WindEurope answer to the European Commission roadmap on the Hydrogen strategy

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Renewable-based electrification is the most cost-effective way to reach climate neutrality by 2050. The direct use of this renewable electricity whenever is available and wherever is possible, across all sectors of the economy (especially in the easy-to-abate-sectors[1]), should be prioritised. Renewable electricity should be used to produce zero-carbon gases and fuels such as hydrogen, only where necessary, in activities which cannot reduce CO_2 emissions otherwise (e.g. the hard-to-abate sectors[2]).

As it is an energy carrier, hydrogen can have a high CO_2 intensity upstream if produced from fossil fuels such as coal, oil or natural gas. It can also come from CO_2 free sources like renewables or its CO_2 content can be reduced using Carbon Capture Usage and Storage (CCUS). Yet, only around 4% of global hydrogen supply is produced via electrolysis today[3] . In theory there is also the possibility to produce hydrogen with curtailed renewable electricity from wind farms or solar PV plants or even dedicated facilities. However, there is no business case for this yet.

The Hydrogen Strategy is an important strategy to deliver decarbonisation, especially in the hard-to-abate sectors. In line with our response to the Smart Sector Integration Strategy roadmap and our contribution to the European Commission dedicated mailbox, **WindEurope welcomes the European Commission roadmap on the Hydrogen Strategy and calls for the Strategy to:**

- **Prioritise and accelerate renewable-based electrification as the most cost-efficient way to decarbonise;**
- **Foster renewable hydrogen in the hard-to-abate sectors; and**
- **Accelerate the deployment and reinforcement of a cost-efficient energy infrastructure.**

1. Prioritise and accelerate renewable-based electrification as the most cost-efficient way to decarbonise

Europe should prioritise direct electrification using renewable electricity wherever is available and whenever is possible in the easy-to-abate sectors, as it is the most mature and cost-effective approach to reach climate neutrality:

- **Heating and cooling** could reach a 64% electrification rate by 2050[4].
- **Transport** could reach a 51% electrification rate by 2050.
- **Industrial processes** could reach an 86% electrification rate by 2050.

Yet, there are several **barriers to direct renewable-based electrification of industry, heating and transport sectors to overcome:**

- Complicated and burdensome **licencing and authorisations** of renewable energy projects;
- **Taxes, levies and tariffs in the use of electricity**: a level playing field between electricity gas and fuels is needed;
- **Energy efficiency accounting methods** are penalising electricity vs fossil fuels;
- **Lack of incentives for widespread use of heat pumps and for integrating electricity into transport** (e.g. financial incentives for new EV purchase);

[1] Power generation, light-duty vehicles, and most industrial processes.
[2] Heavy industry (cement, steel, and chemicals), heavy-duty road transport, aviation and shipping.
[3] IRENA, 2018. Hydrogen from renewable power. p. 13
[4] WindEurope (2018), Breaking New Ground. https://windeurope.org/wp-content/uploads/files/about-wind/reports/WindEurope-breaking-new-ground.pdf

- **Lack of transparency and incentives for consumers**: for instance, there is a lack of information on the availability, and accessibility of charging stations;
- **Lack of a specific sub-target for electricity** under the fuel suppliers' obligations of the Renewable Energy Directive (as compared to biofuels);
- The **framework for vehicle-to-grid services is not clear** yet; and
- Ensure a **level playing field between electricity, gases and fuels** by applying the same principles and methods for determining grid tariffs of both sectors.

2. Foster renewable hydrogen in the hard-to-abate sectors

Where direct electrification is not cost-efficient, technically viable, or sustainable, other ways to help decarbonising and reaching carbon neutrality by 2050 are needed. Indirect electrification with renewables should be used only where necessary, like in the hard-to-abate sectors of the economy:

- **Heavy industrial processes**: Substituting the fossil gas-based hydrogen with renewable hydrogen could significantly reduce CO_2 emissions in industry (e.g. chemistry, steel and refineries).
- **Heavy-duty transport**: a significant part of heavy trucks could run on hydrogen by 2050.
- **Shipping and aviation**: Direct electrification would remain marginal with less than 5% for both sectors[5].

Renewable hydrogen production can be a source of demand flexibility. It could help to smooth ramp rates and reduce intra-day variability of the wind supply. However, its cost structure will limit its deployment as demand flexibility can be enabled at a lower cost from other sources (e.g. industrial demand, battery systems). It could be more interesting to provide a source of seasonal storage.

After converting electricity to hydrogen, shipping it and storing it, then converting it back to electricity in a fuel cell, the delivered energy can be below 30% of what was in the initial electricity input. Therefore, **using electricity directly is more efficient than converting it into other energy carriers. Indirect electrification, besides being intrinsically more expensive, would require more renewable energy capacities than direct electrification**.

While renewable hydrogen is currently expensive and its costs structure highly depend on specific projects (size, location, price of electricity), technologies for direct electrification are already available and their deployment should be accelerated to significantly curve GHG emissions already by 2030.

Barriers to indirect electrification, especially to renewable hydrogen, also need to be tackled:

- **Taxonomy:** a clear and consistent European definition for renewable hydrogen is needed;
- **Energy Taxation**: the EC should review the definition of hydrogen in the revised taxation directive to tackle renewable hydrogen. Nowadays, electricity is taxed when released for consumption it is not clear whether electricity is released for consumption when supplied to storage facilities. This opens the door to double taxation of electricity that is stored and re-sold. To avoid double taxation of storage, the revised directive should state that electricity supplied to storage facilities electrolysers cannot be considered as end-consumption;
- **Scale and cost reduction for electrolysers:** Producing hydrogen with electrolysers costs roughly double than with fossil-fuels[6]. The use of electricity represents 65-80% of the operational costs of electrolysers (IEA);
- Some **infrastructure developments** could be required depending on the end use of renewable hydrogen. Renewable hydrogen used as feedstock for industry is a high value gas that is needed in pure form. Today, most of it is compressed and transported by trucks or produced onsite at the industrial location. Infrastructure for transporting renewable hydrogen from locations with high

[5] Ibid
[6] 21 IEA, 2019. The Future of hydrogen. p.55

wind concentration (and grid congestions) to industrial clusters is needed**. So, policymakers should first develop renewable hydrogen on a local basis in Europe to serve the existing demand for hydrogen which already has its local infrastructure**; and

- **Lack of hydrogen refuelling stations** across Europe both for heavy-duty transport, public transport and passenger vehicles.

Policymakers should support the development for the commercialisation of renewables hydrogen by:

- **Ensuring a clear, consistent, and transparent European definition** for renewable hydrogen, and the different sources and routes to produce renewable hydrogen and renewable hydrogen derivatives, is missing in the current legislations. We are calling for **electrolysed renewable hydrogen powered by 100% zero-carbon renewable electricity to be the reference baseline**;
- **Ensuring a clear distinction between Guarantees of Origins (GO) for renewable energy** (renewable electricity and renewable hydrogen) and, where applicable GOs for non-renewable energies. GOs for renewable energy play an important role to stimulate final customer's demand for renewable energy. Renewable energy GOs should only be issued for energies that are 100% renewable-based;
- **Targeting the development and upscaling of electrolyser** technologies through industrial policies for securing technology leadership and reducing the cost of renewable hydrogen production;
- **Supporting the uptake of a robust European electrolyser industry and the creation of a knowledge base by continuing Research & Innovation on system integration** and giving incentives for research, test, and demonstration, of large-scale electrolysers and off-grid connected renewables;
- **Ensure grid tariffs are cost-reflective** for power-to-gas injected to the gas network, and for the input electricity when power-to-x infrastructure provides flexibility to the energy system;
- **Resoling the pending delegated act under Article 27 of the Renewable Energy Directive**. It defines what renewable energy or renewable sources are but is not clear whether other energy carriers produced with such renewable energy or sources can be referred to as renewables when used in other sectors (e.g. when electrolysers are connected to a power grid with a varied energy mix and co-located with other sources of power generation to produce hydrogen). This is critical to provide clarity to investors and to prevent conflicting definitions across schemes; and
- **Ensuring power-to-X remains a competitive activity**: it has to be developed by market operators, in order to avoid distortions and inefficient outcomes. TSOs and DSOs should not be involved in competitive activities like power-to-gas, as they will have a potential conflict of interest when planning, granting access and operating / dispatching infrastructures.

3. Accelerate the deployment and reinforcement of a cost-efficient energy infrastructure

To reach net-zero emission by 2050, Europe will need a highly flexible energy system with very large shares of wind and solar energy as foreseen by the EC 2050 Long Term Strategy[7]. It shows a five-fold increase from today's wind power capacity, from 192 GW to 1,200 GW by 2050. **Accelerating the deployment of smart and stronger electricity grid infrastructure is the cornerstone for a successful renewable hydrogen strategy.**

Increasing the electricity share in Europe's energy mix would also require larger and stronger grids which will allow faster and cheaper energy sector integration. Thus, **optimising the existing power**

[7] European Commission, In-depth analysis in support of the Commission Communication COM(2018) 773, *A Clean Planet for all - A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy*, November 2018.

grid infrastructure should be the priority together with further development of this grid. In that regard, TSOs should have greater incentives to save on OPEX by applying optimisation technologies. The upcoming Trans-European Networks for Energy (TEN-E) Regulation revision in 2020 should also be aligned towards a renewables-based electrification and prioritise electricity infrastructure, such as an interconnected offshore grid and gives sustainability criteria for the selection of PCIs a more important weighting.

According to various stakeholders[8], gas demand has been systematically overestimated. So, the **extension of the gas infrastructure to accommodate and transport renewable gases and renewable hydrogen should be carefully assessed by the EC**. In some cases, it might not even be necessary to connect power-to-gas facilities to the grid. This is the case for on-site production of renewable hydrogen. It could be consumed locally on the territory of an industrial customer and thus a grid connection becomes obsolete.

Repurposing and re-using the existing gas infrastructure for the transport of renewable hydrogen and other renewable gases but also as a storage medium could unlock a cost-efficient pathway towards the upgrading of renewable gases' role in the energy system. But it could also lead to stranded assets if not done carefully.

Blending hydrogen with natural gas into the gas network should be approached with caution, making sure that hydrogen does not end up feeding final uses for which other more effective and efficient decarbonisation options already exist and avoiding a lock-in into technologies using gaseous fuels with limited decarbonisation potential.

Furthermore, **Europe should carefully assess the need for extensive retrofitting of the existing gas infrastructure**. A large demand for renewable hydrogen is still uncertain as are locations where it will be produced and used. There is no need of such an infrastructure today. The first deployment of renewable hydrogen projects should start from solutions that see generation as close as possible to the consumption point.

[8] http://www.caneurope.org/docman/climate-energy-targets/3580-2020-can-gas-pp/file
https://www.e3g.org/docs/E3G_Trends_EU_Gas_Demand_June2015_Final_110615.pdf
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