Additionality and renewable hydrogen rollout – how to reconcile them?

Achieving climate neutrality requires massive volumes of renewable energy in the form of electrons and molecules which is in short supply. Renewable electricity is also intermittent and hard to store, its volatility and the limitation of the grid hampering a faster rollout. The cost efficiency of renewable electricity suffers from high amounts of valuable curtailed energy going to waste.

The additionality principle of the Renewable Energy Directive (RED) is based upon the idea that renewable electricity is valuable and should be used for the most effective applications with the highest energy efficiency. The Directive considers a 70% efficiency rate for renewable hydrogen production which puts it at a disadvantage in comparison to direct electrification. Moreover, the Directive does not take into account the limitations of the electricity grid rendering valuable energy worthless, therefore restrictions and conditionality needs to be carried by heavy grid users.

1. Factor in geographic differentiation. Additionality is redundant in certain regions and essential in others.
2. Use hydrogen production as a solution to grid congestion. An ambitious RED II should decrease the cost of the energy transition.
3. Allow temporary exemption for small scale hydrogen production. A toolbox approach will deliver faster gains.
4. Apply technology neutrality for energy storage solutions to deliver system energy efficiency.

Factor in geographic differentiation. Additionality is redundant in certain regions and essential in others.

Geography and scale are key variables in finding appropriate energy solutions and turning a blind eye is not an option if we are serious about climate neutrality by 2050. The additionality principle should be implemented in a regionally differentiated way, reflecting the aptitude of a certain region for the production of renewable electricity. Regions with high solar, wind or unexplored hydro power potential should implement the additionality principle in a much less restrictive way than regions where renewable electricity is still scarce. For example, Spain has tremendous potential for solar, there is no reason to restrict its use for the production of hydrogen, in particular when the conversion to hydrogen is done close to site.

Use hydrogen production as a solution to grid congestion. An ambitious RED II should decrease the cost of the energy transition.

The intermittency of renewable electricity leads to grid congestion at times of production peaks. Power grid constraints already cost taxpayers 1.5 bn euros in curtailment costs and an additional 30 bn euro in grid flexibility services in Germany alone[1]. Renewable hydrogen production can offer grid balancing services thereby alleviating grid congestion and adding to energy efficiency. We call on the European Commission to exempt hydrogen producers from additionality when using otherwise curtailed electricity or clarify the reason behind applying additionality in this context.

The ENTSOE Regional Investment Plan Northern Seas and many of its country annexes emphasise the importance of power to gas and underlines that many renewable offshore landings will be in the form

[1] Bundesnetzagentur (2021).

of e-fuels. The reason being that congestion will increase until 2040 and will not be solved even with all the grid investment proposed[23].

Allow temporary exemption for small scale hydrogen production.

Where hydrogen is only produced at small scale for local consumption, the production should be outside the additionality regime. This will avoid unnecessary bureaucracy and enable an organic development of the hydrogen economy. Such examples include refuelling stations, feedstock, pilot projects. It is important that the exemption is limited in size and scale, for instance only up to 20 MW and until 2030. Depending on the local conditions of the grid and the date of availability of green hydrogen distribution at scale, the rules for exemption could be extended on a case-by-case basis.

Apply technology neutrality for energy storage solutions to deliver system energy efficiency.

Hydrogen Europe underline that the preferential treatment of one renewable technology versus another should be avoided as it is highly distortive for the market. One example could be energy storage applications. Conditions and rules applying to battery storage directly connected to the electricity grid should also apply to hydrogen installations providing storage solutions. Moreover, when electricity prices are excessively high, hydrogen producers could use hydrogen storage to meet demand bringing flexibility to the system. We note that a number of electricity intensive industries are already forced to stop production when electricity prices are high e.g. aluminium smelters.

Radical changes require radical solutions. Time to think long-term.

Applying additionality blindly and its resulting consequences need to be factored in. Hydrogen Europe calls on the European Commission to revisit the principle of additionality and ensure it is indeed Fit for 55 in its current form. Adequate infrastructure planning is key to accommodate high shares of renewable energy. Energy efficiency should also take into consideration the risk of grid congestion.

The energy transition requires radical action. As such, Hydrogen Europe considers that the principle of additionality should be phased in at a time when the hydrogen sector reaches the 2024 6GW and 2030 40GW target of the H2 strategy. Member States should bear responsibility for providing additional renewable electricity capacity by setting dedicated renewable energy targets to be used for RFNBO production. In addition, hydrogen producers should be allowed to produce renewable hydrogen from curtailed renewable electricity. Guarantees of Origin alongside Power Purchase Agreements should be sufficient to prove the renewable character of the electricity used in the production of hydrogen.

Additionality will have a negative effect on new renewable energy deployment. Renewable energy curtailment combined with low wholesale energy prices in bidding zones with high penetration of renewables, are making new investments in renewable energy less attractive to potential investors. Opening the renewable energy market to new consumers (e.g. hydrogen producers) would create additional demand for it. More demand would result in higher market prices of renewable energy, thus incentivizing new investments.

[2]ENTSOE Regional Investment Plan Northern Seas. January 2021.
[3] TYNDP 2020

Additionality makes the RED II 50% RFNBO target in industry difficult to comply with. Whilst Hydrogen Europe fully supports the RED II revision proposal 50% RFNBO target for industry, we would like to point out that the additionality criteria in its current form will make it extremely difficult for a number of industrial companies to comply with. A substantial part of industrial hydrogen consumers today are ammonia and methanol plants located in the Northern and North-Eastern Europe, mostly in industry clusters. Given the fact that a single medium sized ammonia plant could require several GW of renewable energy, it is extremely unlikely that additional RES capacities could be built up locally (i.e. in the same bidding zones) before 2030. This is especially true considering the stringent permitting procedures for renewable electricity projects.

Additionality will not always lead to the maximization of GHG emission savings. One of the principal reasons for the additionality criteria is to channel renewable electricity towards decarbonising the electricity grid, where it is most efficient and results in most CO2 savings. While this is true in most cases, it is not true in every case, for example decarbonising steel production with clean hydrogen. If the entire steel production value chain is taken into account one tonne of green hydrogen can result in savings of up to 38 tonnes of CO2. In this case, even if the renewable energy taken from the grid would be replaced with fossil electricity, the net CO2 emission balance would still be overwhelmingly positive (for example, if renewable energy was taken from the grid and replaced by electricity produced with a natural gas fired CCGT, net emission savings would amount to 14tCO2/tH2).