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“GREEN POWER” PURCHASE APPLIED FOR ENVIRONMENTAL REPORTING AND MARKETING

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ABSTRACT

Electricity consumption represents an important input to almost all environmental analyses and reports. When introducing Guarantees of Origin (GO) and Electricity Disclosure according to the European Renewable Energy Directive (2009/26/EC) and Electricity Market Directive (2009/72/EC), respectively, a system allowing informed consumer choice was established. A GO represents both a tracking instrument and a contractual obligation between suppliers and customers, and can therefore be used to allocate specific electricity generation to specific end-user. An important precondition is the calculation of corresponding Residual Mixes.

There is a need for reaching an internationally common understanding regarding the principle of whether GOs should be allowed, or not, for environmental reporting in order to make fair comparisons between products/companies.

INTRODUCTION

When introducing Guarantees of Origin (GO) and Electricity Disclosure according to the European Renewable Energy Directive (2009/26/EC) and Electricity Market Directive (2009/72/EC), respectively, a system allowing informed consumer choice was established.

A GO is defined as a means of proving the origin of electricity, while the objective of Electricity Disclosure is to provide consumers with relevant information about power generation and to allow for informed consumer choice, not only based on electricity prices. The Electricity Market Directive requires all suppliers of electricity to disclose their electricity portfolio with regard to energy source and environmental impacts, specifying the emissions of CO₂ and the amount of radioactive waste.

The European Energy Certification System (EECS) constitutes a commercially funded, integrated European framework for the international trade of energy certificates, such as GOs. The EECS has been developed by the Association of Issuing Bodies (AIB n.d.), which is a membership-based non-profit organisation. It currently has members from 14 EU member states plus Norway and Switzerland. The EECS offers a set of agreed standards, known as the Principles and Rules of Operation (PRO), to ensure that the systems of its member

organisations are compatible with one another. As seen in Figure 1, the EECS market has increased significantly since 2000, when the market was established.

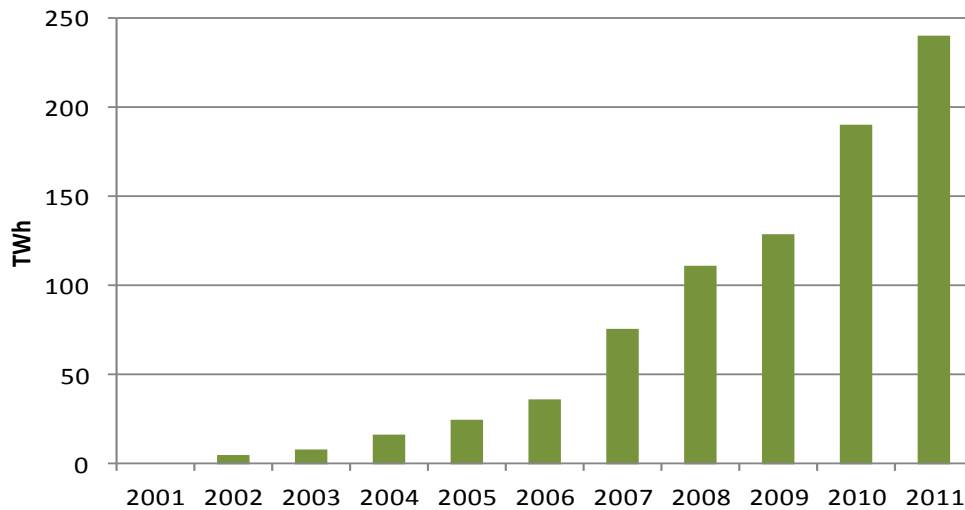


Figure 1. Cancelled GOs (and similar products) using the EECS system (AIB, 2012).

As seen from the figure, about 240 TWh GOs and similar products were traded in Europe in 2011, accounting for 30% of the European renewable electricity generation. However, despite the relatively rapid growth in this market, the knowledge and interest with regard to the application of such products in environmental reporting have been relatively modest within the LCA community.

MATERIALS AND METHODS

Environmental reporting (such as Carbon footprint calculations of companies, products etc.) clearly takes the attributional LCA modeling approach (European Commission, 2010, Frischknecht & Stucki 2010). Hence, the data required for the analyses relate to the value chain of the product/object under study. In accordance with relevant literature (International Standard ISO 2006, European Commission 2010, The International EPD System 2010, The GHG Protocol 2011, European Commission Joint Research Centre 2013, Frischknecht & Stucki 2010), for electricity consumption, the general recommendation is to use technology-specific data, specified variously by the terms “supplier-specific production mix”, “specific electricity technology”, “specific, contracted electricity”, etc. In addition, some standards/guidelines require the avoidance of double counting of electricity. Thus, it can be concluded that there is a general preference for the use of specific data. There is, however, a general lack of harmonisation in the guidelines as to how this “specific electricity” should be defined and determined.

With regard to electricity, which is delivered through a common electricity grid, there is a particularity in that the electrons are indistinguishable. Thus, the implementation of GOs, which represent both a tracking instrument for proving the origin of electricity and a contractual obligation between electricity generators/suppliers and customers, opens up possibilities for the allocation of specific electricity generation to a specific end-user. The tracking mechanism and contractual relationship, however, do not automatically qualify GOs

to be claimed. An important presupposition for this is the avoidance of double counting of the environmental attributes (which are sold as GOs). The electricity covered by GOs must therefore be separated from the average consumption mix. On this basis, a methodology for calculating the Residual Mix, representing the consumption mix for all the customers who do not purchase GOs in the related country or region has been developed (RE-DISS, n.d.). The traditional way of determining electricity mixes in environmental inventories has been to use “fixed” average national or regional grid mixes, based on production mixes corrected by physical import and export figures.

As no clear recommendation regarding the determination of “specific electricity” exists, two different principles for the calculation of relevant electricity mixes are available for environmental reporting: the traditional use of average electricity grid mixes and the specific use of GOs/Residual Mixes.

RESULTS

Based on the two different principles for determining electricity mixes, relevant electricity mixes and related CO₂-emissions have been calculated and exemplified by a Norwegian consumer who can voluntarily choose to purchase GOs. These are shown in Table 1.

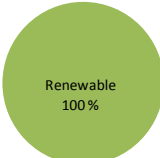
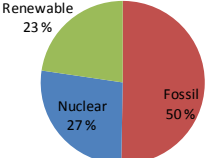
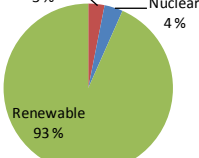
| GOs allowed to be claimed | | GOs not allowed to be claimed |
|---|--|---|
| Customers purchasing GOs | Customers not purchasing GOs | Customers purchasing or not purchasing GOs |
| Contractual purchased electricity | Residual Mix for the country/region | Grid mix for the country/region |
| <p>GO Hydropower</p>  <p>Renewable 100 %</p> <p>2 g CO₂-equiv./kWh</p> | <p>Residual Mix</p>  <p>Renewable 23 %</p> <p>Nuclear 27 %</p> <p>Fossil 50 %</p> <p>518 g CO₂-equiv./kWh</p> | <p>Norwegian Grid Mix</p>  <p>Fossil 3 %</p> <p>Nuclear 4 %</p> <p>Renewable 93 %</p> <p>36 g CO₂-equiv./kWh</p> |

Table 1. Relevant electricity mixes for environmental reporting, depending on whether or not GOs are allowed to be claimed.

The table shows that the different electricity mixes represent a large variety of CO₂-emissions, varying from 2 to 518 g CO₂-equivalents/kWh. If GOs are allowed to be claimed in the environmental report, the purchase of GOs will lead to an improvement in the inventory of the product in question, since the CO₂-emissions are significantly lower when compared with the Residual Mix’ emissions. This improvement will occur to the detriment of the “ordinary” electricity customers (not purchasing GOs), as it makes the Residual Mix more “dirty”. If GOs are not allowed to be claimed, the relevant electricity mix for electricity consumption relating to the product in question is based on the national or regional Grid Mix. In that case, customers would have no possibility of influencing the energy source of their own electricity.



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DISCUSSION AND CONCLUSIONS

Environmental reporting takes the attributional modelling approach. Hence, the inventory model is based on the value chain of the product under study and that specific data relating to the value chain should be applied. Since electrons are indistinguishable, a tracking mechanism is needed to distinguish between electricity originating from different electricity plants. A GO, which represents both a tracking instrument for proving the origin of electricity and a contractual obligation between suppliers and customers, could therefore be used as an instrument for allocating specific electricity generation to specific end-users. Important preconditions in this case are the avoidance of double counting of attributes and the availability of reliable electricity data. When these requirements are fulfilled, the GO system makes it possible for consumers to, in a reliable way, choose purchased electricity on the basis of environmental preference, thus treating purchased electricity just like the purchase of any other product chosen by a company. The environmental attributes relating to the specifically purchased electricity (influenced by the consumer) should therefore be included in the inventory. On this basis, voluntarily purchased renewable electricity products may represent an “environmental liberalisation” of the electricity market’s relationship with its customers, moving from “fixed” average grid mixes, based on geographical locations of facilities and grid, to specific electricity mixes based on the customer’s demand and choices.

There is a need for reaching an internationally common understanding regarding the principle of whether GOs should be allowed, or not, for environmental reporting in order to make fair comparisons between products/companies.

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