
The Disclosure of Guarantees of Origin: Interactions with the 2030 Climate and Energy Framework

Jaap Jansen, Eleanor Drabik and Christian Egenhofer¹

No. 149 / November 2016

Abstract

Demand is increasing in the EU for specific electricity products of desired origin. For now, this demand relates almost exclusively to electricity generated from renewable energy sources, and comes from business organisations wishing to enhance their environmental credentials and households wishing to contribute to a better environment. The tracking system of guarantees of origin is instrumental to the reliable authentication of claims about the origin of a certain quantity of final energy. European law stipulates that guarantees of origin are to be used to prove the share of renewables in total deliveries of a supplier to customers. Among other factors, this report considers the rationale and selected options in the design of forthcoming EU legislation to extend the use of guarantees of origin to verify disclosed information on sources of electricity deliveries to final consumers.

¹ Jaap Jansen is a non-resident Fellow and Eleanor Drabik a Researcher at CEPS Energy Climate House. Christian Egenhofer is Director of CEPS Energy Climate House and Head of the CEPS Energy & Climate unit. The report is part of an initiative by CEPS Energy Climate House to discuss the role of Guarantees of Origin in the 2030 Climate and Energy Framework. The project has been supported by the Association of Issuing Bodies.



ISBN 978-94-6138-519-2

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Key Points

Currently, guarantees of origin (GOs) are mandated to be issued on request by generators of renewable electricity. Within the 2030 Climate and Energy Framework discussions, the EU faces the question of whether, and if so how, this mandate is to be expanded.

The advantage of expanding such a scheme would be that consumers would know their energy mix and thus be able to judge the impact of their electricity consumption. But this would require the disclosure of information to each consumer about the origins of the electricity supplied.

The experience of full disclosure in Austria and Switzerland seems to suggest that inherent administrative burdens can be controlled. Full disclosure may, however, be difficult for those member states with lower administrative capacity, or which have other priorities.

A system of disclosure would be helped by collaboration between the issuing bodies and the agencies responsible for the disclosure of information, as well as all relevant stakeholders. The aim is to ensure the reliability of information disclosed through coherent regulation among member states, precluding double counting.

Policy Recommendations

Moving forward with GOs in the legislation related to the 2030 Climate and Energy Framework would require the following:²

- Disclosure of both product and supplier mix with their respective average carbon emissions and nuclear waste per kWh,
- Mandatory inclusion of the two environmental indicators in guarantees of origin,
- Extended member state statistics,
- Harmonisation of disclosure information across member states, notably EU-wide templates, harmonised calendars of disclosure and authentication, and a common EU standard,
- Notably the moment when national auctions for renewables are opened up or, in the case of joint member states' auctions, rules on how to treat market revenues from GOs will need to be harmonised,
- To reduce administrative costs, especially for small installations, a threshold could be introduced under which there is no obligation to issue GOs, but with a voluntary option possibility,
- Before introducing an expanded GO scheme, a cost-benefit analysis should be undertaken.

² Details are provided in section 5.

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CEPS Special Report No. 149 / November 2016

Introduction

In the coming months, the European Commission is due to present proposals for legislative instruments to set the climate and energy framework for the period until 2030. These instruments are intended to underpin the three politically agreed headline objectives for the 2030 climate and energy policy framework.³ One of the instruments, *a new Renewables Energy Directive*, will amend or repeal the current Renewable Energy Directive.⁴ The current directive contains some detailed provisions on national tracking systems for guarantees of origin (GOs) for renewable electricity in the member states, for the sole purpose of disclosing to final consumers the origin of the electricity delivered last (calendar) year by their suppliers.⁵ It also offers member states the possibility to expand their respective GO systems to renewable heating and cooling. Additionally, GOs appear in the current Energy Efficiency Directive⁶ that mandates the development of national tracking systems for GOs of electricity from highly efficient combined heat and power installations.

Another proposal for European legislation due by the end of 2016 concerns a new electricity market design. To date, the main legislative instrument in force on market design is the Electricity Directive.⁷ This directive stipulates, among other things, what information should be disclosed to electricity consumers by their suppliers.

Current EU legislation mandates member states to ensure that electricity suppliers specify to final customers the overall fuel mix of the supplier, covering the latter's total electricity deliveries over the preceding year and a reference to public information on the environmental impact associated with this fuel mix, i.e. at least in terms of CO₂ emissions and radioactive waste.⁸

The purpose of guarantees of origin is currently to authenticate disclosure information, i.e. to prove the share or quantity of energy from renewable sources in an energy supplier's energy

³ Conclusions of the European Council meeting on 23 and 24 October 2014, EUCO 169/14, 24 October, Brussels

⁴ Directive 2009/28/CE.

⁵ A glossary of technical terms and abbreviations is provided in Annex 2.

⁶ Directive 2012/27/EU.

⁷ Directive 2009/72/CE.

⁸ Directive 2009/72/EU, Article 3(9), sub (a) and (b).

mix⁹ and guarantee the origin of electricity produced from high-efficiency cogeneration.¹⁰ It can also be used for final customers, including households wishing to contribute to a better environment as well as business organisations wishing to improve their carbon footprint. The share among the corporate sector seeking to reduce their carbon footprint is growing fast, notably by purchasing and consuming renewable energy products instead of electricity products not differentiated by origin.¹¹ In so doing, the companies concerned can substantiate their public relations claims about corporate social responsibility and show that their activities result in fewer greenhouse gas emissions. Demand in the EU for products differentiated by origin is likely to be further stimulated by the Paris 2015 Climate Agreement.

By extending (at least the possibility to issue) GOs to all sources and introducing disclosure at product level, consumers would understand their own energy mix and the impact of this mix. By choosing certain sources over others, consumers could send signals both to policy-makers and producers. At present, suppliers are obliged to show the supplier's mix but not the product mix. Hence, under current legislation the signal towards disclosure is weak.

So far, significant progress has been made in the development of national GO systems in the EU. The last RE-DISS project on reliable disclosure,¹² funded by the EU's Intelligent Energy Europe programme, provides the most recent, in-depth documented review of progress on GO tracking and disclosure in the EU.¹³ For instance, a major institutional accomplishment is the growing importance of the Association of Issuing Bodies (AIB), which represents an increase in the number of official operating agencies of national GO tracking systems in EU member states and other European countries.¹⁴

A key issue warranting further attention is that the disclosure rules diverge hugely among member states. Among others, through cross-border trade in electricity and GOs, this divergence still poses challenges to disclosure reliability.

1. How guarantees of origin legislation has evolved

The GO concept emanated from the Renewable Electricity Directive of 2001.¹⁵ This directive mandated all member states to develop a reliable scheme for guarantees of origin of renewable electricity. The mandate did not prescribe design details but instead defined the purpose of GOs, which is to serve as evidence for renewable electricity generators that the electricity they sell is produced from renewable sources.

⁹ Directive 2009/28/CE, Article 15 (1).

¹⁰ Directive 2012/27/EU, Article 14(10).

¹¹ For example, in the run-up to the 2015 Paris climate conference, 69 large multinationals lined up to publicly commit to 100% renewables: <http://there100.org/>.

¹² See <http://www.reliable-disclosure.org/>.

¹³ See e.g. (Seebach et al., 2015).

¹⁴ So far, three non-EU European countries, which are represented in the AIB and have transposed EU legislation on disclosure and guarantees of origin in their national legislation are Iceland, Norway, and Switzerland.

¹⁵ Directive 2001/77/CE.

Disclosure to electricity consumers was introduced into EU legislation in 2003 by the directive on the internal market for electricity.¹⁶ This directive mandates member states to ensure that electricity suppliers specify in or with the bill and in promotional materials made available to final customers: a) the contribution of each energy source to the overall fuel mix of the supplier over the preceding year and b) information on the average environmental impact, in terms of at least CO₂ equivalent emissions and the radioactive waste resulting from generating the electricity delivered by the supplier to all customers over the preceding year. Moreover, member states have to ensure that the information provided by suppliers to their customers is reliable.

In preparing the proposal for the Renewable Energy Directive, published at the beginning of 2008, the European Commission adopted an integrated approach to the use of GOs. This approach was to prove that a unit of electricity was produced from a renewable energy source for a range of applications, including proving eligibility to a national support scheme, target accounting and disclosure for final consumers.¹⁷ Up to the last unofficial draft, dated 23rd January 2008, it was suggested that the scheme would be upheld with an opt-out provision. The European Commission relinquished this approach, partly because a number of member states might have feared legal challenges to their national support schemes.

After subsequent negotiations, the Renewable Energy Directive of 2009¹⁸ was adopted, which stipulates a single-purpose approach for the use of GOs. It states that GOs issued for the purpose of this directive have the sole function of proving to the final customer that a given share or quantity of energy was produced from renewable sources. Further, this directive expands the potential scope of GOs from renewable electricity only, to include renewable heating and cooling also. Moreover, it provides details about the GO issuing and tracking system, including the specification of energy generation attributes that GOs have to endorse.

The Combined Heat and Power Directive of 2004¹⁹ introduces guarantees of origin of electricity from highly-efficient cogeneration installations. This directive was repealed by the 2012 Energy Efficiency Directive.²⁰ Few member states have implemented, even in part, the provisions on GOs in the aforementioned two directives.

1.1 Purpose of GOs

The purpose of GOs is to facilitate accurate disclosure of factual information on generation attributes associated with electricity delivered to final consumers. As such, GO systems and

¹⁶ Directive 2003/54/EC, repealing Directive 96/92/EC. Directive 2009/72/2009, repealing Directive 2003/54/CE, encompasses the same disclosure provisions. No cross-reference to the use of GO is made.

¹⁷ A 2005 CEPS Task Force Report was the first paper to advocate an integrated approach to the use of GOs to mitigate double claiming of the renewable feature of the MWh covered by a GO for different commercial uses, notably to acquire support benefits and sell renewable electricity contracts (see, Jansen, Gialoglou and Egenhofer, 2005).

¹⁸ Directive 2009/28/EC repealing Directives 2001/77/EC (Renewable Electricity) and 2003/30/EC (Biofuels).

¹⁹ Directive 2004/8/CE.

²⁰ Directive 2012/27/EU.

disclosure do not aim to achieve additionality. Consumers wishing that their electricity purchases result directly in more production of electricity from renewable energy sources may opt to subscribe to an electricity contract specifying delivery of renewable energy that is audited and consequently endorsed by an issuer of a preferred *quality label*.²¹

Since 2001, progress has been made with the development of GO tracking systems in close collaboration with market players. The following guiding considerations underlying provisions on GOs and consumer disclosure are present in several pieces of EU legislation:²²

- I. Improving the functioning of European energy markets through informed choices by energy consumers.
- II. Electricity disclosure is a valuable instrument to educate consumers with the potential to assist consumers in making informed energy purchase decisions.
- III. Harmonised design and implementation of GO legislation, along with well-designed disclosure, can empower consumers to make a statement in support of sustainable energy supply system, with a growing role for renewables.

GO tracking systems enable the renewable component of the energy to be quantified in a consistent way.²³ As it stands, GO systems create a market delinked from the ‘physical trading’ of electricity. This can be achieved through digital accounts held by renewable generators, GO traders and electricity suppliers. Some representatives of electricity-intensive companies, including those with access to cheap hydropower, argue for contract-based tracking, however. This would allow them to not only benefit from low-cost electricity (the commodity) as such, but also from the renewable attributes, without having to ask and pay for it, unlike a consumer who might wish to articulate the choice for electricity from this source by purchasing a corresponding electricity product. Contract-based tracking follows the commercial trajectories and unlike delinked GO tracking, this type of tracking does not enable consumers to make choices about the source of electricity they consume and it will become complex, e.g. when electricity is traded through power exchanges. Contract-based nor (de-linked) GO-based tracking follow the trajectory of grid-based electricity.²⁴

²¹ To examine the additional environmental benefits of choosing a renewable electricity contract, stakeholders such as environmental organisations or consumer organisations have established ‘green electricity’ quality labels in several countries. Suppliers can apply for label certification if they comply with the quality label’s own minimum requirements. These can entail payments to an independent fund that finances investments in new renewable generation capacities with the money consumers spend on a labelled ‘green’ tariff. (BEUC, 2015)

²² See e.g. (European Commission, 2004)

²³ Consistent in the sense that each MWh of final electricity consumption covered by GOs can be traced back to each MWh of electricity generation, for which a GO was issued, on a unique one-to-one basis in accordance with pre-set accounting rules. In the case of cross-border GO transactions, the accounting rules between the countries of origin and destination should match to avoid double counting the origin features.

²⁴ For more detailed argumentation of why GO-based tracking systems might be preferable to contract-based tracking systems, see (Lise et al., 2007) and Gillenwater (2008).

1.2 The market for GOs

The demand for electricity products differentiated by origin²⁵ is overwhelmingly accounted for by renewable electricity products²⁶ offered through renewable energy tariffs.^{27,28} Statistics on the aggregate guarantees of origin market compiled by Grexel (David and Klimscheffskij, 2016) are shown in Figure 1. Some two-thirds of GOs issued and transferred comply with the European Energy Certificate System (EECS) standard of the Association of Issuing Bodies (AIB), which is the association representing competent national bodies for operating GO registries. Since its inception EECS has gradually become the dominant GO standard in Europe. To date, remaining non-EECS member states are Bulgaria, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, and the UK.

Figure 1 exhibits market trends over the last six years, with rapidly rising demand for electricity products differentiated by origin shown by the volume of cancellations (MWhs of electricity consumption proven by surrendering GOs to the official operating body concerned; these are almost completely generated by renewable energy sources). In 2015 these amounted to 557 TWh, i.e. about 47% of generation from renewable sources in Europe.²⁹ In 2015 the number of GO exceeded the number of GOs issued, indicating increasing scarcity in the previously over-supplied GO market. Up until 2015, at least, legal obstacles to the issuance of GOs representing renewable electricity whose production benefited from support by a national support scheme existed in France, Germany, Ireland and Portugal (David and Klimscheffskij, 2016).

The price of GOs is determined by supply and demand. If prices increase, this might affect the fuel mix. Yet to date, according to GO traders the average price of GOs of renewable electricity is rather marginal, typically well below 1 €/MWh, except for some small market niches. Should the demand for renewable electricity products keep on rising, average GO prices may go up. This, in turn, might favourably affect future investment decisions in renewable generation capacity and expand the volume of renewables, while raising the proportion of renewables that is not supported.

²⁵ That is, a delivery contract between an electricity supplier and his customer, specifying explicitly from which particular fuel(s) the electricity delivered has been generated and/or other generation details.

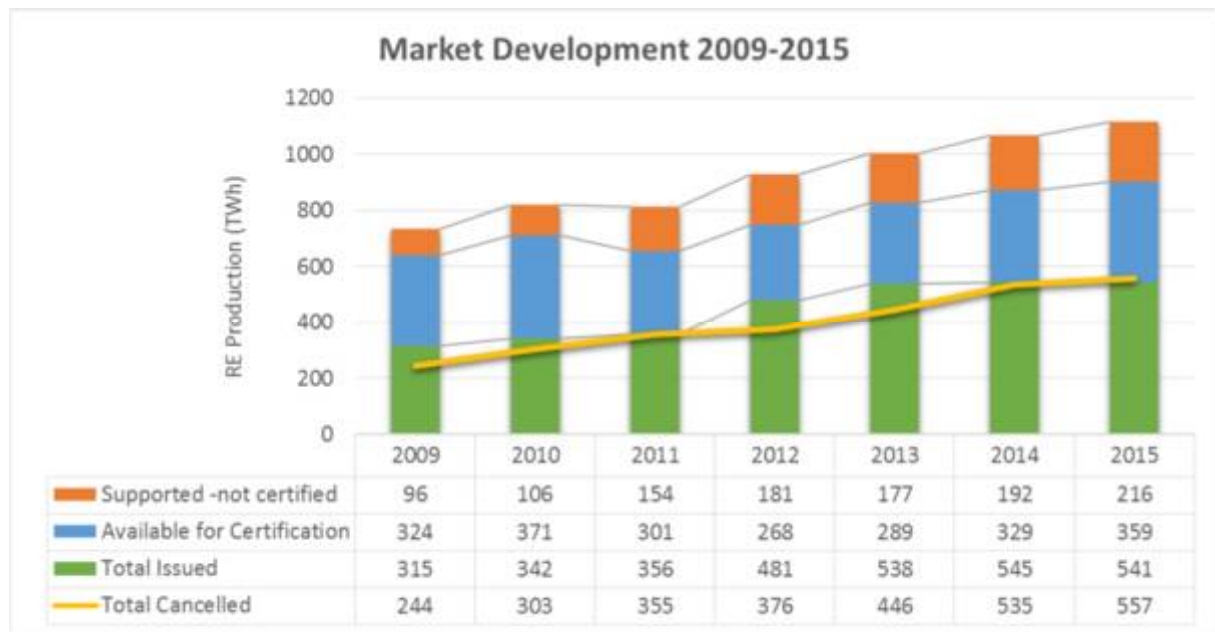
²⁶ That is, products of electricity from renewable energy sources. Market players, including consumers, have coined these products “green electricity (or green power) products”.

²⁷ Often referred to as green tariffs, e.g. by Ofgem (2014).

²⁸ To date, a tiny fraction of the market for origin-differentiated electricity contracts is accounted for by electricity products from other sources, such as electricity from nuclear power plants.

²⁹ ENTSO-E area: <https://www.entsoe.eu/db-query/production/monthly-production-for-a-specific-country>. Note that the total amount of certified electricity in e.g. 2015 is likely to be markedly higher than 357 TWh with EECS endorsement, notably in countries not (yet) represented in the AIB.

Figure 1. Evolution of the aggregate market for guarantees of origin in Europe, 2009-15



Source: David and Klimscheffskij (2016).

2. Recent developments on consumer disclosure

More recently, questions have arisen about whether the GO system should be extended to provide consumers with more information. In 2015, a mid-term evaluation of the Renewable Energy Directive (2009/28/EC) was published and set out suggestions to investigate the possible extension of the use of GOs beyond renewables, to include fossil fuels and nuclear power generation. In a recent public consultation³⁰ the following questions were posed:

1. Should the current system for providing consumers with information on the sources of the consumed electricity be further developed and improved?
2. Should the current GO system be the mandatory form of information disclosure to consumers?
3. Should other information, such as e.g. CO₂ emissions be included?
4. Should it be extended to the whole energy system and include non-renewable sources?
5. To what extent has the current GO system been successful in providing consumers with information on the sources of electricity they consume?

The responses confirmed broad consensus among most respondents, suggesting that first, an easily understandable system is considered important to drive market demand for RES. Second, the GO system is a key tool for electricity source disclosure and that it should be strengthened. There were mixed views, however, about the extension of GOs to all generation types and the inclusion of CO₂ emissions, as a number of stakeholders raised the issue of excessive administration burden.³¹

³⁰ See https://ec.europa.eu/energy/sites/ener/files/documents/RED%20II%20Public%20Consultation_0.pdf.

³¹ See <https://ec.europa.eu/energy/sites/ener/files/documents/Summary%20RED%20II%20Consultation.pdf>.

Within Europe, Austria and Switzerland have implemented a system with full coverage of the electricity sector by GOs. The obligation in Austria is on suppliers and in Switzerland on operators of power-generating installations. Austria's full GO-based tracking system took effect in 2014 with all electricity consumed declared with GOs; this includes the share of energy in the supplier's fuel mix as well as environmental information, such as CO₂ emissions and radioactive waste. The supplier's fuel mix is calculated on evidence by GOs of the source of energy for a given disclosure period. GOs surrendered by suppliers as proof of origin of delivered electricity are cancelled in the Austrian GO database. In Switzerland, from 2013 GOs are mandatorily issued for all electricity produced, however, unlike in Austria, environmental information is not disclosed. Detailed public information on the financial costs of these GO systems appears to be lacking; as does cost information from most member states, which have not yet adopted full coverage.

The importance of the role of consumers in driving energy markets is also developed by the European Commission in the Communications on Energy Union framework strategy³² and Delivering a New Deal for Energy Consumers. A number of obstacles to consumers are identified in the latter Communication, one relating to GOs is the lack of information and transparency, which makes it difficult for consumers to assess market situations. The Communication recognised that consumers should be empowered by giving them choice based on "easily accessible, transparent, trustworthy and readily comparable information". This also relates to the protection of consumers against misleading environmental claims.³³ Most likely, this would require more resources to be made available.

3. Interactions of GOs and disclosure with the 2030 climate and energy framework

There are three main areas of interaction between GOs and disclosure with EU energy and climate change policy, or as it is generally known, the '2030 climate and energy framework'. The first and most developed one is the interaction with renewables policy and support systems. The second is the interaction with energy efficiency, essentially high-efficiency cogeneration. The third is the interaction with climate policy, meaning the need and possibility to disclose carbon, i.e. CO₂ equivalent. The following section explores these interactions, identifies open issues and refers to the suggested solutions in section 5.

³² COM(2015) 80 final, page 2: "...our vision is of an energy Union with citizens at its core, where citizens take ownership of the energy transition...,participate actively in the market..."

³³ General principles are laid down in Directive 2005/29/EC. See for more specific, non-legislative Commission recommendations: SWD(2016) 163 final, pp. 102-118

3.1 Renewables and renewable support policies

There are consumers who are interested in buying specific electricity products based on specific energy sources. Most notable is renewable products, but as the Swedish example³⁴ shows, consumers can also be interested in nuclear energy and others may be interested in natural gas. To date, virtually only the consumption of electricity produced from renewables is widely regarded to have distinctly desirable origin features. This has been the result of EU governments agreeing to stimulate renewable electricity, sourced in their respective jurisdiction, i.e. only renewable energy is considered as having desirable features. Legislation in many member states to accommodate the issuance of GOs for non-renewable electricity is generally lacking, with a few exceptions (including Austria, the Netherlands, Sweden, and Switzerland).

Coverage of supported electricity

Generally, investment decisions in renewable generation projects benefiting from national support schemes are made in the expectation that there will be ample return to investors. National support schemes aim to make this production financially feasible without overcompensation.

In many member states, legislation allows GOs to be issued to generators also benefiting from renewable support schemes.³⁵ Some argue that this implies that consumers (or their suppliers) could end up paying twice for the renewable feature of the energy concerned. First, when consumers are mandated to pay extra money for renewables support, e.g. through the electricity bill or through dedicated support appropriations by the government paid for by general taxes and levies. Second, when consumers opt to consume green electricity products their suppliers may opt to pass on the costs of procuring and using the GO needed to their 'green' customers or spreading these costs out to all customers. By 'socializing' the costs of GO procurement, suppliers can offer 'green' products at the same price as 'grey' products. At the currently modest cost of GOs this seems affordable and may improve a supplier's reputation among existing and potential customers of special renewable electricity products.

Some member states, such as Germany and France, forbid the issuance of GOs to renewable generators on supported electricity. The risk that willingness to support renewables might decrease where GOs from supported generation will be sold across borders might have played a role here. For this reason, Austria forbids the export of GOs covering supported electricity from renewable sources.³⁶

On the other hand, revenues from GOs – provided prices are increasing – will reduce the gap between the committed support level and the revenue. If accounted for in either the GO

³⁴ See Katarina Abrahamsson, *Electricity Disclosure in Sweden*, Presentation at CEPS Energy Climate House workshop on "Guarantees of Origin: what EU energy market implications of full disclosure, 31 May 2016.

³⁵ Including notably several member states with a relatively high demand for renewable electricity contracts, such as the Netherlands, Belgium, Sweden and Denmark.

³⁶ Germany is currently reviewing its policy on the verification of disclosed electricity on supported electricity.

scheme or the support scheme this will reduce the level of support to be provided by consumers or public budgets. If there are auctions at regional level, i.e. across borders, GO policies would need to be aligned among the member states concerned to avoid distortions of competition. In the past, materially this did not matter because potential or actual revenues from GO sales did not play a role in investment decisions because prices are low. See also the recommendations in 5.4.

Clarity of consumer information

Another issue is the link between renewable electricity generation and consumption. For instance, Norway generates almost all its electricity from renewable sources, yet consumers may find it strange when their bill shows their supplier's fuel mix with a high share of fossil energy, as a result of Norwegian hydro-generators selling GOs to consumers in other European countries that have transposed the RES directive into their national legislation. While in the Netherlands, with 10% of electricity generated from renewables, on aggregate renewables account for about 42% of disclosed electricity consumption. Recommendations are provided in section 5.2.

At present consumers may be inclined to associate a national fuel mix with the generation mix. Publication of the national final electricity consumption provides factual information on final consumers' preferences regarding the sourcing of their electricity by way of revealed consumer choices. This can be addressed by information including official statistics compiling the breakdown of national final electricity consumption. Such statistics, if not yet published by the respective national/regional bureau of statistics, are already available for some countries/regions.³⁷

3.2 Energy efficiency policies

To date, the only interaction relates to the existing national systems for GOs of electricity from high-efficiency cogeneration. As national GO systems for electricity from renewable sources have been mandated by EU legislation as well, this could create problems of double counting between the two directives, e.g. for electricity. This could be addressed by aligning or merging the GO provisions in the two directives, which is discussed in section 5.4.

3.3 Climate policies

Prevailing EU disclosure legislation would require disclosing CO₂ equivalent emissions from the generation of the fuel mix of supplier's overall deliveries to final consumers in the previous (calendar) year.³⁸ This environmental indicator is expressed as grams of CO₂ equivalent per kWh. The World Resources Institute, jointly with the World Business Council for Sustainable Development (WBCSD), has developed guidelines for a robust methodology to calculate on-

³⁷ E.g. the Netherlands and Flanders/Belgium.

³⁸ Directive 2009/72/CE, Article 9 mandates member states to ensure, inter alia, that electricity suppliers specify to final consumers at least the reference to existing reference sources, such as web pages, where information on the environmental impact, in terms of at least CO₂ emissions and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year, is publicly available.

site (i.e. so-called 'Scope 2') indirect emissions, associated with a consumer's energy consumption.³⁹ Most companies listed on the large stock exchanges apply this methodology in the Social Responsibility Reporting.

Currently, European GO legislation does not prescribe GOs to carry the verified plant-specific value of this indicator at issuance. The possibly increasing demand may help in creating certainty in this field.

4. How GO-relevant areas could be included in EU legislation

This chapter briefly discusses options for the way forward, including practical suggestions to be considered for inclusion in upcoming proposals for new EU legislation.

4.1 Statistics

In many member states, statistics on the fuel mix of national electricity consumption are not as readily available as corresponding information on national electricity generation. As a result, this has the potential to increase misperception among electricity consumers because at present they are inclined to compare mandatory disclosure information on the energy bill on (consumed) fuel mixes with the national generation mix. Attention for the share of renewables in the fuel mix of national final electricity consumption might further stimulate the awareness and interest of consumers concerning their electricity products.

This can be addressed by requiring member states to mandate their respective national bureaus of statistics or energy regulators to publish joint annual statistics on, for example:

- the fuel mix of national electricity generation, and
- the fuel mix of national final electricity consumption

This would include for both mixes a specification of the share of renewables.

In addition to statistics on fuel mixes, it would be beneficial to encourage governments and organisations representing energy-intensive industry and domestic energy consumers to monitor the costs of GO tracking systems with official issuing bodies encouraged to publish audited annual reports.

4.2 Harmonising disclosure information

It is important that final consumers opting for a product-differentiated contract with their supplier for the delivery of electricity are certain of the veracity of the origin of product they wish to buy. This requirement allows the origin of such products to be verified by GOs. Some stakeholders demand the full tracking of all electricity deliveries to final consumers by GOs, coining this 'full disclosure'. A system with (mandatory) full disclosure would improve

³⁹ See (Sotos, 2015). Scope 2 emissions only regard emissions generated on-site at power plants whose GO are procured and cancelled by a supplier to authenticate the electricity product it delivers to its consumers. Theoretically, all emissions on an LCA basis would need to be allowed for. In practice, this is not done in emissions trading schemes, such as e.g. the EU ETS. Besides, estimates of emissions outside the premises of a production location (included in Scope 3 emissions) are surrounded by high uncertainty and are difficult to obtain.

reliability and reduce costs per MWh of the GO schemes. Under full disclosure the costs of the GO scheme would ultimately be borne by all consumers or their suppliers.

Some claim that there may be another reliable option, whereby only deliveries under special contracts, differentiated by origin, would need verification by GOs. This also applies to consumers requiring delivery of certain non-renewable fuels. The costs of the GO scheme under this regime would ultimately be borne by its (deliberate) beneficiaries, i.e. consumers desiring special contracts or their suppliers. Reliable statistics can be made available by TSOs and DSOs on the fuel mix of net injections of electricity into their networks, except possibly for small-scale generators and self-consumption by 'prosumers'. These net injections would have to be adjusted for: i) deliveries to final consumers of electricity under special contracts, differentiated by origin to be proven by corresponding GOs, and ii) for cross-border exchanges of electricity and GOs to arrive at the national residual mix. Also with mandatory full disclosure, *ex post* adjustments would need to be made as a result of certain cross-border exchanges, notably with third countries.

Although the incremental system costs when implementing (mandatory) full disclosure will be low, they still exist for the users of GO tracking systems, including generators that might not profit from GO sales revenues. It could therefore be considered that only generators benefiting from GO sales and, ultimately, consumers opting for special products, differentiated by origin, pay for the service to verify the origin of the electricity concerned by guarantees of origin. This would enable those consumers who do not reveal preferences for specific sources, including households that have to cope with energy poverty, to be relieved of having to pay GO-related administrative costs.

The disclosure templates should be developed in such a way that they are readily understood by final consumers and ultimately ensure awareness and understanding among a wide variety of final consumers.

- a. Suppliers in countries that implement (mandatory) full disclosure,⁴⁰ that is, Switzerland and Austria, provide the following information: the share of the energy sources in the supplier's fuel mix (both countries)
- b. The product fuel mix with associated average values of the two mandated environmental indicators, i.e. CO₂ equivalent emissions and nuclear waste per kWh of net electricity (Austria only).⁴¹

Harmonised calendars for disclosure and authentication procedures will underpin reliability and sound market functioning. Suppliers require time for acquisition and cancellations of GOs

⁴⁰ Among others, the Netherlands and Sweden enable full disclosure on a voluntary basis: upon request from generators, GOs for electricity from fossil and nuclear sources are also issued.

⁴¹ In Austria, the obligation to document information to be disclosed with GOs is on the suppliers; in Switzerland all generators have to ensure issuance of GOs on their production. The Swiss disclosure legislation can lead to a significant category 'non-verifiable energy carriers' in the disclosed supplier mix; in Austrian disclosure legislation ensures no 'unknown origin' category in mandatory disclosure statements. The Austrian, unlike Swiss, mandatory disclosure statements, include information on environmental indicators. Yet the Austrian disclosure statements are at supplier level only, while the Swiss ones also contain information at product level. (See country profile information: (<http://www.reliable-disclosure.org/>)).

to prove delivery of special products in accordance with contractual commitments. To strengthen the tracking of GOs, if GOs issued in a certain calendar year can only be used for proving the origin of final electricity consumption of the same calendar year, the possibility that GOs can be used to prove consumption of either one of two consecutive calendar years is eliminated. Furthermore, to improve disclosure reliability, GOs should be based on a common standard, for example the EECS standard.

4.3 Market revenues from renewables

Some member states forbid issuance of guarantees of origin to generators of electricity benefiting from a national support scheme. The moment when national auctions for renewables are opened up for cross-border participation or in the case of joint auctions, disparity between member states can create distortions to competition among generators. Different rules from different member states can mean that for the same project there are different revenues from GOs, which most likely will affect the bidding price. Therefore, in these cases, rules on GOs would need to be harmonised. Generally speaking, revenues from GOs should reduce the government-induced support for renewables.

4.4 Avoid double-counting from high-efficiency cogeneration

By merging the GO system for electricity from highly efficient combined heat and power (CHP) installations and the GO system for electricity from renewable (and potentially other) sources and aligning the relevant provisions from the renewables and the energy efficiency directives, the issue of double-counting electricity from renewables and electricity from highly efficient CHP installations will be avoided. This could foster the introduction of desired electricity products that include electricity from high-efficiency cogeneration plants.

4.5 Protection against potentially unfair marketing

An increasing number of companies seek to reduce their indirect GHG emission levels by subscribing to renewable electricity contracts.⁴² It might therefore be considered to mandate GOs to carry this information in upcoming EU legislation on GOs (e.g. in the envisioned new Directive on Electricity Market Design or the new Renewables Directive). The EU ETS requires generators with power plants covered under this scheme to report on-site emissions only. The definition of indirect GHG emissions to be applied might be aligned with EU ETS legislation. This could enable synergies in obtaining such verified information.⁴³

4.6 Administrative costs

An obligation to issue GOs on electricity from renewable sources forms the core of the GO tracking schemes. To avoid potentially excessive administrative costs to operators, mandating

⁴² See e.g.: <http://there100.org/> Evidently, the companies concerned deem to have forward-looking commercial reasons to commit to 100% renewables policies. When they do so fact-based, notably on the basis of GO, this supports the socio-political clout in favour of a transition towards a low-carbon energy sector.

⁴³ In theory, emissions accounting on a life-cycle analysis basis would be best. Yet in practice, LCA emissions estimates are complex and liable to high uncertainties.

the issuance of GOs for renewable electricity generated by installations could be linked to a certain threshold, e.g. above 500 kW_e. Households with roof-top solar PV or other operators of small-scale installations would not be covered, but could – if they wish – opt in. The system would need to be simple enough to be implemented by all member states.

5. Some thoughts on the way forward

There is an interest on the part of consumers, producers and policy-makers to introduce full authentication or disclosure by GOs of renewable electricity and any other electricity differentiated by origin for which there is specific demand. Whether full coverage of all sources of final electricity by the GO system is debatable, particularly including those sources that are not explicitly demanded by final consumers or their suppliers.

The advantage of full disclosure is that all consumers would know their consumption and the impact of it. Disclosure would be on the basis of the energy mix and fully verified by GOs. By choosing certain sources over others all consumers would be able to send a signal to both policy-makers and producers. Implicitly, this might support the policy aim of moving to a less CO₂-intensive fuel mix.

A counter argument is the potential financial burden on final consumers. It has been argued that the benefits of full coverage of the electricity system by GOs may not outweigh the additional administrative burden.⁴⁴ Some stakeholders claim that it would be adequate and more transparent if suppliers are mandated to be verified by GO deliveries of special (i.e. non-residual) electricity products from non-renewable sources only – in addition to any deliveries of electricity from renewable sources. For residual products disclosing the residual mix would be adequate, according to these stakeholders. A possible way forward could therefore be to undertake a cost-benefit analysis of mandatory full coverage by GOs of aggregate electricity demand or supply in those (member) states that have already implemented it, i.e. Austria and Switzerland.

A second reason for caution is that some member states may lack the administrative and financial capacity to deal with the complexity of authentication. A relatively simple system might be able to address this.

There is a risk that least desired sources might be disclosed in member states with a less vibrant voluntary energy market or 'disappear' through electricity exchanges with third countries without GO systems. For example, innovative traders in countries with strong environmental awareness among their customers might use opaque cross-border GOs or electricity swaps to do away with GOs of least desired fuels. Such a situation might make a GO system politically most likely untenable.

⁴⁴ Concerns about the associated administrative burden have been highlighted by several stakeholders in the public consultation on the second renewable energy directive.

<https://ec.europa.eu/energy/sites/ener/files/documents/Summary%20RED%20II%20Consultation.pdf>.

Irrespective of the level of ambition of a GO system in the EU for the 2030 Climate and Energy Framework, the harmonisation of provisions across the EU, adequately avoiding double-counting seems desirable. For a coherent disclosure and GO framework, their adoption in one piece of upcoming new EU legislation would be very favourable,⁴⁵ e.g. in the 'Renewable Energy Directive II' with a validity spanning the next decade or in the upcoming directive on the design of the internal electricity market.

⁴⁵ C.f. (AIB, 2015).

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Annex 1 Glossary of Technical Terms and Abbreviations ⁴⁶

AIB: Association of Issuing Bodies. As per ultimo 2015, this association represents competent national bodies for operating GO registries and other stakeholders concerned in 20 European countries. It operates an electronic interface between the national registries aligned to the AIB, to enable cross-border GO transactions. Member states represented in the AIB are: AT, BE, LU, SI, CY, CZ, DK, EE, ES, FI, IT, NL, DE, IE, FR, HR and SE. Moreover, CH, IS and NO are represented in the AIB. Member states not (yet) represented are: BG, EL, HU, LV, LT, MT, PL, PT, RO, SK, UK. Several of the latter are due to become represented within the short term.

CHP: Combined heat and power generation, also referred to by the term: cogeneration.

Contract-based tracking: Allocation of generation attributes for disclosure (fuel mix, environmental indicators) based on the contracts concluded by market participants in the electricity market. In the absence of a dedicated power connection between generators and consumers, the physical flows of electricity diverge from contract pathways from generators to consumers.

(Electricity) Disclosure: Based on Directive 2009/72/EC electricity suppliers are required to disclose to their customers certain generation attributes of the electricity which they have supplied in the previous year. This comprises all products which a supplier offers to its customers. Sometimes suppliers are also allowed to add specific information about the specific product bought by a customer.

Direct allocation-based tracking: A tracking method, by which disclosure attributes of (certain instances of) electricity are allocated to consumers on a certain pro rata basis stipulated by national law, e.g. in proportion to financial contributions to a national support scheme.

Disclosure attributes: Disclosed information on the generation of the electricity delivered, including environmental indicators.

Disclosure period: The period of time used as the accounting period for electricity consumption. Directive 2009/72/EC stipulates that disclosure of electricity consumed in a calendar year should be based on the fuel mix of the supplier in the previous calendar year. However, Directive 2009/28/EC stipulates that guarantees of origin have a validity of one year as from the date of issuance. This implies, that at present valid guarantees of origin might be used for authentication of information disclosed in (one of) two successive calendar years.

Domain: A region covered by a tracking system with a competent issuing body for supervising tracking and others for operating legal tracking systems. It usually concerns a country; Belgium is covered by three domains. Note that domains may evolve into multi-country groupings and eventually into an EU-wide area and beyond.

⁴⁶ Definitions are provided on the basis of elaboration – or direct referencing – from several sources, including the European Commission, RE-DISS, GHG Protocol.

Double counting: Disclosing the attributes from an instance of electricity generation twice (or more) for disclosure. This is the case when a MWh of renewable electricity is disclosed: (i) twice (or more) to a consumer or (ii) to two (or more) different consumers.

EECS. European Energy Certificate System. This is a widely accepted common European standard for national GO registries and GO-endorsed generation attributes. It enables cross-border GO transactions with strong mitigation of the risk (double) counting the energy attributes concerned, i.e. both the country of origin and the country of destination of these transactions.

Environmental additionality: environmental effects of consumption of a certain electricity product, such as additional generation of renewable electricity or reduction of greenhouse gas emissions, which would not have happened if the product concerned was not consumed

Environmental claims: The expressions 'environmental claims' and 'green claims' refer to the practice of suggesting or otherwise creating the impression (in a commercial communication, marketing or advertising) that a good or a service has a positive or no impact on the environment or is less damaging to the environment than competing goods or services. This may be due to its composition, how it has been manufactured or produced, how it can be disposed of and the reduction in energy or pollution expected from its use. When such claims are not true or cannot be verified, this practice is often called 'greenwashing'.

Environmental indicators: Disclosed information, relating to environmental effects from the generation of the electricity delivered. Directive 2009/28/CE mandates information on at least CO₂ equivalent emissions and the radioactive waste resulting from the electricity produced by the overall fuel mix of the supplier over the preceding year.

Full GO-based tracking: Also referred to by some stakeholders as 'full disclosure'. Use of GOs as the only instrument for comprehensive tracking of renewable and non-renewable electricity. In practice, this could become possible for the lion's share of electricity delivered, but not for electricity exchanges with non-EU countries which do not use GO tracking systems. GOs can be bundled to contracts between participants in the electricity market or transferred through de-linked traded. Typically, in neither way alignment with physical electricity flows is assured.

Generation attribute: A piece of factual information characterising the source and process of generating an instance of electricity.

Green electricity: Also known as 'green power'. Electricity generated from renewable energy sources.

Green tariff: Tariff charged to consumers for delivering a distinct **green electricity** product.

GO: Guarantee of Origin.

Guarantee of origin: An electronic document which has the sole function of providing proof to a final customer that a given share or quantity of energy was produced from renewable sources.

GO-registry: An electronic database in which electronic GOs can be issued, transferred and cancelled. Typically, there is one registry per domain. To allow transfers of GOs between domains, the registries must be connected and the definition of the information content of GOs needs to be harmonized.

GO-based tracking: A tracking method, by which a GO registry is operated for issuance of GOs upon request of a generator from a renewable source, transfer of GO to consumers or their suppliers, usage (cancellation) of GOs for disclosure purposes and retiring unused GO upon expiration. Directive 2009/28/CE provides legal provisions for GO tracking systems. Contingent on national legislation, in several member states only generators, traders, and suppliers can hold a GO account with exclusion of final electricity consumers.

Quality label: A premium electricity product meeting certain published normative, origin-related, criteria (e.g. on the generation location, the age of power generation plants, etc.). Compliance with these criteria of electricity delivered under the quality label concerned is certified in a public report by an independent auditor.

RE-DISS: Acronym of two projects co-financed by the EU's IIE programme on electricity disclosure, hosting the project website: <http://www.reliable-disclosure.org/>. In the framework of RE-DISS a proper methodology for determining the **residual mix** has been developed.

Residual mix: Determination of the residual pool of attributes for electricity that was consumed within the considered market boundaries (member state, region) during a disclosure period and that was not disclosed by another authorized tracking method (GO-based, sometimes direct-allocation based). To that effect, **RE-DISS** has developed an objective and transparent method. The **AIB** has embraced this method for application by itself and its membership.

Residual mix tracking: Allocation to consumers of the residual mix, pro rata with their respective consumption.

Scope 1 emissions: Emissions from operations that are owned or controlled by the reporting company, applying the WRI-WBCSD GHG Protocol. See Sotos (2015) for further references.

Scope 2 emissions: Indirect on-site emissions from the generation of purchased or acquired electricity, steam, heat or cooling consumed by the reporting company, applying the WRI-WBCSD GHG Protocol. See (Sotos, 2015).

Scope 3 emissions: All indirect emissions, not included in scope 2, that occur in the value chain of the reporting company, including both upstream and downstream emissions, applying the WRI-WBCSD GHG Protocol. See Sotos (2015) for further references.

Source of electricity: Fuel used for generating electricity.

Supplier fuel mix: The total of all products sold to final consumers by an individual supplier, expressed in fuel mix and related environmental attributes, as required for electricity disclosure.

Tracking: A methodology to account within the considered market boundaries (member state, region) for generation attributes and their allocation to final consumption of electricity.

Voluntary (renewable) energy market: The market driven by voluntary choices of consumers for final energy products, differentiated by energy origin. To date, this market is virtually completely covered by renewable electricity products.