CARBON DISCLOSURE PROJECT

# Accounting of Scope 2 emissions

## Technical notes for companies reporting on climate change on behalf of investors & supply chain members 2013

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# Terminology

Contractual instrument – a contractual instrument is any contract between two parties on the purchase of physical electricity, which does not necessarily imply the sale of specific characteristics of the electricity and the exchange of "tracking instruments". According to this definition, a Power Purchase Agreement is a "contractual instrument".

Tracking instrument – a distinction is made between "contractual instruments" and "tracking instruments". A tracking instrument is used to track specific electricity characteristics, from the origination up to the final consumption, allowing for robust traceability of those characteristics through a proper and auditable system. Tracking instruments can have different names depending on the specific system they originate from. They can be designated as a "certificate", "tags", an "instrument", "credits", a "guarantee of origin", etc. For the purpose of this guidance the term "tracking instruments" will be used as the overarching concept for all these different designations.

Certificate – generally an instrument created by a certification scheme that can be based on a proper tracking instrument (e.g. a REC or a GO) or not. As an example Green-e is a certification scheme based on North American RECs (tracking instrument). Green-e certifies that certain criteria are met when purchasing the REC.

GO – Guarantee of Origin

EECS – European Energy Certificate System

PPA – Power Purchase Agreement

REC – Renewable Energy Certificate

Residual mix – the residual mix is the electricity mix delivered to the consumers that don't have a contract to get a particular form of electricity (e.g. consumers buying green electricity). For more information check http://www.res-e.org/learn/residual-mix/.

Vintage of REC/GO – the year the REC/GO (or similar tracking instrument) has been issued

Year of source – the year that the renewable electricity source became operational. This information can be documented in the tracking instrument.

# Introduction

This document has two main objectives. The first is to present and explain the new recommendations introduced by CDP in the 2013 disclosure cycle on the calculation of Scope 2 emissions in corporate GHG inventories (Scope 2 accounting). The second objective is to summarize the main questions arising from the current debate on Scope 2 accounting.

The first section presents CDP's new recommendations for accounting and reporting of Scope 2 emissions, introduced in the 2013 disclosure cycle. These recommendations are based on continuing discussions arising from the GHG Protocol process to develop Scope 2 Accounting Guidance, which clarifies the calculation methods noted in the Corporate Standard. This CDP guidance precedes the final GHG Protocol Scope 2 Guidance, due to be published in the spring of 2013 and may therefore be updated to align with it. They represent interim recommendations in light of the on-going GHG Protocol process and reflect CDP's position in it, while recognizing the evolving nature of electricity grid management and accounting methods to reflect it.

The second section of this document provides a short but complete introduction to the key questions arising from the current debate on Scope 2 accounting. In this section the "debate" held by stakeholders will be described. It presents the approach to accounting followed by the GHG Protocol *Corporate Standard* and how it relates to emission factors and sources of emission factors used for Scope 2 calculations. This document does not aim to cover all possible aspects of Scope 2 accounting and it should not be used as a source of emission factors.

In the third section complementary relevant information is made available. This section documents, as thoroughly as possible, references and data sources to support aspects covered in previous sections. This section is a work in progress and at the time of publication has no presumption of being complete.

The final sections of this document offer answers to frequently asked questions, provide real-life worked examples, and list the references used to compile this document.

The intended reader of this document is anyone looking to obtain a deeper understanding of how companies should account, and are already accounting, for Scope 2 emissions. Users that may find this document useful include: sustainability officers; preparers of information within companies; GHG accounting practitioners, and ESG analysts.

Last, but not least, CDP would like to thank RECS International, Resource Solutions and the Greenhouse Gas Protocol for their contributions and comments on early drafts of this document.

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

# CDP recommendation for accounting of Scope 2 emissions

The GHG Protocol has been leading the process to develop Scope 2 Accounting Guidance, to clarify the calculation methods noted in the *Corporate Standard*. This Guidance is expected to be published in spring 2013, and its discussions and materials have informed and been used to produce this CDP document.

CDP's reporting recommendations reflect the practices and principles that CDP and many of the active stakeholders have supported throughout the consultation period. This document was prepared with inputs from the GHG Protocol team. Future changes to this guidance will be made if and when needed, after the GHG Protocol Guidance has been published.

*Rationale for the changes in CDP's recommendations on Scope 2 accounting*

For the past four years CDP had asked companies to follow a set of criteria on Scope 2 accounting that addressed the issue of double counting of properties. CDP found that companies were not applying the criteria consistently. Some companies would not consider their certificates as being double counted and would include them in their main Scope 2 figure, while others would consider them as being double counted and would therefore choose not to include them in their main Scope 2 figure. They would instead include them in an alternative contractual figure reported separately. In practice, companies found the criteria difficult to assess and it was difficult to ascertain who was double counting. When looking at the Scope 2 practices of companies reporting to CDP, CDP found the following problems:

- the recommendation to use "grid averages" in the absence of clear mandates to produce emission factors also leads to double counting and quality issues;
- the existence of two Scope 2 figures was introducing parallel ways of accounting for Scope 2 and added complexity into the accounting process;
- despite the criteria specified by CDP, transparency and clarity of disclosure did not improve.

In addition, CDP observed two factors that would favor a new approach to Scope 2 accounting:

- there are systems and methods in place and that can be further developed to avoid the double counting of properties that are sold separately from the physical electricity;
- Consumers' choices can play an important role in changing markets by shifting demand and there should be a way to reflect these choices in the indirect emissions profile.

In order to increase the transparency and simplify Scope 2 accounting, CDP has updated its recommendations on Scope 2 accounting and the relevant sections in the 2013 information request. These changes were introduced following: discussions held between CDP and several companies throughout the years; the work that the GHG Protocol has been leading to develop internationally-applicable Scope 2 Guidance, which has highly informed and shaped this guidance; the strategy for change, published by CDP in 2010; and, the public questionnaire consultation conducted by CDP in September 2012.

*CDP's recommendations on Scope 2 accounting*

CDP recommends that companies responding to the CDP core climate change questions follow the hierarchy of guidelines listed below when selecting emission factors for Scope 2 accounting:

1. Use source specific emission factors, based on renewable energy tracking systems;
2. If a company is not buying tracking instruments then it should be using supplier-specific emission factors, particularly where this is an established country practice and there are robust methodologies/regulations in place requiring this type of disclosure from suppliers;
3. If a company is not buying tracking instruments and option 2 above is not possible, then it should follow the guidance listed below:
    a. Use "corrected grid average factors" (residual mix). These are grid average emission factors that have been corrected to take into account renewable electricity that has been produced within the grid region but sold separately using tracking instruments;
    b. If there are no "corrected grid average emission factors" available then it should use emission factors that reflect import and export of electricity for the given geography that better reflect the consumption of electricity in that geography;
    c. If the option above is not available, then it should use production based emission factors, such as the ones provided by the IEA, where the emission factor reflects the production of electricity within a given geography.

Furthermore, CDP has also updated its recommendations on targets covering Scope 2 emissions. Companies reporting targets that cover Scope 2 emissions should clarify whether the target is planned to be achieved through a reduction of energy consumption or through the purchase of low carbon energy. Targets covering Scope 2 emissions should consider both aspects but companies should clarify what portion of the emissions reduction is expected to be achieved by decreasing the consumption of energy and what portion is to be achieved through decarbonized energy.

CDP recommends that companies responding to the CDP core climate change questionnaire follow the hierarchy of guidelines listed below when seeking to implement activities to reduce their Scope 2 emissions:

1. Reduce the purchase and consumption of energy. This can be achieved by energy efficiency measures or by consuming renewable energy produced by on-site sources;
2. Procuring low carbon energy carriers from renewable sources;
3. Other measures.

*Changes made to the information request*

The changes made to the information request seek to increase the transparency of Scope 2 disclosure while minimizing change in the questions.

The key change is that companies now have the option to reflect their Renewable Energy purchases in their main Scope 2 figure if they wish to do so. However, this is optional and companies may also choose not to do this. In order to distinguish between companies that use low carbon energy carriers (such as electricity) and fully account for them and those that

do not, CDP will ask companies to report how much electricity has been consumed and how much has been accounted for at a low emission factor. Companies that choose to account for electricity at a low emission factor should disclose this information. These changes in CDP's recommendations have led to the following questionnaire changes:

- Deletion of the section pertaining to contractual Scope 2 emissions (section 11 in the 2012 information request);
- The addition of two columns in the Scope 2 country breakdown (question 10.1a):
    - Purchased and consumed electricity (MWh) – this column will require the disclosure of the purchased and consumed electricity (activity data) associated with the Scope 2 figure reported in the same line. This should encompass all purchased and consumed electricity, independent of the emission factor rate that the electricity has been accounted for.
    - Purchased and consumed electricity accounted as green power (MWh) – this column will require the disclosure of the purchased and consumed renewable electricity (activity data) associated with the Scope 2 figure reported in the same line, that has been accounted at a zero (or near zero) emission factor, and that is properly backed by tracking instruments. If no electricity has been accounted at a zero (or near zero) emissions factor, then companies should report zero in this column.
- An additional question (question 11.4) has been added to the "Energy" page, requiring the disclosure of information related with electricity accounted at a zero emission factor. This includes the basis for applying a low emission factor and any comments considered necessary to explain it.

The changes in CDP's Scope 2 accounting recommendations will have an effect on the following reporting areas:

- Targets (question 3.1): if you have specific policies on contracting renewable energy, which have been considered in your target setting, you can reflect it in your disclosure. It is important that in the narrative part of the disclosure (the "Comment" column) you provide details as to how the target is expected to be met: energy reduction consumption; production of energy by company; contracting renewable energy and reflecting it in the accounts.
- Emission Reduction Activities (question 3.3): as with targets, you can now reflect any specific policies on contracting renewable energy in your emission reduction activities. If you are already buying renewable energy instruments and accounting them as a zero emission factor, then emission reductions activities can only be achieved as "additional purchases" to what you are already doing. Therefore, emission reductions activities are established by comparing what you have done in the previous year and what you are proposing to do for the next year(s). Contracting renewable energy power as an emission reduction strategy is a serious and long time commitment to renewable power. If you stop buying it, your footprint can immediately increase.
- Total Scope 2 emissions and respective breakdowns (questions 8.3 and 10.1a): you can reflect specific policies on contracting renewable energy into your global Scope 2 figure, as well as in the breakdowns.
- Energy (question 11.4): you will be requested to explain the basis for applying low emission factor in Scope 2 accounting, for example because you are producing renewable electricity on site; because RECs or GOs bought; because of specific PPAs; etc.

- Emissions performance (question 12.1a): you can reflect specific policies on contracting renewable energy into your disclosure on emissions performance, namely if your Scope 2 emissions have reduced as a consequence of buying RECs or GOs you can consider that as a emission reduction activity. If you have previously not accounted for these types of instruments, but now wish to account for them, you can consider it as a "Change in methodology".

In the USA RECs can also convey information on emission reductions, calculated using a consequential approach[1]. Companies should not use this information to calculate their Scope 2 figures, but if they wish to do so they can report it in the "Further information" field of the questionnaire pages "Emissions data" or "Scope 2 Emissions Breakdown", as an avoided emission figure.

### *CDP's approach to additionality and other eligibility criteria*

An issue that is frequently raised when discussing Scope 2 accounting and renewable electricity is the "additionality" of the renewable electricity. Additionality is the need to satisfy that the activity (renewable energy production; an emission reduction project) has certain characteristics (is new renewable energy capacity; would not have happened) as a consequence of specified actions, policies or interventions (buying renewable energy certificates; generation of CERs).

CDP views additionality as a criterion that is essential in the carbon offset market but is misplaced within the context of the renewable energy instrument markets. Within the context of renewable energy instrument markets, additionality should be seen as an "eligibility criterion" [2]. Eligibility criteria are defined by policymakers for the purpose of selecting tracking instrument and energy sources that reflect a set of preferences and aim to achieve a specific policy outcome. CDP holds the opinion that, as long as the Scope 2 figure can be produced without double counting or loss of attributes (is robust), specific policy preferences and their associated eligibility criteria should not be specified in the context of inventory Scope 2 accounting.

Furthermore, because CDP is a global initiative and cannot accommodate for all the different and sometimes contradictory policies around the globe, it does not assign a role for eligibility in calculating a gross Scope 2 emission figure.

Such difference in policies can be illustrated by a fictitious example:

- Animal conservation organizations requiring renewable electricity to be sourced from existent sources – guaranteeing that no new habitat loss or other impacts are being created for animal conservation purposes;
- Climate change organizations requiring renewable electricity to be sourced from sources that have started to operate in the last 10 years.

In this example, both groups have commendable environmental objectives, but the policy recommendations are opposed to each other.

Buying of renewable electricity from old renewable capacity has been particularly under attack by certain organizations and can constitute a risk for companies. This can be perceived by those organizations as "green washing" and an "easy way to decrease the carbon footprint".

[1] Working in practice as a "Scope 2 offset". See next section for an explanation of consequential accounting.

Likewise, buying renewable electricity that has received public funding can be labeled as "cheap way to decrease footprint" and a "robbery of the tax payer" who has partially funded that power.

From a CDP perspective, many of these considerations are, and should be, at the discretion of national governments and policymakers, and their decisions should be respected or debated in the appropriate forum. One country, for example, might decide that all feed in tariff support shall be granted to renewable capacity only if tracking instruments are not issued or are retained by the state, while another might consider that on top of the feed in tariff, all producers have the right to sell the electricity properties provided they use appropriate tracking instruments. What is relevant is that, under an "attributional approach" to accounting using appropriate tracking instruments, the accounts can be robust while there is flexibility for companies to decide their best approach and governments their specific policy on renewable energy support mechanisms.

However, CDP recognizes that eligibility criteria exist for good reasons. Different attributes can imply different impacts on the environment and on carbon emissions. As such - depending on time, location and point of view – companies, stakeholders and the general public, might require different eligibility criteria. The fundamental issue is to guarantee that the tracking instruments can track these different characteristics and in a way that is as robust as the electricity quantities tracking.

Recognizing that eligibility can play a role, in future CDP might consider introducing specific eligibility criteria within its performance scoring policy. This would be introduced in order to reward leading companies that promote or support environmental good practices through their energy procurement decisions. At the moment of writing CDP has no plans to do this but it might choose to introduce this change in future.

When sourcing electricity and accounting for it, companies should consider their own internal policy objectives and what they want to achieve, as well as their stakeholders. Companies wanting to decrease their carbon footprint and contribute to increased renewable capacity might choose to set criteria for the electricity they purchase. For example, they might require that the electricity purchased is not generated by sources that have been subsidized by government, and have been generated from recent renewable capacity. On the other hand, companies wanting to contribute to energy independence and local climate resilience might choose to generate their own electricity or to source it locally. It is appropriate for companies to articulate their reasons within their climate strategy narrative.

# Aspects of Scope 2 accounting

The purpose of this section is to introduce and summarize the key issues arising from the discussion that has been talking place over the past three years on Scope 2 accounting.

## The debate

The GHG Protocol *Corporate Standard* serves as the international standard for corporate greenhouse gas (GHG) accounting. The *Corporate Standard* introduced and defined the concept of "operational scopes" to promote transparency and to make the protocol more useful to different types of organizations and climate-related goals. Scopes 1 and 2 have been established in order to "ensure that two or more companies will not account for emissions in the same scope". In other words, to avoid double counting within the same scope [1, pp. 25][2].

In the GHG Protocol *Corporate Standard,* Scope 2 covers "emissions from the generation of purchased electricity consumed by the company." Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated" [1, pp. 25]. The footnote attached to this paragraph states that "The term 'electricity' is used … as shorthand for electricity, steam, and heating/cooling" [1, pp. 33]. "For most consumers, Scope 2 predominantly includes electricity consumption, but other purchased energy products such as distributed heat/steam facilities also fall into this category" [2].

The GHG Protocol *Corporate Standard* continues to explain that Scope 2 "reflects emissions from the generation of energy that is purchased and consumed in the facilities or equipment owned/ controlled by the reporting company. It is an indirect emissions category because the source of the emissions is physically located outside of the reporting company's organizational boundary" [2].

Due to the nature of most energy distribution grids, in particular electricity, companies cannot precisely identify the generation source of the energy they consume in their operations. Multiple energy generation sources typically contribute to the energy available on the grid. Their contribution will vary depending on the demand for power and how the grid operator dispatches that energy production demand.

One of the issues that can cause a conceptual problem is the impossibility to track the physical flow of electricity. This issue has been addressed in some markets by creating a parallel information flow which can be managed separately from the physical electricity[3].

Several approaches can be used to estimate the emissions associated with the purchased energy companies consume. However, in current practice the following three main approaches (all noted in the *Corporate Standard)* have been used:

[2] This, however, requires that a further condition is fulfilled: all the companies need to follow the same approach to organizational boundary setting and consolidation of accounts.
[3] See section "Renewable energy tracking systems" later in this paper.

1. The use of energy-specific tracking instruments, such as Renewable Energy Certificates (RECs) or Guarantees of Origin (GOs), as a means to claim a specific emission factor for Scope 2 calculations;
2. The use of supplier-based programs or labels and power purchasing agreements[4] (contracts), that are not backed by tracking instruments, as a means to claim a specific emission rate;
3. The use of location based emission factors, usually averages reflecting either production or consumption within a certain time frame, as a mean to produce a Scope 2 figure that can represent the average $CO_2$ production for a consumer of a given grid.

Technical and normative uncertainties raise questions over whether any of these approaches should be introduced as standardized procedures in GHG accounting. These uncertainties raise concerns in the following areas:

a. alignment of accounting practices and comparability of accounts;
b. the robustness of the figures and risks of double counting;
c. the equitable attribution of "green claims";
d. and the general credibility of company's accounts and reduction claims.

These uncertainties affect all stakeholders:

- Companies are left without a clear link between their energy purchasing strategies and their GHG reduction goals;
- Verifiers lack a clear way to evaluate the energy emissions reported in corporate GHG inventories;
- Investors and the public in general, are left without the real confidence in the information that is provided to them.

Within the past three years, a considerable discussion has occurred around these issues. Accounting for Scope 2 emissions associated with energy purchase and consumption can present many conceptual and technical challenges. The GHG Protocol is seeking to provide international Scope 2 Guidance that clarifies appropriate methods, and is due to be published in spring 2013. Until its publication, CDP's reporting recommendation reflects an interim recommendation of the practices and principles that it and many other active stakeholders in the GHG Protocol consultation have supported. These notes have been done with inputs from the GHG Protocol

## Approach to accounting in the GHG Protocol *Corporate Standard*

In the GHG Protocol *Corporate Standard*, Scope 1,Scope 2 and Scope 3 are defined in the context of a corporate inventory (or attributional) approach to accounting[5], where actual

[4] In certain jurisdictions some of these emission rates can be backed by tracking instruments, e.g. in the US PPAs will generally include the transfer of RECs, and in Europe electricity disclosure from suppliers will generally be backed by Guarantees of Origin. When such cases occur this should be considered under line 1 "use of energy specific tracking instruments".

[5] The terminology is derived from the one established as part of life cycle analysis (LCA) methodologies and two approaches are considered: attributional and a consequential approach. An attributional LCA inventory answers the question "What are the total emissions from a given process/entity?". It tracks the responsibility for real emissions delivered to the atmosphere by a given entity/process. The objective is to allocate (or attribute) the total mass of emissions according to specified criteria, avoiding to the extent possible double counting. The attributional approach is the approach adopted by the GHG Protocol *Corporate Standard* for corporate inventories. A consequential approach, on the other hand, tries to answer the question "What are the systemic consequences (changes) in total (system) emissions from

emissions (either direct or indirect) to the atmosphere are to be tracked to a given source/entity [2, 3]. A variety of approaches can be used to make this attribution, based on the sources of information available, the regulatory framework in place, companies' level of environmental awareness, and companies' proficiency in GHG accounting.

For the attributional accounting of Scope 2 emissions, companies will generally use one single and simple calculation method or expression:

Emissions [tCO2e] = Activity data [MWh] * Emission Factor [tCO2e/MWh]

Where:

- Activity data is for example the amount of electricity purchased and consumed in megawatt-hours (MWh). This value will generally be measured (by a physical device) or estimated;
- Emission factor, which represents some type of average, for a given period of time, of emissions per MWh, for either a specific grid, supplier or electricity source.

The GHG Protocol *Corporate Standard* recognizes and recommends that source and supplier-specific information are preferable for the purpose of calculating Scope 2 [1, pp. 42, 87] and provides examples of how energy purchasing instruments such as certificates [1, pp. 61][6], green power markets and contracts [1, pp.12, 27][7] can be used as part of "purchase switching" to change the GHG-profile of the energy companies purchase and report on. These have been grouped in the category of "contractual instruments" in the GHG Protocol draft Scope 2 Guidance [2].

The GHG Protocol recognizes two important consequences of the attributional approach to accounting:

- Emission reductions are presented and calculated by comparing changes in the company's actual emissions inventory over time relative to a base year. All other ways of quantifying emission reductions – namely by applying a project accounting methodology or a "consequential approach" – can be presented under optional information [1, pp. 59] [8];
- Emissions reductions in a corporate GHG inventory might not always reflect actual physical emissions reduction of the company, specifically in the case of indirect emissions (scopes 2 and 3) [1, page 59][9].

Furthermore, the attributional approach supports the view that renewable energy purchases in Scope 2 emission inventories should be calculated using "grid type" emission factors[10]. The

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given policy decisions at product/entity level?" This approach, which is followed in the GHG Protocol for Project Accounting and in the Clean Development Mechanism, has historically been applied to accounting for carbon offsets/GHG reductions. Further information on attributional and consequential approaches to LCA can be found in references [4], [5] and [6].

[6] See Alcoa example.

[7] See IBM example and text on pp. 27 "Companies can reduce their use of electricity by investing in energy efficient technologies and energy conservation. Additionally, emerging green power markets provide opportunities for some companies to switch to less GHG intensive sources of electricity."

[8] "Reductions in corporate emissions are calculated by comparing changes in the company's actual emissions inventory over time relative to a base year".

[9] "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."

attributional approach does not support the view that the purchase of renewable energy should be treated as "avoided emissions" [2].

## Emission factors and sources of emission factors

This section presents a discussion of the characteristics, use and limitations of several types of electricity emission factors.

*Grid average emission factors*

Most companies that do not purchase electricity from specified sources through contractual or tracking instrument[11] usually estimate their Scope 2 emissions using grid average emission factors. There are no particular issues with calculating emissions using a grid average emission factor. However, it is important to be conscious of which factor is in fact being used. There are several ways of calculating a grid average emission factor and important nuances can exist. Nevertheless, grid averages have several advantages, for example:

1. They are usually available for most countries/grids and several organizations calculate/publish this type of emission factor (International Energy Agency, eGRID; government bodies);
2. They are often repackaged into carbon calculating tools used to facilitate the work of calculating footprints (e.g. GHG Protocol tools; web carbon calculators);
3. They are known and well accepted method in the GHG accounting community ("traditional approach").

However, CDP recognizes that this approach has a number of issues and has been working with several organizations to address them, namely:

1. There is usually a time lag of more than a year before they are published, due to the data that needs to be collected in order to produce them. This can be a problem in geographies with high content of renewable energy, as the generation capacity of the renewable energy sources can vary significantly from one year to the next, depending on weather conditions;
2. It is not always clear – or it requires considerable expertise – to know what is included in the emission factor. This can also depend on the specific mandate and sources of information available to the organization that produces them. Sources of "methodological variation" may include:
    a. whether they account for emissions of other GHG from combustion besides $CO_2$;

[10] 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.

[11] A distinction is made between "contractual instruments" and "tracking instruments". A tracking instrument is used to track specific electricity characteristics, from the origination up to the final consumption, allowing for robust traceability of those characteristics through a proper and auditable system. Guarantees of Origin and Renewable Energy Certificates (in the USA) are examples of tracking instruments. On the other hand, a "contractual instrument" is any contract between two parties on the purchase of physical electricity, which does not necessarily imply the sale of specific characteristics of the electricity and the exchange of "tracking instruments". According to this definition, a Power Purchase Agreement is a "contractual instrument". See [2] for more background on this issue.

b. whether transmission and distribution (T&D) losses are included or not. 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;

c. whether heat-related emissions are incorporated into the emission factor;

d. how the electricity grid is defined;

e. and specific policies on how renewable energy sources are accounted for. For example, a company may enter into a contract with a supplier for renewable electricity because it wishes to make a certain statement regarding its Scope 2 emissions. However, in most jurisdictions this electricity and its associated emissions (or lack of them) are counted within the grid average emissions factor used by other end-users, leading to double-counting of the benefits.

3. Companies that are required to calculate their Scope 2 emissions for compliance purposes using grid average factors have very little flexibility around the actions they can take to reduce Scope 2 emissions. Companies can reduce these emissions in two fundamental ways. They can either reduce the amount of electricity purchased and consumed, or they can reduce the carbon intensity of the electricity purchased and consumed. The latter is determined by the grid-average figure - which treats every consumer on the grid "equally" and over which companies have little influence. Thus, if companies want to achieve significant Scope 2 emission reductions, which they can directly control, they are restricted to reducing their electricity consumption. This does not favor accountability for purchasing/consumption choices;
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 emissions (referred to in 2e above)[12];
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.

### Production based grid-average emission factors – the grid average factors from the International Energy Agency [7]

Until its 2012 edition the IEA published an indicator for $CO_2$ emissions per kWh for the electricity and heat generating industries of each country. This "grid-average" emission factor is used in many tools and GHG inventories, despite the fact that it incorporates $CO_2$ emissions from electricity production and steam and hot water production. As of 2012, the IEA started producing an electricity-only emission factor. In its calculation it is using an allocation method to attribute to electricity part of the emissions from combined heat and power. In most cases this has led to small variations in the emission factors. However, in countries like Estonia or Denmark the variation can be

[12] 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" [9, pp. 14].

up to 30% higher than in previously stated emission factors that consider electricity and heat production.

However, there are still other issues with the use of IEA emission factors. Useful as they are, IEA emission factors do not reflect certain features such as:

1. The exchange of electricity within a grid. IEA uses consumption of fuels for electricity production and the electricity produced within a country, and does not consider exports and imports of electricity between countries. This should be considered if you are calculating the emission factor within a grid. For certain countries, this becomes relevant in the calculation of the "grid average" (or consumption average) vs. the "country production average" emission factor.
2. The electricity emission factors are calculated using production data for $CO_2$ and electricity, thus disregarding transmission and distribution losses. This fact further strengthens that this is a "production electricity country emission factor" that does not necessarily reflect the consumption of electricity.
3. It only accounts for $CO_2$, disregarding emissions from other GHG gases – which are, admittedly, considerably lower than emissions from $CO_2$.

While corrections to issues 2) and 3) above can be made, based on reasonable assumptions, issue 1) is of a more fundamental nature and requires a different methodology and data set.

### Grid-average emission factors, considering import and export and grid connections – the grid average from Scandinavia

The transmission of electricity between Nordic countries (Norway, Sweden, Denmark and Finland) is closely interconnected in what is usually referenced as the Nordic Power System. The Nordic system and other countries are interconnected by several direct current (DC) transmission connections. Furthermore, Norway and Sweden are probably the two most advanced countries in implementing a system of guarantees of origin (GO). Norway, in particular, is the largest supplier of GOs in the European market.

Despite this harmonized approach to electricity markets, within this region it is possible to find emission factors reflecting a diverse range of methodology choices, which lead to significant material variation.

As an example, we present the comparison between the emission factor of Norway for the year 2010, following the approaches of:
1. IEA (production base, no account of import or exports) for Norway, Denmark, Sweden and Finland [8];
2. Klimaloflet reports an emission factor, accounting for import and export of physical electricity, but not considering the sale of Guarantees of Origin [9] ;
3. NVE emission factor, accounting for import and export of physical electricity and considering the trade of Guarantees of Origin with Norway [10] [11].

| | Year | Emission factor (gCO2e/kWh) | Reference |
|---|---|---|---|
| 1 | 2010 | 10 | IEA, Norway [8] |
| 2 | - | 33 | Klimakalkulatoren [9] |
| 3 | 2010 | 353 | NVE, residual mix [10] [11] |

As well as a range of other emission factors for Norway for different years:

| Year | Emission factor (gCO2e/kWh) | Reference |
|---|---|---|
| - | 99 | CO2focus, using a 5 year rolling average 2004-2008 [12] |
| 2006 | 7.63 | Defra 2011 [13] |
| - | 211 | Klimaløftet, using a Nordic mix average [9] |

Certain companies, recognizing that there is in fact one single electricity pool in the Nordic countries use a "Nordic grid" emission factor, reporting emission factor values in the order of 100-200 g/kWh. These values do not seem to reflect the sales of GOs to outside the Nordic pool, but merely the different production mixes in the four Nordic countries.

| Year | Emission factor (gCO2e/kWh) | Reference |
|---|---|---|
| 2010 | 10 | Norway [8] |
| 2010 | 360 | Denmark [8] |
| 2010 | 30 | Sweden [8] |
| 2010 | 229 | Finland [8] |

As shown, if a single emission factor is used for the entire Nordic grid, then footprints in Norwegian and Swedish sources will increase relative to the "country grid average", and in Denmark and Finland they will decrease, benefiting from the renewable/nuclear energy produced in Norway and Sweden which they also consume.

This example shows the diversity of emission factors that can and are being used for the production of inventories, as well as the variability they entail, with emission factors varying up to a factor of 35!

### The eGRID approach in the United States of America

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 [9, pp. 14] (see previous footnote nr. 12). 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 particular 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 clients[13], 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.

### 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

[13] 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 $CO_2$ and the production of radioactive waste. This is different from country disclosing obligations as part of the Renewables Directive.

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 2011"[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. For more information check http://www.reliable-disclosure.org/.

*Supplier-specific average emission factor*

An alternative to the use of "grid average" emission factor is to use supplier-based average emission factors. This alternative 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 companies[15] 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 factor[16], this seems to be an appropriate solution.

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.

[14] See http://reliable-disclosure.org/upload/147-RE-DISS_2011_Residual_Mix_Results_v1_1.pdf or http://www.recs.org/voluntary-market/why-consume-renewable-energy-/residual-mix-figures-2011

[15] Communication to CDP in a country workshop and as observed through CDP disclosures.

[16] 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".

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.

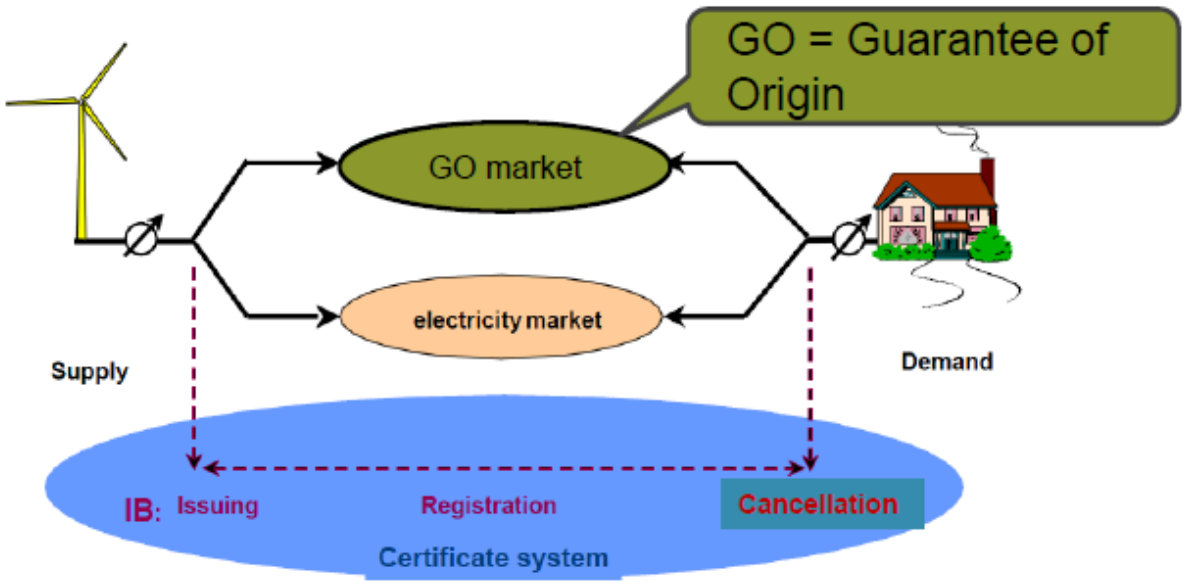
### Supplier Mix Figures and Disclosure

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 $CO_2$ 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.

*Source-specific emission factor*

Source-specific factors will be characterized by being unique for each transaction of a unit of electricity (usually a MWh) between a supplier and a consumer. They rely on robust tracking and auditing systems that enable a link to be established between the energy production at a given source (with its specific characteristics), 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, which is not feasible. Instead it aims to track the contractual relationships of the electricity purchase in a robust and auditable form.




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 systems, the Renewable Energy Certificate System (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.

### Example of Carbon Accounting With a Residual Mix

A company based in Norway is interested in calculating their emissions inventory for the year 2012. In 2011 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 $gCO_2$/kWh results in emissions for the grid consumed electricity of 176.5 $tCO_2$. 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 $tCO_2$.

# Reference materials and data sources

## Renewable energy tracking systems

As it will be seen in the following sections, there is a variety of systems implementing what can be generically called "Renewable Energy Certificate"(REC) schemes. Even though the instruments are often called the same thing (REC) they are often used for very different purposes. It is very important to understand what purpose the instrument is trying to serve, as the ability to count it for GHG inventory purposes may depend on it.

## 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. In an attempt 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.

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.

### The RECS Certificate (Europe)

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.

### An Example of Electricity Consumption with the GO

A corporation has had 120-MWh of electricity consumption in 2011, 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 2012. 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.

### Other schemes

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.

### Further information

For further information about electricity disclosure in Europe please check:

- http://reliable-disclosure.org
- http://www.recs.org

## North America (US and Canada) - The Renewable Energy Certificate System (RECS)

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.
- "Best Practices in Public Claims for Green Power Purchases and Sales" (July 10, 2009). Written by CRS, this report details claim issues with renewable energy installations, hosts, sellers, and customers.
- "Market Brief: Status of the Voluntary Renewable Energy Certificate Market (2011 Data)." A look at the voluntary green power market and the role of RECs from the National Renewable Energy Laboratory.
- "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.
- "Status and Trends in U.S. Compliance and Voluntary Renewable Energy Certificate Markets (2010 Data)." Annual report from NREL on the state of the retail renewable energy market, released in 2011.

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/

### South America

CDP is currently unaware of any of such systems in any South American country.

### India

CDP is currently looking for further information on the development stage and regulation around Renewable Energy Certificates in India.

Some information can be found at https://www.recregistryindia.nic.in/ .

### South Africa

CDP is currently looking for further information on the development stage and regulation around Renewable Energy Certificates in South Africa.

### Australia

CDP is currently looking for further information on the development stage and regulation around Renewable Energy Certificates in Australia.

Some information can be found at https://www.rec-registry.gov.au/home.shtml

### Japan

CDP is currently unaware of any of such systems in Japan.

### China

CDP is currently unaware of any of such systems in China.

## Appropriate tracking instruments & certification systems

Tracking instruments can have different names depending on the specific system they originate from. They can be designated as a "certificate", "tags", an "instrument", "credits", a "guarantee of origin", etc. For the purpose of this guidance the term "tracking instruments" will be used as the overarching concept for all these different designations.

When accounting for renewable energy based on tracking instruments, companies should be made aware of what constitutes a good system for tracking electricity. 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/cancelation mechanism within the system.
- The information in the system can be used to avoid the double counting of attributes.

CDP will generally consider the following systems (and instruments) as appropriate for the purpose of tracking renewable electricity:

- Systems based on European Guarantees of Origin (GOs) such as the EECS (European Energy Certificate System).
- Systems based on USA Renewable Energy Certificates such as : the Electric Reliability Council of Texas (ERCOT), Midwest Renewable Energy Tracking System (M-RETS), Michigan Renewable Energy Certificate System (MIRECS), North America Renewables Registry (NARR), New England Power Pool-Generation Information System (NEPOOL-GIS), North Carolina Renewable Energy Tracking System (NC-RETS), New York State Energy Research and Development Authority (NYSERDA), PJM-Generation Attribute Tracking System (PJM-GATS), and Western Renewable Energy Generation Information System (WREGIS)[17].

It is important to distinguish between tracking systems and certification systems, as they are not equivalent. 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, which cover the tracking criteria above plus other important assurances and quality criteria, such as the Green-e Energy program in the USA.

[17] A map of these tracking systems is located here: http://www.etnna.org/images/ETNNA-Tracking-System-Map.gif.

Thus, for example, Green-e Energy in North America is not a tracking system, but it does require that RECs be tracked either in an electronic tracking system or through an equivalent, auditable chain of custody.

### Emission factors and sources of emission factors

http://reliable-disclosure.org/upload/147-RE-DISS_2011_Residual_Mix_Results_v1_1.pdf
REDISS project has calculated residual mix emission factors for all European countries; however, it does not recommend these numbers to be used for carbon accounting purposes. The reason for this recommendation is unclear at the time of writing this document. These figures can also be found at
http://www.recs.org/voluntary-market/why-consume-renewable-energy-/residual-mix-figures-2011

The Norwegian authority also publishes a residual mix emission factor that can be found here http://www.nve.no/en/Electricity-market/Electricity-disclosure-2011/ . As far as we are aware, unlike REDISS, NVE supports the use of the corrected emission factor for the purpose of personal or corporate carbon accounting for all entities consuming electricity in Norway.

# Frequent Asked Questions (FAQ's)

### Are the recommendations made in this document aligned with the GHG Protocol?

CDP has been consulting closely with the GHG Protocol team for several years in order to reach maximum alignment between the two initiatives and it intends to continue to pursue this objective. CDP has actively participated during 2011-2012 in the Technical Working Group developing international Guidance clarifying the approach that should be adopted to calculate Scope 2 emissions and account for renewable electricity. The GHG Protocol Guidance is expected to be published in the spring of 2013 and its discussions and materials have informed and been used to produce this document. Until its publication, CDP's reporting recommendation reflects an interim recommendation of the practices and principles that it and many other active stakeholders in the GHG Protocol consultation have supported, and they are valid for the 2013 disclosure cycle. The current guidelines do not contradict or go against any recommendation made in the Greenhouse Gas Protocol *Corporate Standard* [1]. This document was done in consultation with the GHG Protocol team. Future changes to this document will be made if and when needed, after the GHG Protocol Guidance is published.

### What type of certificates/instruments can be used?

CDP recommends that appropriate tracking instruments are used. Please see the section on "Appropriate tracking instruments & certification systems".

### Can I count a GO/REC towards my Scope 2 target?

Yes.

### Can I count CERs or VERs towards my Scope 2 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 (connected) region, 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 which 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.

### Where can I find corrected emission factors for the grid?

The Norwegian NVE authority has published corrected grid emission factor (residual mix) on their website http://www.nve.no/en/Electricity-market/Electricity-disclosure-2011/ .

The RE-DISS project as also calculated corrected grid emission factors for all EU countries, although their current recommendation is that these should not be used for corporate GHG inventories. Check http://www.reliable-disclosure.org/ .

### What will be the implications of this change in accounting on base year emissions and emissions from previous reporting years? Should companies recalculate their base year emissions?

According to the GHG Protocol companies should recalculate base year in case there are:

- Structural changes in the reporting organization (mergers, acquisitions, divestments or outsourcing and insourcing of emitting activities);
- Changes in calculation methodology or improvement in emission factors;
- Discovery of significant errors.

Furthermore, these cases only trigger a base year recalculation if a certain level of “significance” is achieved. The “significance threshold” is a “qualitative and/or quantitative criterion used to define any significant change to the data, inventory boundary, methods, or any other relevant factors. It is the responsibility of the company to determine the “significance threshold” that triggers base year emissions recalculation and to disclose it” [1, pp. 35].

If you have always been buying RECs or GOs it might be that you already reflect those purchases in your inventory, but have disclosed to CDP previously using grid averages. Or it might be that you have never reflected your renewable energy purchases in your inventory and CDP disclosure. It will be a policy decision from the company to decide if it wants to recalculate

its base year or other inventory years and if it wants to restate that information to the CDP again.

If restating, companies should make it explicit that they are conducting a restatement and should also indicate the reasons for it.

### 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 13.2 and 13.2a 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.

# 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 most clear 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: is the facility owned by the company or is it owned and/or managed by other company?

Additional cases might occur that take into account other factors/variables. Judgement 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. To the extent known and identified by CDP, when there is on-site generation with no grid connection it is unlikely that certificates like RECs or GOs are being generated and sold separately. However, if such thing occurs from a principle point of view, one would have to admit that the electricity attributes would be accounted by a third party (the party that buys and retires the attributes) and that no claim could be done by Company 1. However, this case is unlikely to occur.

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

As with case 1, this case is also unlikely to happen. Nevertheless, 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.

### 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, with a decrease in energy consumption associated with those emissions;
2. an increase in the electricity consumption;
3. an equal amount of electricity purchased and consumed.

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 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 CDP response would look like:

**Q10.1 - Do you have Scope 2 emissions sources in more than one country?**
Yes

Q10.1a - Please complete the table below

| Country | Scope 2 metric tonnes CO2e | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling (MWh) |
|---|---|---|---|
| United States of America | 190.00 | 350 000 | 0 |
| Canada | 10.000 | 80 000 | 0 |
| United Kingdom | 30.000 | 70 000 | 0 |
| Spain | 10.000 | 60 000 | 0 |
| Rest of world | 10.000 | 80 000 | 0 |

Note: because electricity is generated by company and is not being purchased, it should not be counted in Scope 2 and thus, it should not appear in the activity data associated with Scope 2 accounting.

Q11.2 - Please state how much fuel, electricity, heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Fuel | 1 500 000 | → Installation of solar electricity led to reduction of amount of fuel consumption in diesel generators and so a decrease can be seen in this figure (all other things being equal). |
| Electricity | 540 000 | → Installation of solar electricity did not lead to any change in the amount of electricity purchased and consumed as it is not “purchased” by the company |
| Heat | 100 000 | |
| Steam | 0 | |
| Cooling | 0 | |

Q12.3 - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Natural gas | 900 000 | |
| Diesel | 600 000 | → the reduction in footprint (all other things being equal) will be due to lower consumption of Diesel amounts reflected in this figure |

Q12.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

| Basis for applying a low carbon emission factor | MWh associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Non-grid connected low carbon electricity generation owned by company, no instruments created | 1 500 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct scope 1 footprint by 400 tCO2e 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 all things equal to 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 10.1 and 11.2.

Q10.1 - Do you have Scope 2 emissions sources in more than one country?
Yes

Q10.1a - Please complete the table below

| Country | Scope 2 metric tonnes CO2e | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling (MWh) |
|---|---|---|---|
| United States of America | 190.00 | 350 000 | 0 |
| Canada | 10.000 | 80 000 | 0 |
| United Kingdom | 30.000 | 70 000 | 0 |
| Spain | 10.000 | 60 000 | 0 |
| Rest of world | 10.000 | 81 500 | 1 500 |

Q11.2 - Please state how much fuel, electricity, heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Fuel | 1 500 000 | → Installation of solar electricity led to reduction of amount of fuel consumption in diesel generators and so a decrease can be seen in this figure (all other things being equal). |
| Electricity | 541 500 | → Despite electricity is being produced on-site it is being "bought" by the company and as such, it is accounted as electricity that counts for the activity data of Scope 2 (purchased and consumed) |
| Heat | 100 000 | |
| Steam | 0 | |
| Cooling | 0 | |

Q12.3 - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Natural gas | 900 000 | |
| Diesel | 600 000 | → the reduction in footprint (all other things being equal) will be due to lower consumption of Diesel amounts reflected in this figure |

Q12.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

| Basis for applying a low carbon emission factor | MWh associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Non-grid connected low carbon electricity generation not owned by company, no instruments created | 1 500 | By supplying its remote equipment with solar electricity, Company 1 reduced its direct scope 1 footprint by 400 tCO2e 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. |

## 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 uni-directional 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 1500 MWh were generated and consumed locally and 2000 MWh were generated and fed into the public grid with the tracking instruments retired/cancelled by Company 1.

### Q10.1 - Do you have Scope 2 emissions sources in more than one country?

Yes

### Q10.1a - Please complete the table below

| Country | Scope 2 metric tonnes CO2e | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling (MWh) |
|---|---|---|---|
| United States of America | 190.00 | 350 000 | 0 |
| Canada | 10.000 | 80 000 | 0 |
| United Kingdom | 30.000 | 70 000 | 0 |
| Spain | 10.000 | 60 000 | 0 |
| Rest of world | 8.500 | 78 500 | 2 000 |

### Q11.2 - Please state how much fuel, electricity, heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Fuel | 1 500 000 | |

| Energy type | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Electricity | 538 500 | → Installation of a renewable power capacity led to a change in the amount of electricity purchased and consumed as the 1500 MWh that it now consumes directly from this renewable source is electricity that it does not have to purchase from the grid |
| Heat | 100 000 | |
| Steam | 0 | |
| Cooling | 0 | |

Q12.3 - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Natural gas | 900 000 | |
| Diesel | 600 000 | |

Q12.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

| Basis for applying a low carbon emission factor | MWh associated with low carbon electricity, heat, steam or cooling | Comments |
|---|---|---|
| Grid connected low carbon electricity generation owned by company, instruments created and retired by company | 2 000 | Company 1 has installed 1MW of renewable electricity in its premises. This has allowed a reduction in purchased electricity of 1 500MWh and has led to the production of 2000 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 form the grid 1500 MWh and then by cancelling 2000 MWh of instruments and accounting 2000 MWh of electricity consumed from the grid as 0 tCO2e/MWh electricity. |

### 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 3500 MWh were generated by the renewable power facility and the bidirectional meter provides an overall consumption from the grid of 76 500 MWh. 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.

#### Q10.1 - Do you have Scope 2 emissions sources in more than one country?
Yes

#### Q10.1a - Please complete the table below

| Country | Scope 2 metric tonnes CO2e | Purchased and consumed electricity, heat, steam or cooling (MWh) | Purchased and consumed low carbon electricity, heat, steam or cooling (MWh) |
|---|---|---|---|
| United States of America | 190.00 | 350 000 | 0 |
| Canada | 10.000 | 80 000 | 0 |
| United Kingdom | 30.000 | 70 000 | 0 |
| Spain | 10.000 | 60 000 | 0 |
| Rest of world | 8.500 | 76 500 | 0 |

Q11.2 - Please state how much fuel, electricity, heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Fuel | 1 500 000 | |
| Electricity | 536 500 | → Installation of a renewable power plant led to a change in the amount of electricity purchased and consumed of 3500 MWh that it consumes from the renewable source and that it does not have to purchase from the grid |
| Heat | 100 000 | |
| Steam | 0 | |
| Cooling | 0 | |

Q12.3 - Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

| Fuels | MWh | [Comment for the purpose of this example] |
|---|---|---|
| Natural gas | 900 000 | |
| Diesel | 600 000 | |

Q12.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

| Basis for applying a low carbon emission factor | MWh 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 500MWh 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 all renewable energy is consumed by our company. |

### 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 and has installations in Oklahoma, California, Upstate New York and Colorado. It consumes the following amounts of electricity

| | MWh |
|---|---|
| MROW | 200000 |
| CAMX | 150000 |
| RMPA | 40000 |
| NYUP | 30000 |
| Total USA | 420 000 |

It 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 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 2007) | t CO2e |
|---|---|---|---|
| MROW | (200 000 – 100 000) = 100 000 | 1831.95 | 83096 |
| CAMX | 150000 | 727.26 | 49482 |
| RMPA | 40000 | 1,892.47 | 34336 |
| NYUP | 30000 | 724.79 | 9863 |
| Total USA | 320 000 | - | 176777 |

Thus, compared to the scenario where RECs would not have been bought, Company 1 has reduced its electricity Scope 2 footprint by 83 096 t CO2e.

Its CDP disclosure would look like this:

Q10.1 - Do you have Scope 2 emissions sources in more than one country?
No

Q11.2 - Please state how much fuel, electricity, heat, steam and cooling in MWh your organization has purchased and consumed during the reporting year

| Energy type | MWh |
|---|---|
| Fuel | 1 000 |
| Electricity | 420 000 |
| Heat | 0 |
| Steam | 0 |
| Cooling | 0 |

Q12.4 - Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor

| Basis for applying a low carbon emission factor | MWh 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 Q8.3. This led to a reduction of 83 096 t CO2e form its footprint. |

# References

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[2] WRI, WBCSD (2011) "Objective/Background document [on Scope 2 Accounting Guidance], available with other Technical Working Group draft documents at http://www.ghgprotocol.org/feature/ghg-protocol-power-accounting-guidelines

[3] WRI, WBCSD (2011) "Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Supplement to the GHG Protocol Corporate Accounting and Reporting Standard"

[4] UNEP, SETAC and LFI (2011) "Global Guidance Principles for Life Cycle Assessment Databases - A Basis for Greener Processes and Products", available at http://www.unep.fr/shared/publications/pdf/DTIx1410xPA-GlobalGuidancePrinciplesforLCA.pdf , 2012/08/01

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