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Europe's Definition of Green Hydrogen (RFNBO) Adopted into EU Law

On June 20, 2023, the European Commission (the **Commission**) published the EU's definition of green hydrogen in the Official Journal. This completes the legislative process for these two long-awaited and highly controversial Delegated Acts, which are now EU law.¹

Together these Delegated Acts define the production requirements for "renewable fuels of non-biological origin" (**RFNBO**) (i.e. green hydrogen and derivative fuels, such as e-ammonia, e-methanol, e-kerosene and e-natural gas (e-NG)).² They apply equally to production projects located in the EU as well as export projects selling to the EU. Given the need for massive quantities of imported RFNBO as well as new domestic EU production, this definition in the Delegated Acts will play a significant role in shaping the European and the global hydrogen and low-carbon fuels industry.

KEY ISSUES

The Commission has adopted these texts amidst an ongoing geopolitical competition for subsidies to the green energy sector. This is epitomised by the generous tax incentives on offer in the U.S. under the Inflation Reduction Act (the **IRA**), with the EU fearing an exodus of capital. In response, the Commission published its Green Industrial Plan and, more recently, launching the European Hydrogen Bank (designed to subsidise both EU production as well as imports of green hydrogen). This kind of policy support is seen as being crucial in allowing the EU to meet the energy security and decarbonization objectives of REPowerEU and Fit for 55. More specifically, subsidies are required to allow the scale-up of the nascent green hydrogen sector.

Yet the complex and strict production requirements for green hydrogen and other RFNBOs in the Delegated Acts are seen by some as exacerbating the very issue the Commission is seeking to solve. On this view, the rules make it more difficult and more expensive for the private sector to meet Europe's energy needs for a decarbonizing economy.



Moreover, certain of these rules create difficulties for producers from countries (e.g. the U.S., Canada, Egypt amongst others) that are seeking to develop a clean hydrogen export industry through incentives in accessing the important European market.

For example, green hydrogen cannot be classified as RFNBO where the grid-transmitted renewable energy source (**RES**) has benefited from State aid (subject to limited exceptions). This would even prevent imported green molecules from non-EU states that have explicitly allowed subsidization of RES for clean hydrogen production and export. In so doing, some industry proponents feel that Europe is inexplicably denying itself the benefit of cheaper imported RFNBO molecules from countries willing to subsidise their export. In other words, this regulation ultimately increases the cost for Europeans of what are, on most accounts, very green molecules.

According to this view the complexity and stringency of the Delegated Acts risk slowing investment in the European hydrogen sector and making Europe structurally dependent on imports from countries with more favorable RES potential and greater availability of land. This would contradict the objective of enhancing Europe's energy independence.

INTRODUCTION TO THE DELEGATED ACTS PUBLISHED

The so-called **Additionality Delegated Act** sets out the conditions that must be met for the supply of electricity from RES to green hydrogen production facilities to qualify as fully renewable. This then allows the hydrogen or derivative product to be certified as RFNBO under the Renewable Energy Directive (Recast) 2018 (**RED II**) (subject to the immediately following test).

The second Delegated Act and accompanying Annex define the greenhouse gas (**GHG**) emissions methodology for the calculation of the lifecycle GHG footprint of green hydrogen and derivatives. To meet this GHG emissions limit, the green hydrogen or derivative must have a carbon footprint below (approximately) 3kg CO₂e / kg on a well-to-wheel basis (i.e. including emissions associated with transporting the molecule to the end-customer). This Delegated Act also sets out the permitted sources of carbon dioxide for incorporation into hydrogen-derivative fuels such as e-methanol, e-kerosene or e-NG.

HOW TO PRODUCE RED II COMPLIANT GREEN HYDROGEN (RFNBO): SUMMARY OF PRODUCTION PATHWAYS

The Additionality Delegated Act stipulates that the hydrogen component of RFNBOs can be produced through one or more of the following production pathways:

- from RES that is transmitted through a direct connection, provided the RES facility is no older than 36 months at start-up of the RFNBO facility (with extended periods for certain expansions) and where no power is taken from the grid;
- from grid-sourced electricity where that RES power would otherwise have been curtailed without the RFNBO production (proof of this needs to be obtained from the national TSO);
- from grid-sourced electricity where the share of RES production was greater than 90% in the relevant electricity market "bidding zone" (i.e. in the EU—for now, and with some exceptions—a country) as an average of all consumption in the previous calendar year;
- from grid-sourced electricity where the grid average GHG emissions intensity is below 18gCO₂e/MJ. This favours production in countries with high penetration of nuclear power (as well as RES). The RFNBO producer must



enter into a renewables PPA (but the RES generation facility need not comply with the additionality test) and satisfy the temporal and geographical requirements described below;

- from grid-sourced electricity where each of the following criteria are satisfied:
 - **Additionality:**
 - i. The RFNBO producer has entered into a PPA (directly, or via intermediaries) with one or more RES producers and such RES generation facility is no older than 36 months at start-up of the RFNBO facility (again, additional periods for expansions).
 - ii. The RES generation facility has not received any State aid (i.e. this restricts a broad category of subsidies and state support, subject to certain exceptions).

These two requirements above will apply from 1 January 2028, except for RFNBO facilities commencing operations before that date, in which case they will only apply from 1 January 2038. They will, though, then apply in full even to pre-existing RFNBO producers. This raises the possibility that, in certain cases, a RFNBO facility may need to change its RES power supply solution in the middle of operations once these rules kick-in.

It is of note that this restriction on State aid is a stricter definition of the “additionality” principle than is being considered anywhere else in the world. In the U.S., for example, there is ongoing debate in relation to the production requirements for and definition of “qualified clean hydrogen” (i.e. to benefit from the U.S. IRA Section 45V production tax credit). But the proposed U.S. definitions are not expected to be as strict as Europe’s, potentially creating domestic cost competitiveness challenges for U.S. projects that would export to Europe as part of their business cases. We will look at this issue in a subsequent note.

- **Temporal correlation:** The production of RFNBO must take place within the same calendar month (until 1 January 2030), or, thereafter, within the same one-hour period as the production of electricity from the contracted RES generation sources.

This one-hour period could make pure solar powered RFNBO production projects, and many wind-only projects, too expensive (since they will not be capable of operating 24 hours a day).

- **Geographical correlation:** The RFNBO and RES facilities must be located within the same, or in an interconnected, electricity market bidding zone.

There are various nuances to this rule and, since a “bidding zone” is an EU law concept, a bespoke analysis is required in non-EU countries, which could lead to a geographical zone that is narrower than country-wide depending on the characteristics of the relevant electricity market (e.g. the relevant bidding zone could be limited to a specific province or state).

SUMMARY OF KEY ISSUES IN GHG EMISSIONS DELEGATED ACT: INCLUDING PERMITTED CARBON SOURCES FOR RFNBO PRODUCTION

The GHG emissions calculation methodology is a detailed and technical document. Producers will need to work through it together with legal and regulatory advisors and GHG modellers (based on their production process and operating assumptions).

In general terms, it contains detailed requirements for producers to calculate the GHG emissions using a production-to-end-use scope for the product lifecycle assessment (i.e. “well-to-wheel”, including emissions associated with transportation to the end-customer). This scope differs from other GHG emissions methodologies, including that under



the U.S. IRA clean hydrogen production tax credit (which is on a well-to-gate basis, i.e. excluding transport related emissions).

It also defines the permitted sources of carbon feedstock for production of RFNBO with embedded CO₂. The Delegated Act takes a phased approach, permitting the use of industrial emissions that are captured and used only until defined dates (2035 and 2040, depending on the industrial source in question) but only if such emissions have been paid for under an “effective carbon pricing system”.

The precise approach for determining such equivalence is expected to be clarified by the Commission through subsequent delegated acts and guidance. However, this is currently understood to require that the carbon price paid must be equivalent (in scope and amount) to that under the EU’s Emissions Trading System (EU ETS).

As a result of this rule, countries without any carbon price or tax will be at a disadvantage when seeking to repurpose captured industrial emissions for the purpose of green fuel production. In contrast, carbon emissions from direct air capture, geological sources of CO₂ or biogenic sources of CO₂ (biofuels or biomass complying with the sustainability requirements under RED II) are all permitted sources (with no expiry date).

FINAL REMARKS

The Delegated Acts will now be directly binding on EU Member States. No local implementation legislation is required.

RFNBOs are a central pillar of the EU hydrogen economy due to the quotas for RFNBO use in the transport sector prescribed in RED II, in industry prescribed in RED III (once the relevant revisions to RED II are adopted) and in the aviation and maritime sectors prescribed in FuelEU Maritime and ReFuelEU Aviation. However, it is important to remember that the EU does not prohibit the production or use of other forms of hydrogen or derivative low-carbon molecules in Europe. Non-RFNBO, low-carbon molecules still have great value, both from a commercial and from a decarbonization perspective, including in view of carbon reduction incentives created by the forthcoming Carbon Border Adjustment Mechanism (the CBAM), which will come into force later this year.

The concept of “low-carbon hydrogen”, is an energy source the Commission has enshrined in European law (in the Hydrogen and Decarbonised Gas Market Package). Moreover, the debate is focussing increasingly on this form of hydrogen. The recently announced support scheme for industrial decarbonization in Germany through carbon contracts for difference (CCfDs) (the so-called “climate protection contracts”, or, “Klimaschutzvertrag”) is, importantly, colour-agnostic, allowing both green and low-carbon hydrogen. Moreover, in the light of the recent (revised) political agreement on the text of RED III by the European Council (following France’s controversial push) low-carbon hydrogen is likely to play a greater role in the decarbonization of EU industry. There will, for a long time at least, still be demand in Europe for other forms of hydrogen and derivative products outside of the mandatory quotas for RFNBO.

There is also growing demand from the rest of the world (where different, and potentially more lenient, regulatory standards apply and generous subsidies are also being proposed, notably in Asian countries). The challenge for the EU is not to make the cost and technical challenges in meeting the definition of green hydrogen so high that producers prefer to sell their product elsewhere.

The King & Spalding Global Hydrogen Industry Team is at the forefront of developments in the sector globally and is actively advising clients on many of the first and largest projects around the world.



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¹ The legal texts are available [here](#).

² In general terms, green hydrogen is hydrogen produced through the electrolysis of water using electricity generated from renewable energy sources.