DO THE EARLY STEPS OF HYDROGEN MEET WITH THE PATHWAYS OF BIOFUELS IN THE EU TRANSPORT?

Recently, and due to the EU policy initiative for "Green Deal" and the "EU Hydrogen Strategy for a Climate-neutral Europe", hydrogen is expected to play a significant role in clean energy transition, since it could replace natural gas and other fossil fuels in "hard-to-decarbonize" sectors, such as:

- energy-intensive industrial sectors (e.g. steel, chemicals) that are unable to decarbonize via direct electrification,
- road transport, especially regarding heavy duty vehicles – given the limitations and costs of current battery technologies,
- aviation, maritime and other sectors.

Renewable (green) hydrogen produced by electrolysis is strongly linked to an electricity sector that is increasingly supplied by renewable power. It could enable both long-term and large-scale storage of renewables and provide the necessary flexibility to the electricity system. However, low carbon (blue) hydrogen from gas through steam methane reformers (SMR) with carbon capture and storage or use (CCUS), although it is not carbon neutral as green hydrogen entailing GHG emissions in gas extraction and transport, seems as the most reliable and mature technological solution currently. Hydrogen production from natural gas accounts for approximately 75% of the annual global hydrogen production using around 205 bcm/year of natural gas that corresponds to 6% of global natural gas use (*IEA: The Future of Hydrogen, 2019*).

Broad use of hydrogen today faces significant obstacles, which are:

- Low-carbon hydrogen is **costly** at present; according to the recent report of IEA (*Global Hydrogen Review 2021*), the levelized cost of hydrogen produced from natural gas (SMR) ranges from $0.5 to $1.7 per kg, depending mainly on regional gas prices. Using CCUS technologies to reduce carbon emissions from hydrogen production, increases the levelized cost of production to around $1 to $2 per kg. Using renewable electricity to produce hydrogen costs $3 to $8 per kg.
- The development of hydrogen **infrastructure** is slow and distribution networks do not exist in many regions. It is worth mentioning that hydrogen prices for consumers are highly dependent on how many re-fueling/supply stations exist, how often they are used and how much hydrogen is delivered daily.
- Necessary **regulations** for a clean European hydrogen industry are currently missing. It is expected that international trade will benefit from common standards for safety of transport, injection in the grid and storage of hydrogen and from harmonized approaches for calculating the carbon emission footprint of different hydrogen supplies.

Thus, there are reasonable estimations that green hydrogen might develop faster after 2030, when production costs will fall and investments on supply infrastructure will be in operation. Increase of blue hydrogen production in the decade to 2030 sounds more promising, since SMR units are still operating in refineries and other industries. Furthermore, the planned implementation of decarbonization measures at Member State and EU level, as for instance the 'sector coupling' approach, could waive existing competition and regulatory barriers and pave the way for a wider hydrogen use in transport.

Hydrogen constitutes a low carbon fuel for the transport sector and its market penetration is provided by **RED II**, or the Renewable Energy Directive (EU) 2018/2001 aiming at promoting the use of energy from renewable sources in all sectors in the EU. RED II is the main EU instrument dealing with the promotion of energy from renewable sources and thus affecting other energy and climate legislation and policy initiatives, as announced in the EU Green Deal roadmap, and in the Commission work programme for 2021 under the title "*fit-for-55" policy package*. RED II establishes a binding Union target of a share of at least 32 % of renewable energy for 2030 (this target was 20% for 2020).

Advanced biofuels and other biofuels and biogas produced from feedstock listed in RED II, renewable liquid and gaseous transport fuels of non-biological origin (**RFNBO**), and renewable electricity in the transport sector can contribute to the formulation of a fuel mix with lower carbon emissions. This mix stimulates the decarbonization of the EU transport sector in a cost-effective manner, and improving, *inter alia*, energy diversification in the transport sector while promoting innovation, growth and jobs in the EU economy and reducing reliance on energy imports.

Each Member State should transpose RED II in the national legislation by 30.06.2021 and set an obligation on fuel suppliers to ensure that the share of renewable energy within the final consumption of energy in the transport sector will be at least 14 % by 2030 (minimum share). **Electromobility and Biofuels** are expected to constitute a substantial part of the

renewable energy in the transport sector by 2030. Biofuels should always be produced in a sustainable manner and fulfil greenhouse gas emissions saving criteria.

A few months ago, on 14.07.2021, the European Commission proposed an amendment for RED II (*"fit-for-55" policy package*) to comply with the Green Deal target of GHG emissions reduction of 55% by 2030. The **amended RED II** will have to be transposed by Member States by 31/12/2024 and it concentrates on the following key points:

- Transport Target: the quantity of renewable fuels and renewable electricity supplied to the transport sector should lead to GHG intensity reduction of the overall transport fuel mix of at least 13 % by 2030.
- Implementation approach: Member States shall establish a mechanism allowing fuel suppliers to exchange credits, including provision for electromobility credits.
- Target of advanced biofuels (Annex IX Part A): a share in the final energy supplied to the transport sector of at least 0,2 % in 2022, 0,5 % in 2025 and 2,2 % in 2030.
- Target of developed biofuels (Annex IX Part B): a share in the final energy supplied to the transport sector capped at 1,7% without exemptions.
- Food and feed biofuels with more than 50% GHG savings are considered.
- Target of RFNBO (green hydrogen is the main fuel in this category): a share in the final energy supplied to the transport sector of at least 2,6 % in 2030.
- Consideration of RFNBO energy into the Transport Target both as end fuels and feedstock (e.g. hydrogen in refineries).
- No renewable electricity (additionality) requirement for RFNBO establishing same status as e-mobility.

In addition, specific targets are proposed for aviation and maritime sectors through the following EU initiatives:

- **ReFuel EU Aviation** Sustainable Aviation Fuel (SAF) and RFNBO blending mandates: 2% in energy terms of SAF in 2025, 5% SAF (incl. 0,7% RFNBO) in 2030, 32% SAF (incl. 8% RFNBO) in 2040 and 63% SAF (incl. 28 % RFNBO) in 2050.
- **FuelEU Maritime**: GHG intensity reduction of the maritime transport fuel mix of 2% in 2025, 6% in 2030, 26% in 2040 and 75% in 2050.

Despite of the European Commission's proposal for the amendment of RED II, **the obligation to transpose and implement RED II by beginning of 2022 remains** although the large majority of Member States will certainly miss that deadline. RED II introduces a legal approach based on wholesale fuel suppliers' obligations (minimum % level or "quota") to offer low carbon fuels with mandated target of GHG emissions and implementation of national market-based instruments (ETS type) with rewarding or penalty imposition on fuel suppliers; this approach cannot comply with the simplified system of mandatory blending of fuels that was implemented by many Member States in the years until 2020 (corresponding to the term of RED). Furthermore, incentivization and obligatory marketing of standard transport fuels, specific mandates for lower GHG emissions fuels used in aviation and maritime sectors and specific provisions for oil refineries towards

producing lower carbon intensity fuels by adopting solutions of green hydrogen, co-processing, etc., are considered among the implementation options prescribed in RED II. In that sense, its transposition is a much-complicated exercise, requiring substantial consultation of national stakeholders, compared to whatever legal situation was in place until 2020.

The amended RED II introduces provisions that enforce the role of advanced biofuels and continues to support sustainable traditional biofuels, while opening the way for the use of hydrogen and other low carbon fuels in transport, especially nearing to 2030. The scenario analyses of EU Climate Target Plan (CTP) indicate hydrogen reaching a share of 0,3% in transport by 2030 and a 19,5% in 2050 (MIX scenario of the CTP). Accordingly, 1% of the heavy-duty vehicle stock is projected to run directly on hydrogen in 2030, whereas the corresponding figure for 2050 climbs to 26%. Thus, in the decade 2020-2030, since the expected growth of electric mobility may not suffice, the role of biofuels remains critical in meeting the set GHG reduction targets. In the period 2025-2030, green hydrogen will emerge, due to the set target, covering specific demand of low carbon fuels and thus competing with biofuels.

The EU industry will be called to invest in new technologies and production processes either in the area of sustainable biofuels or in hydrogen production and its market penetration. To this end, the necessary legal framework should be in place in the Member States, first on implementing the RED II and secondly, on the amendment of REDII on the basis of the process initiated with the "*fit-for-55*" package. The timing of regulatory settlement and the investment security criteria are crucial parameters that should be considered by policy makers in the context of enabling necessary investments.

EXERGIA builds on its 30-years long expertise on energy policy and planning at EU and national level to provide top notch consulting services to its clients, supporting them to navigate through the Energy Transition to a low carbon energy system and economy era. In particular, our palette of services includes, among others:

- Analysis of EU and national policy framework, including EU ETS, RED, FQD, ESR, FuelEU Maritime, ReFuelEU Aviation, and other significant EU policies, regulations and initiatives.
- Market assessment for alternative and renewable transport (ART) fuels including advanced biofuels, RCF and e-fuels (green hydrogen).
- Support for appraisal of investments on sustainable ART fuels for the road, maritime and aviation sectors.
- Technical assistance on strategy design and implementation of electromobility and e-fuels.