Non-paper

Hydrogen Europe input to the EC Communication on "*Building a hydrogen economy for a climate-neutral Europe. A strategic roadmap.*"

In view of the upcoming Communication on a Hydrogen Strategy, we welcome the opportunity to provide our input at this stage of the drafting process. In this document, we take the opportunity to focus on two topics. In particular, the topic of **definitions** which is crucial. The other topic concerns the **transportation of hydrogen via pipeline** and perceived inefficiency; on this we would like to provide clarity. We thank you for your consideration and remain at your full disposal.

Hydrogen Definitions

Defining concrete definitions to recognise hydrogen produced via differing production methods is a prerequisite for kick-starting a hydrogen economy. **Rapid agreement on a comprehensive and science-based uniform EU-wide terminology is necessary** to adapt legal definitions and provide a clear taxonomy which brings with it legal certainty.

To ensure both legal and investor certainty, the **definition for "*renewable hydrogen*" needs to be aligned with the definitions outlined in article 2.1 of the renewable energy directive specific to "energy from renewable sources"**. In the main body of the draft communication, the current definition stipulates that renewable hydrogen is hydrogen produced by water electrolysis, whereby the electricity stems from renewable electricity. However, renewable hydrogen can also be produced from e.g. biogas, biomass or biogenic/organic waste (as reflected in the annex of the draft communication). It is the resource that determines whether or not it is renewable, not the technology.

With regards to the definition for "***low-carbon hydrogen***", electricity based hydrogen is highly dependent on the carbon intensity of the electricity used to produce it (e.g. 0,7 / 0,9 kg CO2/kg H2 in Sweden and Lithuania to over 40 kg CO2/kg H2 in Estonia and Poland). **We believe low carbon hydrogen should be defined as hydrogen produced from feedstock of non-renewable origin, with a greenhouse gas intensity of no more than a certain threshold**. At present, there are different threshold values appearing across different pieces of EU legislation and/or noteworthy certification schemes, specifically:

- Sustainable Finance: Taxonomy regulation → stipulates 48.3 gCO2eq/MJ which corresponds to using electricity below or equal to 100g/kWh;
- Renewable Energy Directive → GHG methodology proposed foresees that hydrogen for the transport sector would have to be produced at or below 28,231 gCO2eq /MJ;
- CertfiHy → threshold is 36.42 gCO2eq/MJ.

A clear definition, with a clear threshold is essential. As such, the hydrogen strategy should stipulate the importance of a singular overarching approach. **A fixed benchmark related to carbon content is needed** that on the one hand enables the production of low carbon hydrogen but on the other hand does not discourage the rapid uptake of renewable hydrogen at a competitive price before 2030.

On the basis of the above-mentioned adjustments, the **definition of "*clean hydrogen*" would also need to be adjusted to recognise both renewable hydrogen and low carbon hydrogen as clean forms of hydrogen**. Today, over 90% of the hydrogen produced in the European Union comes from unabated fossil fuels. One of the priorities of this strategy should

[1] 70% of the average GHG values of gasoline and diesel under the RED II (94 g CO2/MJ)

[2] 60% of SMR

be the promotion of renewable and low-carbon pathways that wean the *Union* away from unabated fossil-based production means. Scenarios that rely on only one production pathway seem unrealistic and would fall short of the required deployment at rapid scale. Also, we must always have in mind the ultimate objective which is to reach climate neutrality in 2050.

Concluding, **the adoption of a *methodology for the calculation of the life cycle greenhouse gas emissions* from renewable and low carbon hydrogen is needed** and should also be reflected in the EU-wide terminology to **allow comparability between energy sources** in terms of the emissions factor. ***CO_2 content of energy carriers and vectors will become the new currency of the energy system and the EU economic recovery***. As such, we encourage the European Commission to take into account the work undertaken as part of the CertifHy project, which can serve as a good starting point for the development of this methodology, but additionally to take into account the role of 'negative emissions'.[3] Furthermore, **a transparent mechanism for *tracking and tracing* the carbon content is required**. This would enable a clear taxonomy and prioritisation.

Hydrogen transportation via pipeline

The draft Communication refers to ***hydrogen transport becoming inefficient*** at distances around 1,500km compared to natural gas at 3,500km. In a study undertaken for the US Department of Energy, it is clearly highlighted that **at the same flow speed the pressure drop for hydrogen is lower than for natural gas and therefore the pump/compressor load for hydrogen is lower than for natural gas**. There are no losses related to the value/volume of the molecules transported.

Transmission Method	Liquid Pipeline			Gas Pipeline	
Energy Carrier	Crude Oil	Methanol	Ethanol	Nat Gas	Hydrogen
Pipe diameter (in)	36	36	36	36	36
Flow velocity (m/s)	3.7	3.9	3.9	18	18
Pressure Drop (bar/mile)	2.5	2.5	2.5	0.67	0.19
Pump / compressor load (MW/station)	29	30	30	39	18
Pipeline Operating Power (MW/1000mi)	715	757	758	464	162

Furthermore, **transportation of H2 via pipeline is a more cost effective and efficient way of transporting large volumes of renewable energy** as compared to transport via the electricity grid. This can be illustrated by the following comparison of the gas and electricity interconnectors between the United Kingdom and the Netherlands[4].

	Cable (BritNed)	Pipeline (BBL)
Capacity	1 GW	15 GW
Cost of construction	€ 500 mln	€ 500 mln
Volume (year)	8 TWh	120 TWh

[3] It has been indicated that the CertifHy project is willing to adapt according to the evolution of EU rules and definitions.

[4] Vermeulen U, Turning a hydrogen economy into reality, presentation at 28th meeting Steering committee IPHE, the Hague, 2017

Regarding the storyline developed for the realisation of hydrogen infrastructure, the draft communication suggests that connecting infrastructure internationally will take place post 2030. However, **in order to connect the optimal resource production sites in Europe (offshore wind in the North and solar and wind in the South) to demand centres, one needs to consider international connections earlier.** This becomes even more important when the storyline extends to imports of hydrogen from our neighbours e.g. North Africa and Ukraine.