GIE Position Paper on the Additionality Principle

Executive Summary

- GIE recognises that renewable capacity should cover the electricity consumption also for RFNBO production in order to ensure that the used electricity is actually renewable and to guarantee an overall decrease of the emissions level.
- The additionality principle should also though allow electrolysers to be built soon and timely enough so they can deliver the expected positive externalities towards whole system decarbonisation, efficiency and integration of renewables.
- The request to respect additionality criteria addressed solely to hydrogen producers appears highly discriminatory. In fact, the principle should be valid for all new electricity uses and related sectors (e.g. EVs, heating, industrial process electrification, etc).
- Renewable hydrogen, produced by renewable electricity, increases energy system efficiency as a whole and enables a faster integration of renewables with lower overall system costs and emissions: electrolysers are flexible assets and hydrogen enables cheap storage.
- According to proportionality and dynamic regulation principles, adequate phase-in period and detailed analysis on the whole energy system are necessary for the application of any additionality principle; this should be coordinated to also reflect national specificities.
- Imposing a strict and narrow temporal correlation is cost-increasing for the energy system and it endangers the investment and market ramp-up of RFNBOs.
- Geographical location of electrolysers should be based on system-efficiency and decarbonisation effectiveness.
- More regulatory flexibility is needed to avoid hampering renewable energy investments and their development; RFNBOs facilitate renewable electricity integration and speeds up its development.
- Once additionality attributes are included, Guarantees of Origin should act as the main mean of proving additionality.

1. Introduction

Gas Infrastructure Europe (GIE) is the association of European gas infrastructure operators: gas transmission networks, storages, and LNG terminals. GIE members are committed to delivering the European Union (EU)'s goal in being the first continent achieving climate neutrality by 2050. We believe that an integrated energy system approach, based on renewable and decarbonised molecules and electrons, paves the way to achieve this target in the most efficient and cost affordable way.

In line with the EU Hydrogen Strategy guidance and in order to fulfil the EU transition targets and decarbonisation goals, a fast ramp-up of hydrogen is essential. Renewable Fuels of Non-Biological Origin (RFNBO), which includes renewable hydrogen, enable the integration of renewable energy in an efficient way, thereby accelerating the process of the energy transition. With their extensive decarbonisation potential both as an energy carrier and as feedstock for various end-user applications and sectors such as steel production, the chemical industry, transport, heating, and capabilities for electricity system ancillaries and mass imports (including from overseas) and storage (including long-term), RFNBOs will become a major driver for the efficient integration of renewables into the energy system. GIE recognises that renewable capacity should cover the electricity consumption also for RFNBO production in order to ensure that the used electricity is actually renewable and to guarantee an overall decrease of the emissions level. However, the additionality principle should also allow to guarantee that RFNBO developments are built soon and timely enough and can deliver their natural positive externalities towards whole system decarbonisation, efficiency through integration of renewables. At the same time, it must be avoided that hydrogen development pathways as well as all other uses would prove unsustainable. Due to indirect carbon emission effects, this would lead to losing the necessary support (as already happened to other renewable energies receiving only initial public support).

With the Renewable Energy Directive's (RED) proposed revision under the Fit-For-55 Package, the additionality principle would apply to all RFNBOs, regardless of the sector they are used in. The specifications of the Delegated Act for this principle will have long lasting implications for the ramp-up of a European market for RFNBOs, for enabling sector-coupling, and for the European energy transition targets achievement and cost-effectiveness in general. Straightforward, market-based, well-functioning, and non-discriminatory rules on the conditions under which RFNBOs are accounted for as renewable energy are essential to the success of the energy transition.

Finally, the request to respect additionality criteria addressed solely to RFNBO producers appears highly discriminatory. In fact, the principle should be valid for all new electricity uses and related sectors (e.g. EVs, heating, industrial process electrification, etc).

2. System Value of Hydrogen

Hydrogen has positive synergies and value for the efficiency of the entire energy system. It allows the efficient integration of intermittent renewable electricity by providing flexibility, efficient energy transport including over long distances, and seasonal storage potential for renewables over long periods at best cost. A well-developed hydrogen market and hydrogen infrastructure significantly contribute to preventing and solving congestion of electricity grids, reducing price volatility in electricity markets and avoiding renewable electricity curtailments including the associated system costs.

First and foremost, renewable hydrogen is needed to decarbonise many processes that require molecules as feedstock. It can also act as an efficient energy carrier that is easy to store, transport and import at a large scale. Regarding the power system, hydrogen flexibility in short-term markets (by the fact that electrolysers are not interested to produce hydrogen with high electricity prices) will have an immediate positive market resilience effect by increasing the price elasticity of electricity demand. In the long-term, the benefits of hydrogen and its infrastructure (through sector coupling, integrated system planning and Power-to-Gas) also enable a more efficient utilization of the electricity infrastructure as a whole: lower investment costs, higher capacity line use rates for the market, less need for safety margins due to congestion, unscheduled flows and other system constraints, these thanks to enhanced system flexibility at the demand side and storage capabilities. Furthermore, in the long-term, flexibility services provided by hydrogen deployment can be considered as an additional supply to respond to peak demand, which avoids disruptions of electricity and heat supply. Subsequently, curtailment of electricity due to congestion could be minimised and efficiency in the energy system operation as a whole could be increased because of the deployment of hydrogen. This is a factor that should be taken into account when considering hydrogen sustainability criteria and its externalities.[1]

Hydrogen infrastructure will provide flexible capacity to the benefit of all energy users as renewable production will be decoupled from its time and location from consumption. On the supply side, hydrogen producers will optimise electrolyser operation on the basis of price variations of electricity. On the demand side, a well-developed hydrogen transport and storage infrastructure will enable a stable hydrogen supply for initial consumers, while responding to renewable integration needs of other sectors like electricity. Hydrogen infrastructure can smooth out sudden price fluctuations as well as issues like negative renewable prices. Hence, it will contribute to financial risk mitigation of supply and demand shocks, based on reduced energy price volatility and increased market resilience because of a better multi-carrier configuration. The future of any resilient sustainable energy system goes through multi-carrier diversity and inter-carrier operational flexibility for an enhanced efficiency and security of supply at best cost.

Renewable electricity and RFNBOs should not be considered as competitors, but rather as complementary carriers with synergies and positive externalities: hydrogen ensures the economic transport, storage, integration and import of mass-volume renewable energy at best cost, even across continents.[2]

The additionality principle as currently planned/formulated risks undermining the desirable rapid build-up of a European hydrogen economy and hence, hampers the sufficiently swift extension of renewable electricity capacities at the best possible cost for society. Thereby, it hinders the EU 2050 climate targets and places Europe (as a whole) at risk of transition delay, exposing it to potentially more efficient competition from outside Europe.

An EU-wide Guarantees of Origin (GOs) system, built on renewable PPAs, should be used as the basis to prove additionality. Advancing the additionality principle within a true system of GOs (featuring e.g. compatibility and tradability across Member States) is a key enabler for the large-scale production of renewable hydrogen. As a market-based instrument, a GO-system can provide incentives for renewable energy producers to invest in new technologies and production capacities without adding bureaucratic obstacles. Once additionality attributes are included, these certificates should act as the main mean of proving additionality.

3. Shortcomings of the Additionality Principle

3.1 Building/Operation timeframe of additionality principle

When talking about additionality, one of the currently most discussed criteria is the necessity for electrolysers to be fed only by renewables built within a maximum of 12-month in advance or later.

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[1] Especially considering that the ENTSOE TYNDP 2020 foresees that with all grid investment expected till 2025 and the added 93GW of grid capacity proposed from 2025 up to 2040 (supposing all investments were made: cfr. costs, permits, etc…) curtailment (not just of renewables) would still prevail for at least 134TWh/year. (Source: ENTSOE, "Power System Needs", https://tyndp.entsoe.eu/system-needs/)

[2] GIE, 'How to transport and store hydrogen – facts and figures, May 2021, https://www.gie.eu/wp-content/uploads/filr/3429/entsog_gie_he_QandA_hydrogen_transport_and_storage_210521.pdf

While it is essential to ultimately meet additional renewable electricity demand (of all types and technologies) with additional renewable production capacities, decarbonisation of the electricity supply is already addressed to an extent on the supply side by instruments such as the EU ETS and national support schemes. The build-up of new renewable hydrogen infrastructure will need fast investments to meet decarbonisation targets. It is important that these will not be potentially hampered by unnecessary barriers. RFNBOs are part of the solution to speed up renewable electricity production and demand (in general) due to their role as enablers of a faster electrification pace via flexibility. Making the development of RFNBOs conditional to non-market-based rules is not a reply to the problem of renewables production scarcity because it does not address the root of this problem (e.g. permitting issues, network congestion, unscheduled flows, and lack of sufficient coordination). It also does not refer to the majority of demand expected for electricity. Moreover, imposing additional non-market-based rules on RFNBOs blocks part of the solution to the renewables production scarcity problem. Often, under a given existing grid, it will be because an electrolyser has been built and is operating flexibly (as is commercially profitable for it to do) that further renewables will become possible, not the opposite.

Besides, a modular approach, where electrolyser capacity is scaled-up in phases (for instance initial capacity of 100 MW, an extra 150 MW electrolysis capacity the following years and an additional 200 MW later onwards) after building-up renewable electricity generation capacity for it ex-ante, would hardly become practicable from a business development perspective. Such additionality timeframe principle would require, that prior to each electrolyser development step, new additional renewable electricity fields must be installed which makes it impossible to build all renewable generation capacity in advance and at once or even use existing renewable fields. This poses a significant disincentive and unnecessary rigidity for markets, investors and developers.

Such criterion would block one of the main options to build-up a fit-for-purpose hydrogen supply chain and an efficient energy system as a whole.

If linked to facilities connected to and receiving electricity from the grid, the timeframe of the additionality criteria would also cause another important market distortion at the renewable electricity supply side: for hydrogen to be renewable, the renewable electricity supplier can only become contractually bound to electrolysers that came into operation in the timeframe fitting his own production site first commercial operation date. It would not be possible for existing renewable electricity suppliers to change their supply contract and sign with newer electrolysers later, if these are built outside the legally set timeframe for their field. Such constraint is also discriminative for the owners of existing renewables (that would be de facto banned from selling their electricity to new electrolysers) by fragmenting the electricity supply side between new and existing renewables. This is especially penalizing for countries with an already high share of renewables in their mix, some of which are net exporters and scheduled to remain so in the future (no local scarcity to be claimed).

Furthermore, the administrative permitting timeframes to build new electricity generation differ significantly between Member States and could, in many cases, cause electrolysers to be inoperable in the market ramp-up phase. Applying a strict timeframe on investment additionality undermines market realities where the installation of renewable electricity capacities often requires long planning and approval procedures. If necessary at all, least strict requirements would be required ensuring: 1) an adequate phase-in period for National and European Law to adapt to any requirements on timeframe; and 2) a long enough timeframe for larger electrolyser projects to be realised. But the recommendation remains the complete removal of such building operation timeframe.

3.2 Temporal correlation

The temporal correlation criterion linked to additionality sets a timeframe for the generation of renewable electricity in relation to the production of RFNBOs in an electrolyser: for RFNBO production to be considered renewable, it needs to be produced within X time units from the production of the renewable electricity. The discussed time periods range from 15 minutes to one year, but could also be longer.

The application of such temporal correlation criterion could create market distortions: it makes the production, storage and use of RFNBOs more impractical, as well as setting operational disincentives against flexibility. At the same time, electricity markets are seeking flexibility today through a multiplicity of other (costly) measures. Studies published by Frontier Economics[3] and the Florence School of Regulation[4] show that the adoption of a strict approach to temporal correlation criterion does not help the market. Introducing such a strict temporal requirement at this early stage of market development can lead to higher costs for green hydrogen, less investment in RFNBOs and, consequently, less system efficiency. This effect is expected to be amplified the narrower the temporal correlation timeframe gets. A binding 15-minute time period could lead to costs for green hydrogen as much as three times higher[5] compared to blue hydrogen.

It will be essential that the temporal correlation criterion does not hamper the optimal operation of the future hydrogen gas grid as a single logistical facility. As the paper from the Florence School of Regulation already points out, renewable targets are only tracked yearly to allow for flexibility in system operation. It would be counter-intuitive to trace green hydrogen production at shorter intervals by creating an artificial correlation. It would reduce system flexibility and would increase overall system costs (not just for hydrogen), while making the integration of renewable electricity more difficult.

Going further than the one-year temporal correlation criterion proposed by the Florence School of Regulation, GIE believes it would be better not to temporally correlate hydrogen production. Hydrogen is storable and it would be suboptimal to undermine such flexibility. Temporal correlation should not hinder substituting electrolysis hydrogen for stored clean molecules in case of high electricity prices (relative scarcity) providing a wrong market signal with the size of the value of the certification. This latter disincentive would act by keeping the electrolyser running more and reacting less to the electricity price signal and electric scarcities due to its need to satisfy the temporal correlation criterion, or risk the loss of the certificate and its value. Furthermore, temporal correlation is inefficient for RFNBO producers, since the temporal correlation principle increases the costs, as expressed above and demonstrated by the Frontier's Study. Finally, from an energy system as a whole perspective, it creates also inefficiencies in the operation of the hydrogen network.

Furthermore, temporal correlation would discriminate the production of green hydrogen against all other methods of electricity conversion and storage (heat pumps, batteries, mobility) and disregard its benefits of overall system efficiency and sector coupling potential. Finally, a short

[3] Frontier Economic, 'RED II Green Power Criteria – Impact on costs and availability of green hydrogen in Germany', July 2021, red-ii-green-analysis.pdf (frontier-economics.com)

[4] Florence School of Regulation, 'Renewable hydrogen and the 'additionality' requirement: why making it more complex than is needed?', September 2021, PB_2021_36_FSR.pdf (eui.eu)

[5] Frontier Economic, 'RED II Green Power Criteria – Impact on costs and availability of green hydrogen in Germany', July 2021, red-ii-green-analysis.pdf (frontier-economics.com)

temporal timeframe, e.g. 15 minutes, would set an unfair burden on hydrogen production via solar electricity that cannot generate electricity during night hours. In sum, the electricity regulatory framework (EU CACM and EU Balancing Guidelines) already price grid congestion management and remedial actions in electricity for all grid users (hydrogen producers included). There is no need for a double burden, especially if it is neither technology-neutral nor market-based.

3.3 Geographical correlation

The geographical correlation implies that RFNBOs need to be at the same side of electric congestion than the electricity renewables used to produce it – this is simplified to a request to be in the same bidding zone (which at least theoretically acts as a copperplate) or within another one when there is price convergence (no congestion) between them.

As previously underlined, electrolysers solve congestion, rather than causing it: this is due to the fact that they are flexible assets. Any geographical correlation criterion could be implemented in a way that enables the most effective and efficient solutions for decarbonising the whole energy system at minimum cost. Market distortion may however occur in relation to introducing geographic restrictions in electrolysers' renewable electricity sourcing choices and by limiting their ability to compete in markets with all other agents (like batteries and aggregators) for the use of (congested or not) interconnectors. Approaches towards congestion management and scarcity in electricity supply should in fact also benefit from the potential added value of electrolysers, as well as pipelines and storage of RFNBOs.

The adoption of a bidding zone approach, for geographical correlation, for example, could prove inflexible and not effective as it does not necessarily prevent congestion, yet could increase it by preventing its automatic management via demand side response on cross-border sourcing by electrolysers and cause the need for other (more expensive and polluting) remedial actions in the electricity system to perform the same task. Moreover, bidding zones are constructed very heterogeneously across the EU in terms of size (electric structural congestion does not perfectly match national borders like most electric bidding zones do) and, hence, ACER has frequently questioned the efficiency of the current bidding zones design.[6]

On the other hand, building electrolysers close to renewable energy supplies could be in principle desirable for certain capacity calculation regions and/or countries, linked to an effective and efficient implementation of their energy transition strategies.

In sum, while in the short -mid-term, (e.g. up to 2025-2027) introducing a degree of flexibility with regard to the implementation of the geographic correlation criterion could be desirable in order to support the ramp-up of RFNBO (e.g. up to its 6 GW at 2024 and 40GW at 2030 European targets), the concrete choice around applicability or not and format should be best left to be coordinated at the capacity calculation region level and based on a Member State decision in the medium-term, so to ensure that a top-down approach does not impact Member States unfairly. As base principles for any development, the following should apply: proportionality in regulation, non-discrimination, lack of market distortion as well as effectiveness and efficiency from a whole-system perspective.

[6] We are amidst ACER's second formal regular process of the Bidding Zone Review → [Bidding Zone Review | www.acer.europa.eu](www.acer.europa.eu)