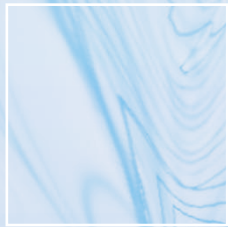


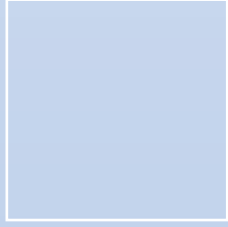


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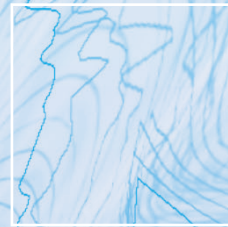
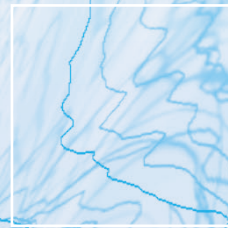
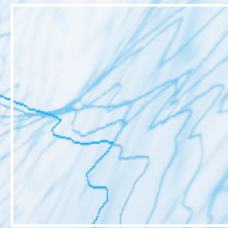
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BRIEF



A Proposal for a Regulatory Framework for Hydrogen Guarantees of Origin

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Highlights

- Energy guarantees of origin (GOO) will be an essential instrument in the context of the Commission's forthcoming legislative proposals on the regulatory framework for facilitating the emerging low and renewable carbon hydrogen market and a concomitant substantial decrease in GHG emissions.
- GOOs will be required to enable customers to determine the source of, and above all GHG content of, the hydrogen they purchase. They will be important in facilitating trade and in developing a liquid EU-wide hydrogen market
- GOOs should cover all forms of renewable and low-carbon hydrogen, on an objective life-cycle basis.



Introduction

The increased use of hydrogen is key in the EU energy sector decarbonisation strategy. To guarantee that this approach substantially decreases GHG emissions GOOs need to be used. Energy guarantees (or certificates) of origin ('GOOs') are aimed at rendering the relevant characteristics of energy purchased transparent, and can be used for different purposes.

In terms of the *information* that GOOs carry, they may be used for identifying: the geographic source of energy (relevant for example, in the case of bio-fuels); whether it originates from a renewable source; the greenhouse gases (GHG) that they contain on combustion; the GHG relevant to their production and supply on a life-cycle analysis; and other relevant externalities (such as particulates, etc.). GOOs may even be used to guarantee that energy has been produced using ethical labour practices (notably for biofuels).

An accredited authorisation and accounting procedure is central to the operation of any GOO system. In the context of the EU energy market GOOs enable consumers that wish or that are legally obliged to purchase a specific type of energy to be certain that the acquired energy, from specific sources, meets the required characteristics. This is especially pertinent for customers wishing to pay a premium for renewable electricity ('RES-E'); or for fuel suppliers that are obliged to blend a minimum percentage of accredited biofuels into the petrol/diesel that they sell. It will also be important for the hydrogen sector, so that companies can measure the carbon footprint of the hydrogen that they consume.

1. The Role of GOOs in Hydrogen Deployment

In the Commission's Hydrogen Strategy the achievement of certain objectives for the production of renewable hydrogen is proposed, as well as pos-

sible 'quotas' for hydrogen consumption on certain hydrogen consumers (such as fertilisers, steel, chemicals, etc., using it as a feedstock) and energy users (steel, cement, chemicals, transport, etc.). Should the Commission successfully propose such quotas (the approach is not without difficulties), then GOOs would be needed to enable the companies, subject to the quotas, to demonstrate the nature and GHG content of the hydrogen purchased, and to prove that they had met their quotas. This would be particularly relevant in the event that quotas were to be imposed on companies that currently use 'grey' hydrogen as a feedstock. Also 'voluntary' consumers of clean hydrogen, for example in vehicles, may wish to be certain that they are buying zero or low-carbon ('clean') hydrogen.

The Commission is likely to propose the reform of the ETS in 2021, combined with the introduction of a carbon-border adjustment mechanism. This is intended to bring in the EU's energy-intensive industry that is completely or largely exempt from the ETS – certain of which are potential consumers of clean hydrogen – to the ETS system. This will gradually create demand for clean hydrogen both to replace feedstock grey hydrogen (for fertilisers, etc.), and later as an energy source in order to reduce GHG emissions (for steel and cement production, etc.). GOOs will be needed so that companies purchasing clean hydrogen instead of grey hydrogen/fossil fuels can demonstrate the resultant CO₂ savings in the context of their ETS-related declarations.

In order to decarbonise the heating of buildings, a combination of heat pumps and hydrogen will be required; using clean hydrogen directly to heat water and/or with a fuel cell to power a heat pump. As the distribution grid decarbonises, this is likely to be done through progressively increased clean hydrogen-natural gas blends. GOOs with GHG content blend specifications would be helpful in informing consumers of their specific GHG content.



GOOs are needed for ensuring that energy imports meet specified sustainability criteria; this is important today in the EU in particular for biofuels, which must demonstrate that they meet minimum criteria regarding crop source and land-use sustainability. In the future, it will be important to demonstrate that hydrogen imports meet EU GHG content criteria.

GOOs also facilitate trading and the uptake of a specific energy form. Where a consumer wishes to use a specific form of energy, for example zero-carbon or other types of hydrogen, it may not be physically possible to purchase and competitively ensure delivery of the product. In the case of renewable electricity, a customer can only be supplied the mixture of electricity resulting from the generation mix on a given network, and not the specific ‘green electrons’ that he or she desires. Thus, by acquiring a GOO the consumer will pay any required premium and notionally be supplied ‘green’ electricity. With respect to the future hydrogen market, two instances where ‘virtual trading’ may be required, which may be facilitated by GOOs, can be identified.

First, potential purchasers of hydrogen may not be able to physically source low and zero-carbon hydrogen due to a lack of infrastructure. In such circumstances ‘virtual trading’ on the basis of low and zero-carbon hydrogen GOOs may bridge the gap. For example, a fertiliser producer wishes to substitute grey hydrogen with a low and zero-carbon option in the context of the ETS obligation. But the producer is unable to source competitive deliveries. In such circumstances, the producer might purchase GOOs for clean hydrogen from another producer, paying the premium between the cost of grey and clean hydrogen, while continuing to use grey hydrogen. The producer would sell the hydrogen on the merchant grey hydrogen market, and the fertiliser manufacturer would be able to claim the GHG reduction in the relevant ETS declaration. Such an

approach would create liquidity in the emerging clean hydrogen market.

Second, peak-shaving electrolysis plants will be increasingly required to store electricity in an electricity system that will be more and more dominated by intermittent renewable electricity. In principle, they should be situated close to electricity production centres to reduce network congestion. However, such locations may be remote from hydrogen consumption centres, and they may prove too small to justify specific hydrogen networks. In such circumstances, it will perhaps be necessary to blend the hydrogen into natural gas, using GOOs (see above) to create value for the green hydrogen.

2. Existing EU Experience in GOOs

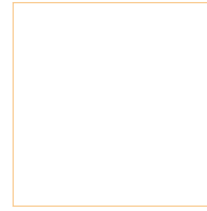
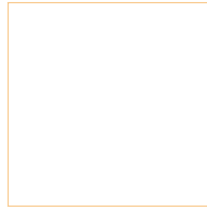
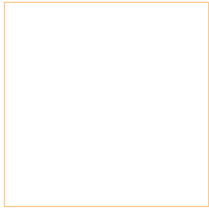
Currently, under EU energy-related law:

1. a certification system/requirement exists for biofuels (certain types of biofuels may be sold in the EU but cannot qualify for EU targets or fuel-blending obligations for suppliers); and
2. Guarantees of Origin are provided for in Article 19 of the EU’s Renewable Energy Directive 2018/2001¹.

The Renewable Energy Directive requires Member States to issue GOOs to producers of renewable energy “*For the purposes of demonstrating to final customers the share or quantity of energy from renewable sources in an energy supplier’s energy mix and in the energy supplied to consumers under contracts marketed with reference to the consumption of energy from renewable sources*”.

The aim, therefore, is to enable renewable energy producers to monetise the value of their energy to consumers willing to pay a premium for it, on the basis of its renewable nature. In this light, Member States may decide not to issue such certificates to a

1. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN>



producer that receives financial support from a support scheme, ‘to prevent double counting’.

The Directive also provides that “Member States may arrange for guarantees of origin to be issued for energy from non renewable sources”. However, in practice, we are not aware of any cases where, for example, natural gas is certified and provided with a GOO.

Article 19(7) of the Directive provides an overview of the information that such GOOs must contain:

“7. A guarantee of origin shall specify at least:

(a) the energy source from which the energy was produced and the start and end dates of production;

(b) whether it relates to: (i) electricity; (ii) gas, including hydrogen; or (iii) heating or cooling;

(c) the identity, location, type and capacity of the installation where the energy was produced;

(d) whether the installation has benefited from investment support and whether the unit of energy has benefited in any other way from a national support scheme, and the type of support scheme;

(e) the date on which the installation became operational; and

(f) the date and country of issue and a unique identification number. Simplified information may be specified on guarantees of origin from installations of less than 50 kW.”

It should be noted that under Article 19(7) (b) of the Renewable Energy Directive, the possibility for hydrogen GOOs may already exist. However, given that this Directive focuses, in reality, on renewable electricity, and contains no technical provisions regarding the nature of a possible hydrogen GOO, the Directive will need to be significantly revised and updated to introduce hydrogen-specific GOOs.

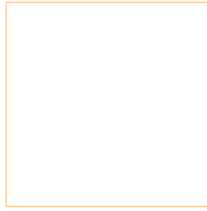
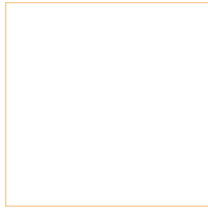
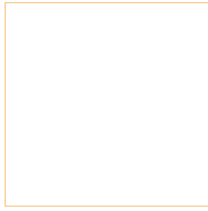
3. Hydrogen Strategy and the Role of GOOs

In the Hydrogen Strategy the European Commission has announced a number of potential concrete objectives and targets that will drive the need for GOOs.

- **Phase 1 – 2020-2024** – The objective is to install at least 6 GW of renewable hydrogen electrolyzers in the EU and to produce up to 1 million tonnes of renewable hydrogen, for decarbonising existing hydrogen production, e.g. in the chemical sector, and for facilitating the uptake of hydrogen consumption in new end-use applications such as other industrial processes and, possibly, in heavy-duty transport.
- **Phase 2 – 2025-2030** – “hydrogen needs to become an intrinsic part of an integrated energy system with a strategic objective to install at least 40 GW of renewable hydrogen electrolyzers by 2030 and the production of up to 10 million tonnes of renewable hydrogen in the EU”.
- **Phase 3 – From 2030 onwards and towards 2050**, “renewable hydrogen technologies should reach maturity and be deployed at large scale to reach all hard-to decarbonise sectors where other alternatives might not be feasible or have higher costs”.

Guarantees of origin are not required *per se* for the proof of attainment of these objectives. Indeed, GOOs are not needed to demonstrate the attainment of national hydrogen objectives; national governments can simply require that hydrogen producers report quantities of clean hydrogen sold which are then aggregated in national statistics. In a similar manner, Member State declarations regarding renewable energy, with respect to national targets, are not based on GOOs.

In addition, the above ambitions are not formal, legal objectives. Indeed, it remains to be seen whether an



EU-level target will be established. In any event, in line with the current approach regarding renewable energy based on the Governance Regulation, it is, rather, certain that any national targets will be non-legally binding, and set voluntarily at the national level.

However, GOOs will be needed: (i) to enable customers to be certain of the nature of the hydrogen they are purchasing (either for personal preferences or legal obligations); (ii) to facilitate the transboundary accounting of hydrogen production and use; and (iii) to facilitate the development of the market through ‘virtual trade’. This will be especially important in the start-up phase of the clean hydrogen market, where infrastructure may (not yet) be sufficiently developed to (always) link supply and demand efficiently.

In initial drafts of the Hydrogen Strategy, the Commission proposed to limit GOOs to green hydrogen. However, in the final version, the Commission announces a more technology-neutral approach as follows:

“In order to tailor a supportive policy framework in function of the carbon emission reduction benefits of hydrogen in a transitional phase, and to inform customers, the Commission will work to swiftly introduce, based on impact assessments, EU-wide instruments. This would include a common low-carbon threshold/standard for the promotion of hydrogen production installations based on their full life-cycle greenhouse gas performance, which could be defined relative to the existing ETS benchmark for hydrogen production.

In addition, it would include a comprehensive terminology and European-wide criteria for the certification of renewable and low-carbon hydrogen possibly building on the existing ETS monitoring, reporting and verification and the provisions set out in the Renewable Energy Directive. This framework could be based on the full life-cycle greenhouse gas emissions, considering the already existing CertifHy methodolo-

gies developed by industry initiatives, in consistency with the EU taxonomy for sustainable investments. The specific, complementary functions that Guarantees of Origin (GOs) and sustainability certificates already play in the Renewable Energy Directive can facilitate the most cost-effective production and EU-wide trading”.

Whilst this statement is open to interpretation, it appears that the Commission is intending to implement a certification approach based on the following criteria:

- The Commission recognises the need for GOOs for all forms of low and zero-carbon hydrogen on an objective basis.
- The anticipated approach would be to assign standard reference values for GHG content depending on the technology in question; hydrogen may be certified based on standard life-cycle analysis with standardised GHG certified levels.
- A standard approach to defining the criteria that any certification body must respect, based on the approach adopted regarding ETS certification/renewable energy GOOs, will be implemented.

CertifHy is an industry driven pilot initiative project for certifying renewable and low-carbon hydrogen. CertifHy has already issued certificates². This pilot’s approach may act as a model for future certificates.

4. Possible Approach for GOOs

The following objectives may, therefore, be set for the future EU GOO scheme for hydrogen:

- The objectives should cover all forms of renewable and low-carbon hydrogen and should be based on a life-cycle analysis.
- The GOOs should be used to demonstrate the GHG content of the hydrogen (for example, in the context of ETS accounting).

2. <https://www.certifhy.eu/>



- The GOOs should follow a ‘standardised’ approach (based on technology/fuel source rather than a plant-by-plant basis): they should be based on an objective analysis.
- In the event that the Commission proposes that Member States are obliged to limit subsidies to the specific types of hydrogen that can qualify for certification, then it will be important to have an objective ‘certification standard’. This should be gradually phased in, based on ETS prices.
- Strict mechanisms should be applied to ensure that renewable hydrogen production is truly sourced from renewable electricity. In this context, the issue of ‘RES-E and fossil fuel electricity substitution’ should be raised.
- If a ‘green’ hydrogen producer sources RES-E from the electricity market and if the marginal supplier is fossil-fuel-based electricity, there is only one consequence of ‘renewable’ hydrogen production: additional fossil-fuel-based electricity to meet the demand that the RES-E used by the ‘green’ hydrogen producer would otherwise have met. Under such conditions, whilst hydrogen is nominally renewable, its production would have resulted in additional non-renewable electricity production. One solution to this would be to oblige green hydrogen producers to source RES-E from new installed capacity via corporate power purchase agreements or direct lines.
- The methane emissions from the natural gas value chain need to be taken into account. The approach should be based on accurate figures determined according to the specific origin of the natural gas, based on company declarations. An objective monitoring system need to be established for this purpose, as proposed in the Commissions new Methane Strategy³.
- GOOs should also be available for renewable and low carbon hydrogen produced in the EU and imports. Certification methodologies in non-EU countries will need to be recognised in an objective, non-discriminatory manner.

3. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1833

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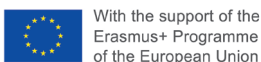
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