of EECS-GOs from fossil-fuel production stations. These fossil-fuel GO certificates can be used by consumers or electricity supply companies to prove the origin of all their electricity purchases or sales, not just renewables. This additional aspect is not mandated in European regulation but can improve the accuracy of greenhouse gas accounting and fuel-mix disclosure.

The Guarantee of Origin, both RES-GO and EECS-GO, are based on a book-and-claim system. This allows a GO to be created (booked in) by a specific producer of electricity and consumed (claimed) by a single consumer. Thus, the end-user who has purchased and canceled a GO (canceled is the industry terminology for consumption) can claim 1-MWh of electricity consumption from the specific production site of that canceled GO. Each GO is standardized as accounting for 1-MWh of electricity allowing end-consumers to purchase the amount of GOs needed to help meet their Scope 2 carbon accounting goals.

¹⁴ See http://www.reliable-disclosure.org/upload/65-RE-DISS_2013_Residual_Mix_Results_v1-0_2014-05-15.pdf

Guarantee of Origin certificates prove the origin of electricity and contain only factual information about the production site of the originating electricity. End-users are allowed to claim a number of different factors regarding their electricity consumption after the purchase of GOs. Items such as the carbon emissions of their purchased electricity can be inferred based on the production site from which the GO was purchased. The GO itself does not make a claim that zero emission electricity was purchased, only for example, that electricity from a wind turbine was consumed. Most consumers are aware that electricity from wind production produced zero direct emissions, but the consumer can decide if wind electricity should include life cycle emissions changing how their GO purchase is reflected in their carbon accounting.

An Example of Electricity Consumption with the GO

A corporation has had 120-MWh of electricity consumption in 2013, from several plants located around the world, including Sweden, Germany, Iceland and Spain. After implementing an electricity savings plan they saw a drop in their electricity consumption to 100-MWh in 2014. Their goal was to have 80% renewable electricity for their remaining consumption. This corporation, based in Sweden, wanted 50% of their electricity to come from Swedish hydropower stations, 30% from wind sources in Europe and 10% from Icelandic geothermal production. To prove this, they bought 50 GO certificates originating from Hydropower stations in Sweden, 30 GO certificates from wind power stations anywhere in Europe, and 10 GO certificates from Icelandic geothermal power. Once these GOs were cancelled on their behalf the company can claim electricity consumption of 50% hydroelectricity, 30% wind, 10% geothermal and 10% grid-mix.

Europe - The RECS Certificate

RECS Certificates carry with them the same information as the Guarantee of Origin and can be used in the same way. Historically, the RECS system was voluntarily implemented in European member states by market parties to allow for electricity tracking and trading while the GO system was being developed. In recent years the RECS certificate trades have been declining as most member states have implemented the GO certificate and no longer need the voluntary RECS system. If RECS certificates are used, they should be treated as if they were GO certificates. Overtime RECS certificates will be used less and may, in the future, no longer be issued in place of the European mandated GO system.

Europe - Other schemes and labels

Other certification/tracking schemes might exist in Europe depending on the country. There are a multitude of labels offering renewable energy for sale. CDP's recommendation is that, independently of the label, companies operating in Europe should make sure that the tracking system behind the label is the one mandated by European law: Guarantees of Origin.

3.3.1 France

Residual mix calculations in France

Companies calculating market-based Scope 2 totals for France are encouraged to use the residual mix factor calculated by [RE-DISS](#).

Companies should also be aware of the existence of two other emission factors for the French electricity grid:

1. Emissions factor based on the methodology for regulatory compliance with Article 75 Loi Grenelle II; and

2. Emissions factor calculated by Ademe

Both sources are available [here](#) and require registration.

The use of these latter emissions factors is not recommended for reporting to CDP, especially for multinational companies seeking methodological uniformity in Scope 2 accounting around the world.

3.3.2 United Kingdom

Renewable Energy Guarantees of Origin (REGOs)

In the United Kingdom, [Renewable Energy Guarantees of Origin \(REGOs\)](#) are contractual instruments that may be used to prove consumption of renewable electricity adhering to the EU directive 2009/28/EC for the implementation of Guarantees of Origin.

REGOs should not be confused with Renewables Obligation Certificates (ROCs) and Levy Exemption Certificates (LECs). ROCs are instruments used to comply with the renewables production obligation on suppliers. LECs are a levy/tax exemption for medium-sized enterprises. ROCs and LECs should not be used in responding to CDP.

3.3.3 Turkey

International REC Standard (I-REC)

At the time of publishing, the I-REC Standard has authorized an issuer to conduct I-REC issuance in Turkey. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Turkey: <http://tigrs.apx.com/>

3.4 Rest of the World

3.4.1 Australia

Australia's REC market

Australia has one of the oldest functioning renewable energy certificate markets in the world. The government's voluntary GreenPower Program was launched in 1997, and the compliance market-based on REC surrender was legislated in 2000 and operational from 2001.

Australian RECs are compliance instruments which serve primarily as the mechanism for meeting the Government's national Mandatory Renewable Energy Target (MRET or RET). This was set in early 2015 at 33,000 GWh of large-scale renewable energy generation in 2020 (23.5% of projected generation).

There are two types of REC – Large Scale Generation Certificates (LGCs) and Small-scale Technology Certificates (STCs). LGCs come from renewable power stations, whereas STCs come from small-scale (<100kw) end-user sited installations.

All electricity retailers and a few very large end-consumers are legally required to surrender a certain number of both LGCs and STCs (separate obligations, each based on a percentage of the liable entity's total annual electricity purchased).

All certificate issuance, holding, transfer, surrender, etc., is done on the Australian REC Registry, which is operated by the Clean Energy Regulator.

Credit: Climate Friendly Australian REC Market Overview, March 2016

3.4.2 Israel

International REC Standard (I-REC)

At the time of publishing, the I-REC Standard has authorized an issuer to conduct I-REC issuance in Israel. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in Israel: <http://tigrs.apx.com/>

3.4.3 Southern African Power Pool (SAPP)

Grid emission factors in South Africa and the SAPP group of countries

The Southern African Power Pool (SAPP) calculates grid emission factor for the electricity generation for South Africa and other group countries. SAPP use Clean Development Mechanism (CDM) methodologies, especially the methodological tool to calculate the emission factor for an electricity system¹⁵. The emission factor is known as standardized baseline emission factor which provides the values of the CO₂ emission rate of the interconnected electricity system (grid) of the SAPP and it is applicable to the group of countries-members of the SAPP. This include The Republic of Botswana; The Democratic Republic of the Congo (DRC); The Kingdom of Lesotho; The Republic of Mozambique; The Republic of Namibia; The Republic of South Africa; The Kingdom of Swaziland; The Republic of Zambia and Zimbabwe.

¹⁵ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v4.0.pdf>

The emission factors have been determined on the basis of Operating Margin (OM), Build Margin (BM) and Combined Margin. Operating margin represents the weighted average emissions rate of all thermal stations currently operational in the regional grid whereas the build margin reflects the average CO₂ emissions rate of newly built power stations. The combined margin emission factor is a weighted average of the simple operating margin and the build margin.

Latest SAPP Grid Baseline Emission Factors is published on 2013. The document is available [here](#).

International REC Standard (I-REC)

At the time of publishing, the I-REC Standard has authorized an I-RECs to conduct test issuances of I-RECs in South Africa. For more information, view the authorized issuer list [here](#).

The TIGR Registry

At the time of publishing renewable energy generators can utilize the TIGR Registry and issue TIGR instruments in South Africa: <http://tigrs.apx.com/>.

3.4.4 Uganda

International REC Standard (I-REC)

At the time of publishing, the I-REC Standard has authorized an issuer to conduct I-REC issuance in Uganda. For more information, view the authorized issuer list [here](#).

3.4.5 United Arab Emirates

At the time of publishing, the I-REC Standard is in discussions with Dubai Carbon Centre of Excellence (DCCE) to become the authorized issuer for the UAE. DCCE has been promoted by the Dubai Supreme Council of Energy to document and issue RECs in the United Arab Emirates. For more information, view the authorized issuer list [here](#).

4. Frequent Asked Questions (FAQ's)

What type of certificates/instruments can be used in my market-based Scope 2 figure?

CDP recommends that appropriate tracking instruments are used. Please see the section 2.4.2 for examples of reliable tracking systems and section 3 for regional notes and resources.

Can I count a GO/REC/I-REC/TIGR towards my Scope 2 market-based target?

Yes.

Can I count CERs or VERs towards my Scope 2 market-based target?

No.

I buy special European credits from a label with guaranteed additionality, but they do not follow the GO system, can I count them towards my target?

CDP does not recommend that any electricity within the EU27 should be accounted for unless it is using European Guarantees of Origin. Please see the section "Europe - Guarantee of Origin and EECS".

Can I use European GOs to account for electricity consumption in USA?

No. CDP does not recommend this practice. Please see the next question.

Why can't I use RECs or certificates produced in certain jurisdictions in other jurisdictions?

As a minimum condition, you should use RECs that are within the same market boundary, or grid-connected region if cross-border markets do not exist, e.g. if you have operations in North America, you are expected to use RECs (USA and Canada) and not Guarantees of Origin (GOs), which are the instruments used in Europe. Likewise, your European operations are expected to use GOs and not North American RECs or other instruments from other geographies. Unlike offsets, electricity tracking instruments are not expected to become global commodities, but regional commodities. This is because there are physical restraints to the transmission of electricity that should be respected by the tracking instrument trade. This type of constraints is understood as best practice that is still evolving. A good example is the case of islands, for example Iceland. There is no connection between Iceland and mainland Europe. As such, buying Icelandic GOs as a supply of European based consumption is seen as a problematic practice. These considerations could be extended to reflect transmission capacity between countries, which could add layers of complexity that, at the current stage of development of the system, are still difficult to address. The best way to address them is to follow best practice and it is considered best practice to source renewable energy from local renewable sources.

Can I use UK green tariffs in order to account for lower Scope 2 emissions?

No. UK green tariffs are based on offsets and CDP does not ask about net emissions but only gross emissions.

Can I use an emission factor provided by my supplier?

Yes, in your market-based Scope 2 figure.

Where can I find corrected emission factors for the grid?

You can find residual mix figures for all EU/EEA/Switzerland at <http://www.residualmix.org/>. The residual mix is calculated as per methodologies developed in the [RE-DISS project](#).

I purchase offsets that are based on renewable energy generation, can I account for these in my Scope 2 figure?

No. In this case the origin of the offsets doesn't really matter. According to the GHG Protocol Corporate Standard, offsets should be reported as separate information from the gross emission figures that Scope 1, 2 and 3 represent.

You can report your use of offsets in questions CC13.2 and CC13.2a where you can provide details of any project-based carbon credits originated or purchased within the reporting period as well the purpose of those purchases.

Can RECs/GOs/IRECs/TIGRs be reported in CC13.2?

Question CC13.2 only applies to companies that have originated the carbon credits or who have purchased them for the purposes of compliance or as voluntary carbon offsets. For the most part, this

question applies to Clean Development Mechanism projects that are in the pipeline and are not yet approved. Therefore, they cannot be reported here.

If we purchased more RECs than the amount of energy we actually consumed (1 REC= 1MWh), can we then enter a negative Scope 2 figure?

No. RECs are not offsets- they are a way to attribute its energy purchase to a renewable source and claim the low carbon benefit. That is why RECs are a regional product - the energy used should be in the same market boundary as the energy produced and represented by the certificate. Even if they were offsets, in accordance with the GHG Protocol, CDP asks companies to report on gross emissions that do not take offsets under consideration. None of the emission fields in the online response system will allow a negative response for this reason.

We operate in a country that has 100% electricity from hydroelectricity. How should we report this?

If the fuel mix in your national grid has a large proportion of renewable energy, then naturally the carbon emissions per MWh is going to be lower than other countries that have a higher proportion of the grid mix from fossil fuel sources and therefore your Scope 2 emissions will be lower. However, unless you are directly purchasing the energy from renewable energy companies tracked by appropriate instruments, you should not report this energy as low-carbon CC8.3, CC10.1a and CC11.4.

5. Worked examples

The following are some worked examples of how to account for green electricity. The first six examples are applicable when there is renewable energy production on-site. On-site renewable energy production is generally considered the clearest cut case for green power accounting. Although this might be true, this is certainly not simple and quite complex cases can exist. Overall, six different cases are provided, which account for different combinations of the following variables:

1. Grid connection: is the facility grid connected or not?
2. Tracking instruments: are tracking instruments being generated, such as GO and RECs?
3. Destination of instruments: if tracking instruments are being generated, are they sold or are they retired by the company that is generating and claiming the attributes?
4. Ownership: does the company own the facility or is it owned and/or managed by other company?

Additional cases might occur that take into account other factors/variables. Judgment should be applied on a case-by-case basis, following the principles of the GHG Protocol. In addition to the examples involving renewable energy capacity on-site, other examples are also provided.

Example 1 – On-site production of non-grid connected renewable electricity [tracking instruments generated, sold to third parties]

In this case Company 1 has facilities with renewable energy generation, that it either owns or not. Company 1 locally consumes the electricity and tracking instruments are generated and sold to third parties. By selling the instruments, Company 1 transfers to the buyer the energy attributes associated with the generation, including the type of energy and its emission factor (often a zero emissions factor). In this situation, Company 1 should not claim the renewable energy in their Scope 2, instead they should add the emissions associated with the sold certificates to its Scope 2 emissions. They would multiply the quantity of generation represented by the sold certificates by grid average emission factors for the location-based method and by residual mix emission factors for the market-based method.

Example 2 – On-site production of non-grid connected renewable electricity [tracking instruments generated, retired by company]

In this case as with all subsequent ones where there is a tracking instrument, the company that retires the instrument is the one that is able to claim the attributes of the energy for accounting purposes. Therefore, the company can reflect the zero emissions associated with renewable generation.

Example 3 – On-site production of non-grid connected renewable electricity owned by the company [no tracking instruments generated]

Company 1 has multiple facilities (remote equipment, e.g. diesel generators) around the world that consume small amounts of electricity as well as large buildings that are grid connected. It has installed solar panels that are supplying their remote equipment and in this way, Company 1 is avoiding the installation of fossil fuel (diesel) based generators and avoiding direct emissions.

All things being equal, the result in terms of greenhouse gas accounting should be expressed as:

1. A decrease in Scope 1 emission, due to renewable energy generation reducing fossil energy consumption associated with Scope 1 emissions;
2. An equal amount of electricity purchased and consumed, because the on-site generation does not occur at facilities that purchase grid electricity.

For all other electricity, the company is being supplied by the grid and does not have any special agreements with its suppliers or buy and retire any type of certificates. As such, this company should account for market-based Scope 2 using the corrected grid emission factor (residual mix) or, in cases where it does not exist, the most update non-corrected emission factor (grid average).

The electricity generated by Company 1 may or may not be metered but is used only for internal purposes, and this electricity is in no way considered in the grid average (a reasonable assumption in this case).

The energy profile for Company 1 would look like the following

| Energy carrier | Purchased? | Consumption (MWh) | Scope |
|--------------------|------------|-------------------|-------|
| Natural gas | Yes | 900,000 | 1 |
| Diesel | Yes | 600,000 | 1 |
| On-site renewables | No | 15,000 | 1 |
| Grid electricity | Yes | 540,000 | 2 |
| Steam | Yes | 100,000 | 2 |

The CDP response would look like:

CC10.1 - Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a - Please complete the table below

| Country/Region | Scope 2, location-based (metric tonnes CO2e) | Scope 2, market-based (metric tonnes CO2e) | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh) |
|--------------------------|--|--|--|--|
| United States of America | 19,000 | 22,000 | 350,000 | 0 |
| Canada | 10,000 | 11,000 | 80,000 | 0 |
| United Kingdom | 30,000 | 32,000 | 70,000 | 0 |
| Spain | 10,000 | 13,000 | 60,000 | 0 |
| Rest of world | 10,000 | 10,000 | 80,000 | 0 |

Note: Question CC10.1a is asking about Scope 2 emissions only. In this example the electricity is generated by the company and is not being purchased, and thus, it should not appear in the activity data associated with Scope 2 accounting. The installation of on-site production of non-grid connected renewable energy electricity will reduce Scope 1 emissions.

CC11.2 - Please state how much heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|-------------|---------|
| Heat | 0 |
| Steam | 100,000 |
| Cooling | 0 |

CC11.3 Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year
 → 1 500 000

CC11.3a - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh |
|-------------|---------|
| Natural gas | 900,000 |
| Diesel | 600,000 |

[Comment for the purpose of this example]

→ the reduction in footprint (all other things being equal) will be due to lower consumption of Diesel amounts reflected in this figure

CC11.4: Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

| Basis for applying a low carbon emission factor | MWh consumed associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|--|
| No purchases or generation of low carbon electricity, heat, steam or cooling accounted with a low carbon emissions factor | 0 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct Scope 1 footprint by 400 tCO ₂ e every year. However, there were no purchases of renewable energy during the reporting year. |

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

| Total electricity consumed (MWh) | Consumed electricity that is purchased (MWh) | Total electricity produced (MWh) | Total renewable electricity produced (MWh) | Consumed renewable electricity that is produced by company (MWh) | Comment |
|----------------------------------|--|----------------------------------|--|--|---|
| 555,000 | 540,000 | 15,000 | 15,000 | 15,000 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct Scope 1 footprint by 400 tCO ₂ e every year |

Example 4 – On-site production of non-grid connected renewable electricity owned by another company [no tracking instruments generated]

It is becoming frequent for a company to supply the space, while another company implements and manages the renewable energy installation that produces electricity. This can then be fed to the company that is providing the space and consumed “on the spot”. For the sake of the example we will assume the same energy profile for the company as in Example 3, but solar panels are owned or owned and managed by another company and the energy supplied to Company 1 is actually purchased or subject to an agreement between the two parts which is equivalent to a sale. In this case the disclosure would not change significantly from the one provided in Example 3, but there would be some nuances like the fact that the energy would now be accounted in Question CC10.1 and CC11.5.

CC10.1 - Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a - Please complete the table below

| Country/Region | Scope 2, location-based (metric tonnes CO2e) | Scope 2, market-based (metric tonnes CO2e) | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh) |
|--------------------------|--|--|--|--|
| United States of America | 19,000 | 22,000 | 350,000 | 0 |
| Canada | 10,000 | 11,000 | 80,000 | 0 |
| United Kingdom | 30,000 | 32,000 | 70,000 | 0 |
| Spain | 10,000 | 13,000 | 60,000 | 0 |
| Rest of world | 10,000 | 10,000 | 95,000* | 15,000 |

*This is the 80,000MWh as reported in example 3, with the addition of the 15,000MWh from low carbon energy.

CC11.2 - Please state how much heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|-------------|---------|
| Heat | 0 |
| Steam | 100,000 |
| Cooling | 0 |

CC11.3 Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year
 → 1 500 000

CC11.3a - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh |
|-------------|---------|
| Natural gas | 900,000 |
| Diesel | 600,000 |

[Comment for the purpose of this example]

→ the reduction in footprint (all other things being equal) will be due to lower consumption of Diesel amounts reflected in this figure

CC11.4: Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

| Basis for applying a low carbon emission factor | MWh consumed associated with low carbon electricity, heat, steam or cooling | Comments |
|--|---|--|
| Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator | 15,000 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct Scope 2 footprint by 400 tCO ₂ e every year. Company 1 has established a contract with SolarCompany, a provider of solar energy solutions, where they own and manage all our on-site installations and we buy the electricity from them. |

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

| Total electricity consumed (MWh) | Consumed electricity that is purchased (MWh) | Total electricity produced (MWh) | Total renewable electricity produced (MWh) | Consumed renewable electricity that is produced by company (MWh) | Comment |
|----------------------------------|--|----------------------------------|--|--|---------|
| 555,000 | 555,000 | 0 | 0 | 0 | |

Example 5 – On-site production of grid connected renewable electricity owned by company [tracking instruments generated and retired by company]

Company 1 owns in this case one single installation (located in “Rest of the World”), where renewable energy production capacity is installed and there is a grid connection. The installation is constantly metered by three unidirectional meters: one that measures the amount of electricity produced by the Renewable Energy source; another that measures the consumption from the grid; and another that measures the amount of energy that is fed into the grid. Tracking instruments are created for the portion that is supplied to the grid and are not sold by Company 1, rather retired/cancelled by them.

For the sake of the example 15,000 MWh were generated and consumed locally and 20,000 MWh were generated and fed into the public grid with the tracking instruments retired/cancelled by Company 1. Therefore, the energy profile of the company is:

| Energy carrier | Purchased? | Consumption (MWh) | Scope |
|---|------------|-------------------|-------|
| Natural gas | Yes | 900,000 | 1 |
| Diesel | Yes | 600,000 | 1 |
| On-site renewables | No | 15,000 | 1 |
| Grid electricity | Yes | 525,000 | 2 |
| Low carbon electricity (instrument created) | No | 0 | 2 |
| Steam | Yes | 100,000 | 2 |

CC8.3a: Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Location-based Scope 2 figure

To calculate this, the company would use the one Scope 2 electricity figure. This is the electricity figure and they would multiply by the grid average emissions factor

$$S2\ tCO2e = [350,000\ (USA) \times GAF] + [80,000\ (Can) \times GAF] + [70,000\ (UK) \times GAF] + [60,000\ (Spain) \times GAF] + [80,000\ (ROW) \times GAF]$$

Market-based Scope 2 figure

To calculate this, the company would use the three Scope 2 electricity figures in the energy profile. For “Electricity” and “Heating” they would multiply by the residual emission factors while the other (renewable energy tracked and retired by the company) would be multiplied by 0.

$$S2\ tCO2e = [350,000\ (USA) \times RAF] + [80,000\ (Can) \times RAF] + [70,000\ (UK) \times RAF] + [60,000\ (Spain) \times RAF] + [60,000\ (ROW) \times RAF] + [15,000(RAW) \times 0]$$

CC10.1 - Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a - Please complete the table below

| Country/Region | Scope 2, location-based (metric tonnes CO2e) | Scope 2, market-based (metric tonnes CO2e) | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh) |
|--------------------------|--|--|--|--|
| United States of America | 19,000 | 22,000 | 350,000 | 0 |
| Canada | 10,000 | 11,000 | 80,000 | 0 |
| United Kingdom | 30,000 | 32,000 | 70,000 | 0 |
| Spain | 10,000 | 13,000 | 60,000 | 0 |
| Rest of world | 10,000 | 8,500 | 80,000 | 15,000 |

CC11.2 - Please state how much heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|-------------|---------|
| Heat | 0 |
| Steam | 100,000 |
| Cooling | 0 |

CC11.3 Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

→ 1 500 000

CC11.3a - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh |
|-------------|---------|
| Natural gas | 900,000 |
| Diesel | 600,000 |

CC11.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

| Basis for applying a low carbon emission factor | MWh consumed associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Grid connected low carbon electricity owned by company, no instruments created | 15,000 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct Scope 1 footprint by 400 tCO ₂ e every year |
| Grid-connected electricity generation owned, operated or hosted by the company, where electricity attribute certificates do not exist or are not required for a usage claim | 20,000 | Company 1 has installed 10MW of renewable electricity in its premises. This has allowed a reduction in purchased electricity of 15000MWh and has led to the production of 20,000 MWh which were sold to the grid. This electricity amount is audited and tracking instruments are generated which are retained by us and cancelled, so that we can claim the full amount of clean electricity that we produce. So overall Company 1 Scope 2 carbon footprint is reduced by not having to purchase from the grid 15000 MWh and then by cancelling 20,000 MWh of instruments and accounting 20,000 MWh of electricity consumed from the grid as 0 tCO ₂ e/MWh electricity. |

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

| Total electricity consumed (MWh) | Consumed electricity that is purchased (MWh) | Total electricity produced (MWh) | Total renewable electricity produced (MWh) | Consumed renewable electricity that is produced by company (MWh) | Comment |
|----------------------------------|--|----------------------------------|--|--|---------|
| 540 000 | 540 000 | 0 | 0 | 0 | |

Example 6 – On-site production of grid connected renewable electricity owned by company [tracking instruments not generated]

Company 1 owns in this case one single installation (located in “Rest of the World”), where renewable energy production capacity is installed, and there is a grid connection. The installation is constantly metered by two meters: a bidirectional one located at the grid connection that measures electricity consumption when the installation is sourcing power from the grid and discounts the energy consumed when the renewable energy source is providing the grid; a unidirectional one that meters the energy produced by the renewable energy source.

For the sake of the example 3,500 MWh were generated by the renewable power facility and the bidirectional meter provides an overall consumption from the grid of 536,500MWh. In this case there are no certificates associated with the electricity and overall it will be considered that, since the grid has been a net provider to the company, all renewable power was consumed internally and there has been no transmission to the grid. This is a simplified assumption of what happens in reality. In terms of accounting, it is currently not clear if and when the renewable energy bought by the supplier will be accounted for, for example, in national grid emission factors. This might vary from country to country. In the absence of more information, it is assumed that it will not, but this should be evaluated on a case-by-case basis while avoiding double counting.

| Energy carrier | Purchased? | Consumption (MWh) | Scope |
|--------------------|------------|-------------------|-------|
| Natural gas | Yes | 900,000 | 1 |
| Diesel | Yes | 600,000 | 1 |
| On-site renewables | Yes | 3,500 | 2 |

| Energy carrier | Purchased? | Consumption (MWh) | Scope |
|------------------|------------|-------------------|-------|
| Grid electricity | Yes | 536,500 | 2 |
| Steam | Yes | 100,000 | 2 |

CC10.1 - Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a - Please complete the table below

| Country/Region | Scope 2, location-based (metric tonnes CO2e) | Scope 2, market-based (metric tonnes CO2e) | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh) |
|--------------------------|--|--|--|--|
| United States of America | 19,000 | 22,000 | 350,000 | 0 |
| Canada | 10,000 | 11,000 | 80,000 | 0 |
| United Kingdom | 30,000 | 32,000 | 70,000 | 0 |
| Spain | 10,000 | 13,000 | 60,000 | 0 |
| Rest of world | 8,500 | 9,000 | 76,500 | 0 |

CC11.2 - Please state how much heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|-------------|-----|
| Heat | 0 |

| Energy type | MWh |
|-------------|---------|
| Steam | 100,000 |
| Cooling | 0 |

CC11.3 Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year
 → 1 500 000

CC11.3a - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh |
|-------------|---------|
| Natural gas | 900,000 |
| Diesel | 600,000 |

CC11.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

| Basis for applying a low carbon emission factor | MWh consumed associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Grid connected low carbon electricity generation owned by company, no instruments created | 3,500 | Company 1 has installed 1MW of renewable electricity in its premises. This has allowed a reduction in purchased electricity of 3,500 MWh that it consumes directly from its plants. This number is the net effect of the production by the renewable energy plant, as when surplus power is produced it is bought by our supplier and fed to the grid, causing the meter to discount energy sourced from the grid. No certificates are generated and it is considered that our company consumes all renewable energy. |

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

| Total electricity consumed (MWh) | Consumed electricity that is purchased (MWh) | Total electricity produced (MWh) | Total renewable electricity produced (MWh) | Consumed renewable electricity that is produced by company (MWh) | Comment |
|----------------------------------|--|----------------------------------|--|--|---------|
| 540,000 | 536,500 | 3,500 | 3,500 | 3,500 | |

Example 7 – On-site production of grid connected renewable electricity owned by third party [tracking instruments not generated]

In this case, there is renewable capacity installed on the premises, but it is owned by a third party that provides it to the grid and no tracking instruments are generated. In this case it is clear that, if the electricity is provided to the grid and not directly to Company 1 (who owns and operates the site, but not the renewable energy source) then Company 1 cannot account for the renewable energy produced in its premises but needs to account either at grid average, or the emission factor of its supplier, or needs to have bought and cancelled (or someone on its behalf) some type of tracking instruments.

Example 8 – An example of calculation using RECS in the USA

Company 1 is a USA based company with installations in Oklahoma, California, Upstate New York and Colorado. It consumes the following amounts of electricity

| | MWh |
|------------------|----------------|
| MROW | 200,000 |
| CAMX | 150,000 |
| RMPA | 40,000 |
| NYUP | 30,000 |
| Total USA | 420,000 |

Its Oklahoma facility also purchases 100,000 RECs (1 REC=1MWh) from an Oklahoma wind farm. Because this facility is within the MROW eGRID sub-region, when doing its calculations to compute the electricity Scope 2 market-based footprint for MROW it uses the eGRID emission factor for the portion of power it does not have RECs, this is $200,000 - 100,000 = 100,000$ MWh. The 100,000 MWh for which it has RECs are computed using the specific RECs emission

factor, which in this case because it is a renewable energy source, will be assumed to be 0 t CO₂e/MWh. Thus the footprint, calculated for each eGRID sub-region will look like the following table:

| | Non-renewable MWh | lb/MWh (eGRID 2012) | t CO ₂ e |
|------------------|-------------------------------|---------------------|---------------------|
| MROW | (200,000 – 100 000) = 100,000 | 1,425.15 | 64,644 |
| CAMX | 150,000 | 650.31 | 44,246 |
| RMPA | 40,000 | 1,822.65 | 33,070 |
| NYUP | 30,000 | 408.80 | 5,563 |
| Total USA | 320,000 | - | 147,523 |

Thus, compared to the scenario where RECs would not have been bought, Company 1 has reduced its electricity market-based Scope 2 footprint by 64,644 t CO₂e.

Its CDP disclosure would look like this:

CC10.1 - Do you have Scope 2 emissions sources in more than one country?

No

CC11.2 - Please state how much heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|-------------|-----|
| Heat | 0 |
| Steam | 0 |
| Cooling | 0 |

CC11.3 Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

→ 10,000

CC11.3a - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh |
|-------------|-------|
| Natural gas | 7,000 |
| Diesel | 3,000 |

CC11.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

| Basis for applying a low carbon emission factor | MWh consumed associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Tracking instruments, RECs (USA) | 100,000 | Company 1 has bought 100,000 RECs from an Oklahoma wind farm and reflected that in its total Scope 2 footprint provided in CC8.3a. This led to a reduction of 64,644 t CO ₂ e from its market-based footprint. |

CC11.5: Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

| Total electricity consumed (MWh) | Consumed electricity that is purchased (MWh) | Total electricity produced (MWh) | Total renewable electricity produced (MWh) | Consumed renewable electricity that is produced by company (MWh) | Comment |
|----------------------------------|--|----------------------------------|--|--|---------|
| 420,000 | 420,000 | 0 | 0 | 0 | |

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