NATIONALER WASSERSTOFFRAT

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The role and necessary design of the certification criteria to ensure a fast and effective ramp-up of the hydrogen economy

1 BACKGROUND

If the German and European economies are to achieve the goal of climate neutrality by 2045/2050 at the latest, then it is vital to have a rapid ramp-up of the hydrogen economy. The extensive use of climate-neutral hydrogen or the corresponding hydrogen derivatives[1] will require an equally extensive bundle of political measures to support it. Measures will need to be taken in four key action areas in particular to ensure the speed and success of the hydrogen ramp-up:

- The prompt creation of certification and standardisation requirements.
- The prompt creation of the necessary infrastructures.
- The creation of target-oriented incentive systems on the application side.
- The rapid ramp-up of value chains, especially on the supply side, and the production capacities needed to achieve the targets for Germany and Europe.

These four key pillars of the hydrogen ramp-up are interdependent, meaning not taking effective action quickly enough in even one of these four areas will jeopardise the ramp-up as a whole.

With regard to the key issue of certification, the regulations that have been developed specifically for and are applicable exclusively in Germany are insufficient. This presents a particular challenge in light of the major role that international hydrogen trade is likely to play both in Europe and beyond. However, creating international certification schemes, which is required in the long term, will take a longer period of time even with ambitious efforts. In light of this, the development of certification schemes for the

[1] Definition for the entire paper: The majority of the German National Hydrogen Council (Nationaler Wasserstoffrat, NWR) defines hydrogen as climate-neutral when no greenhouse gases are released into the atmosphere during production regardless of the production process and raw material used. This can safely be assumed to be the case if the hydrogen is produced using additional emission-free energy sources or if the carbon released during production is completely and permanently prevented from entering the atmosphere. Another part of the NWR defines climate-neutral hydrogen as hydrogen which is exclusively produced using renewable energy sources.

European Union will have to form the core of the necessary processes, both to enable the rapid ramp-up of hydrogen in Germany and Europe and to provide strong impetus for the international processes. This has two consequences:

- The schemes should be strictly oriented towards the EU, making unilateral changes to the certification schemes for use in Germany counterproductive to the hydrogen ramp-up.
- The certification schemes should remain compatible at international level and promote the development of a global hydrogen market. Regions such as Europe, which are likely to be dependent on substantial imports, will be starting from a different position to that of regions such as North America, which are likely to be self-sufficient.

Creating the necessary certification schemes is also an extremely urgent matter. Providing the quantities of hydrogen needed to achieve Germany's and Europe's climate, energy and industrial policy goals requires rapid implementation measures:

- The schemes should enable far-reaching investment decisions that are essential for the hydrogen ramp-up to be made in the next two years.
- Given the sometimes-complex issues the certifications schemes will have to address, it would be appropriate to use phase models to create them. Continuing the schemes applicable at the time of investment for sufficiently long production periods ('grandfathering') is critical. Changes to certification schemes made shortly after commissioning ('sunset clauses') may prove to be a key obstacle to investment and ramp-up.
- The complexity and requirement levels of hydrogen certification and the quantities that can be made available subject to these requirements are closely linked during the early phase of the hydrogen ramp-up. Preference should thus be given to gradually developing schemes that are as simple as possible throughout, and backed up by practical application experience, over an approach that focuses on schemes that are perfect and cover all (in the absence of practical evidence: conceivable) eventualities from the outset.

The certification framework created in the European Union should also keep two specific requirements in mind in this context:

- The European Union is currently pursuing the approach of classifying hydrogen according to its production paths and on the basis of the related minimum requirements (green hydrogen and low-carbon-intensive hydrogen). This is partly due to the different legal frameworks (RED, Gas Market Directive and so forth). In contrast, the focus at international level, which is especially relevant in terms of the geostrategic issues the hydrogen economy faces, is often on requirements regarding the specific greenhouse gas emissions emitted by the process chain ('GHG load'), while the classifications mentioned in the previous sentence only play a secondary role. The development process for European schemes should look to use appropriate combined solutions (classification and reporting of GHG load) in this context, at least over time (international consistency).
- The certification of hydrogen and hydrogen derivatives is not only necessary for the various instruments to support the hydrogen market ramp-up (RED, Gas Market Directive, funding programmes and so forth) in the narrower sense, but also for other, broader regulatory areas (carbon border adjustment mechanisms – CBAM). The schemes should be as uniform as possible from the start (regulatory consistency).

The certification of hydrogen not only includes the basic regulations for the certification itself, but also for the necessary tracking or the technical, administrative and institutional infrastructures for the certification. These dimensions of the certification are both incredibly important and extremely time sensitive, but they are not the subject of this position paper.

2 BASIS FOR CERTIFICATION SCHEMES IN THE EUROPEAN UNION

The framework for the certification schemes for hydrogen and hydrogen derivatives in the European Union is defined by various legal regulations. Some of these regulations have already come into force, while others are in the process of being legislated or amended.[2] They are the end product of input from different regulatory areas and are also yet to demonstrate the consistency required across all aspects.

Five aspects in particular are key with regard to the assessment dimensions relevant to the certification schemes:

- Additionality (emission reduction)
- The energy base
- GHG load
- The source of the carbon used to produce hydrogen derivatives that contain carbon
- System compatibility in terms of interactions with the electricity system

The European Taxonomy Regulation and the implementing provisions it lays down provide an initial basis for hydrogen certification. They are legally valid and contain the following aspects:

- They refer to the classification of investment projects from a financing perspective.
- They contain extremely detailed regulations on the classification of hydrogen as an energy source, especially with regard to renewable electricity generation.
- They contain detailed regulations on the classification of the GHG load of hydrogen.
- They do not contain regulations on hydrogen derivatives.
- They do not contain regulations on additionality or system compatibility (these are also unnecessary in the context of the taxonomy).

The Renewable Energy Directive (RED II / (EU) 2018/2001) is also legally applicable. The implementing acts necessary for the certification schemes have not yet been negotiated (and have now been overdue for almost a year), but the drafts for these acts have been announced. The situation regarding the aspects relevant for certification is as follows:

- The regulations initially only refer to the renewable energy sources of non-biological origin (RFNBO) that are relevant for the transport sector and can be recognised in the context of RED II. Hydrogen not produced using renewable energy sources is not regulated.
- Green hydrogen and derivatives produced from it must reduce GHG emissions by 70 per cent compared to fossil fuels to be eligible for the RED II targets.

[2] New draft versions for the Delegated Acts of the European Commission on the certification of hydrogen for transport applications were announced after work on this position paper had been completed, which meant they could not be included in it. The recommendations set forth by the German National Hydrogen Council (Nationaler Wasserstoffrat, NRW) on the requirements for certification schemes for green and low-carbon hydrogen have not changed, however.

- The basic structure of the drafts for the implementation regulations, which have been announced so far, (additionality, temporal and spatial connection between renewable electricity and hydrogen production) is laid down by RED II and can only differ within the limits set out in the legal implementation acts.
- Additionality is mainly derived from the business models used to provide renewable electricity, with the strictest requirements defined here pertaining to procuring electricity from the grid. Using a grandfathering approach has been given relatively tight deadlines with a view to less strict requirements (until the end of 2026) and an associated sunset clause that is valid until the end of 2036.
- The requirements for the temporal and spatial correlation between renewable electricity generation and RFNBO production are very narrowly defined and can be seen as at least somewhat oriented towards the criterion of system compatibility. No grandfathering at all is envisaged, as is a relatively strict sunset clause (end of 2029), with a view to more relaxed requirements.
- With regard to the carbon sources used to produce hydrogen derivatives that contain carbon, the draft implementing act announced to date specifies that only carbon subject to full pricing in the EU ETS or derived from air, biomass or geological sources can be recognised for the production of green hydrogen derivatives.
- The regulations on co-processing[3] and GHG emissions to date are not clearly defined and intend for a uniform GHG emission to be applied. No distinction is made between the different inputs in the energy sources as envisaged in a mass balancing procedure.

The amendment to the Renewable Energy Directive (RED III) is currently being legislated. The following regulations were provided in the European Commission's original draft:

- The RED II implementation acts (for the transport sector) are to be extended to all sectors; there are no plans to re-emphasise the criteria of additionality, temporal and spatial coherence or system compatibility.

In contrast, the European Parliament's decision on the RED III directive proposal includes far-reaching changes regarding the requirements for certification:

- Concrete specifications for the temporal and spatial correlation between renewable electricity generation and RFNBO production are anchored in the directive; these specifications are significantly less strict than those in the previous drafts of the RED II implementation acts.
- At present, it is impossible to predict if these proposed amendments to RED III will cause delays in the creation of legally binding certification schemes and what form such delays may take.

In addition to the legal requirements that relate exclusively to the certification of green hydrogen and green hydrogen derivatives, the draft directive on the development of the European internal market also contains general requirements for renewable gases and hydrogen. The following regulations listed here are relevant for certification:

- With regard to hydrogen produced from renewable energies, reference is made to the relevant regulations of RED II/RED III.
- With regard to hydrogen not produced on the basis of renewable energy sources, the specific greenhouse gas emissions must be reduced by 70 per cent as a minimum requirement.

[3] Co-processing describes the mixing of hydrogen or other raw materials produced on the basis of renewable and non-renewable energy sources in a process during the creation of derivatives.

- The directive proposal does not contain deadlines by which the corresponding legal certification requirements must be enshrined in legislation.
- Beyond the basic regulations for certification, the draft for the amended Gas Market Directive contains a clear requirement for a physical tracking system (mass balance) for green and low-carbon hydrogen.

3 REQUIREMENTS SET FORTH BY THE GERMAN NATIONAL HYDROGEN COUNCIL FOR GREEN AND LOW-CARBON HYDROGEN

The German National Hydrogen Council considers eight key requirements for the certification schemes to be particularly urgent with regard to the necessary hydrogen ramp-up in terms of production, infrastructure and application:

- They should ensure a high degree of climate policy integrity, while not disregarding the effects arising from other energy and climate policy guidelines (the EU ETS limiting emissions in the electricity sector, robust expansion paths for renewable power generation under the RED and so on).
- They must become legally applicable and be implementable quickly.
- They must ensure a sufficient degree of investment security, especially for the investment projects that are to be carried out early on, and should not result in any competitive disadvantages for Europe and Germany with regard to the limited global production capacities for the equipment of hydrogen production plants in the coming years.
- They must enable the level of hydrogen to be supplied that is needed for the hydrogen ramp-up on the application and infrastructure side.
- For this reason, they should follow a gradual learning-oriented approach.
- They should address future connectivity from the outset, as well as options for designing certification schemes that can be applied at international level.
- They should also ensure a high degree of consistency compared to the corresponding requirements, especially with regard to electrification strategies.
- There must be a level playing field for imports from third countries. RED III should clarify that the same rules also apply to imports. To this end, fuel producers shall use national or international systems recognised as equivalent by the European Commission. If fuel producers demonstrate compliance with one of these systems, Member States may not require further evidence.

Specifically, the NWR considers the following regulations for the certification of climate-neutral hydrogen and hydrogen derivatives to be suitable:

- The NWR considers it sensible and necessary to increase the German and national legally fixed expansion targets and paths for electricity generation from renewable energies and to promote them accordingly so that the additional electricity demand needed for water electrolysis plants can be covered. The additionality of the electricity from renewable energy sources used to produce green hydrogen is decided in particular based on the expansion of renewable electricity generation achieved in the electricity system as a whole, rather than at the level of projects or specific business or procurement models.
- The standards of the implementing legal acts for the Taxonomy Regulation form a target-oriented reference, which is already legally binding, for the requirements regarding the greenhouse gas

emissions associated with the production of hydrogen and hydrogen derivatives in the process chain. They should therefore be used as a basis to certify the investments made in the first certification phase, as long as no updated legally binding requirements have been set.

- Also, in light of the additionality, which ultimately cannot be robustly determined at project level, the temporary correlation of the electricity generated to produce green hydrogen and electricity drawn from the grid should be oriented towards longer observation periods (on a monthly basis, for example) for longer transition periods.
- The current grid bottlenecks must not be disregarded when ramping up hydrogen electrolysis. Until the electricity market design is adapted accordingly, for example with regard to electricity price zones, and grid bottlenecks are reduced, the spatial correlation between renewable electricity generation and electrolysis should be designed in such a way that hydrogen production does not significantly increase electricity generation from fossil sources (due to necessary redispatch measures, for example). The reduction of grid bottlenecks must also be addressed through other instruments (promoting electrolysis plants, accelerating the expansion and prioritisation of hydrogen and electricity grid infrastructures, market systems and incentives and so on). Pragmatic solutions are needed for the early ramp-up phase in particular to strike a balance between avoiding grid bottlenecks and the ramp-up of hydrogen applications in regions without sufficient connection to hydrogen grids.
- The requirements for carbon sources used for hydrogen derivatives are unsuitable for imports from regions outside the EU ETS or comparable regulations. Regulations that are integral to climate policy, as in those that exclude double counting, but at the same time can be implemented pragmatically, have yet to be developed in this regard.
- The application of mass balancing in co-processing is imperative to implement the transformation of hydrogen-based processes in existing plants in a gradual process that is cost efficient.
- In view of the sometimes-differing timetables that different segments have in place to create the certification requirements to provide hydrogen and hydrogen derivatives and the need for comprehensive certification schemes, a fast-track regulation should be used to make these legally binding across the board in as short a time as possible. This could be done in the context of both the Gas Market Directive and the Renewable Energy Directive.
- With regard to international compatibility, the certification schemes should be designed so that the GHG load to be applied in each case is also calculated and reported in addition to the requirements set out in the 'colour spectrum' pursued in the EU for hydrogen and hydrogen derivatives.

Most of the acceleration and simplification measures considered suitable by the NWR are based on increasing the flexibility and ambition of the requirements over time as more experience is gathered:

- It would be appropriate to use a phase model for the hydrogen ramp-up and to create the corresponding certification requirements. By the end of 2030, the simplified regulations mentioned in the previous sentence should apply in a quick-start phase (for the hydrogen ramp-up and the desired learning effects). For the market penetration phase (starting in 2030), the certification requirements for new plants should be increased accordingly.
- With regard to international processes, a target model should be developed at the same time. This should be oriented towards the needs, possibilities and limits of certifying hydrogen and hydrogen derivatives in an increasingly climate-neutral energy and industrial system. It should also take into account the corresponding regulatory needs in a broader sense (CBAM and so forth).
- With regard to the necessary and potential experience drawn from the practical application of the certification requirements in particular, a comprehensive field report should be created together with the corresponding analyses of the CBAM (by 2028), which acts as the basis to adapt and standardise the certification schemes.

- In the context of the quick-start phase, consistent grandfathering regulations should be established for a period of 15 years for the investments made up to 2030.
- Sunset clauses should also only apply for periods beyond 15 years after the corresponding generation plants have been commissioned. However, these clauses should apply until no later than 2040 in view of the rather short to medium-term investments needed with regard to generation, import, infrastructure and application.

If you are interested in finding out more or have any questions, please contact:

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THE GERMAN NATIONAL HYDROGEN COUNCIL

On 10 June 2020, the German Federal Government adopted the National Hydrogen Strategy and appointed the German National Hydrogen Council. The Council consists of 26 high-ranking experts in the fields of economy, science and civil society. These experts are not part of public administration. The members of the National Hydrogen Council are experts in the fields of production, research and innovation, industrial decarbonisation, transportation and buildings/heating, infrastructure, international partnerships as well as climate and sustainability. The National Hydrogen Council is chaired by former Parliamentary State Secretary Katherina Reiche.

The task of the National Hydrogen Council is to advise and support the State Secretary's Committee for Hydrogen with proposals and recommendations for action in the implementation and further development of Germany's National Hydrogen Strategy.

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