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# Fit-for-55: Green and Low-Carbon Hydrogen at the Core of Decarbonization in the EU

Stratas Advisors

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The European Commission's (EC) proposed initiatives under the 'Fit-for-55' legislative package could have a major impact on the uptake of green and low-carbon hydrogen in Europe, significantly contributing to the targets outlined in the EU Hydrogen Strategy. Stratas Advisors has analyzed the EU's progress since the adoption of the Strategy, and has assessed whether the existing efforts will suffice to meet key decarbonization targets.

## Progress Towards the EU's Hydrogen Targets

Since Stratas Advisors' latest assessment in [November 2020](#), new announced electrolyzer capacities have increased by 0.6 GW for projects starting operations before 2024, but the greatest progress is attributable to the period 2025-2030, when a total installed capacity of over 27 GW can be expected.

The table below provides an overview of installed electrolyzer capacity announcements as of September 2021, compared against the targets set out by the EU Hydrogen Strategy.

### Expected Capacity Additions Towards EU Targets

EU Target	Planned Projects as of Sep. 2021	Share of Planned Projects as of Sep. 2021 v. EU target
6 GW by 2024	2.7 GW	45 %
40 GW by 2030	27.3 GW	68 %

Source: *Stratas Advisors, 2021*

With low-carbon hydrogen becoming an important element for the realization of the EU Green Deal, the newly released 'Fit-for-55' legislative package includes hydrogen-related mandates that could help attain the initial targets set out in the Hydrogen Strategy.

### Hydrogen-related Targets under the 'Fit-for-55' Legislative Package

Hydrogen-related Targets	2030	2035	2040	2045	2050	Post-2050
Share of RFNBOs <sup>1</sup> of total hydrogen used in the industry sector (RED II <sup>2</sup> )	50 %	-	-	-	-	-
Carbon intensity reduction target for transport fuel suppliers (RES-T <sup>3</sup> )	13 %					
RFNBO blending sub-mandate for all transport fuels (RES-T)	2.6 vol%	-	-	-	-	-
RFNBO blending sub-mandate for aviation fuels (ReFuelEU Aviation)	-	0.7 vol%	5 vol%	8 vol%	11 vol%	28 vol%
Carbon intensity reduction targets in shipping (FuelEU Maritime)	6 %	13 %	26 %	59 %	75 %	-
CO2 emissions performance standards for new LDVs <sup>4</sup> (Regulation 2019/631)	55% for new passenger cars and 50% for new vans.	100% for all new LDVs				
Infrastructure (hydrogen refueling stations) (AFID <sup>5</sup> )	Every 150 km along the TEN-T network and urban nodes.					

Notes:

(1) RED II – Renewable Energy Directive (Directive 2018/2001/EU, recast)

(2) RFNBOs – Renewable Fuels of Non-Biological Origin\*

(3) RES-T – Renewable energy sources in transport

(4) LDVs – Light-duty vehicles

(5) AFID – Alternative Fuels Infrastructure Directive (Directive 2014/94/EU)

\* Renewable Fuels of Non-Biological Origin (RFNBOs) is the term adopted by the EC to refer to hydrogen-derived e-fuels produced from renewable power.

Source: *Stratas Advisors based on the 'Fit-for-55' package, 2021*

### More Targeted Policies are Needed to Overcome Key Market Barriers

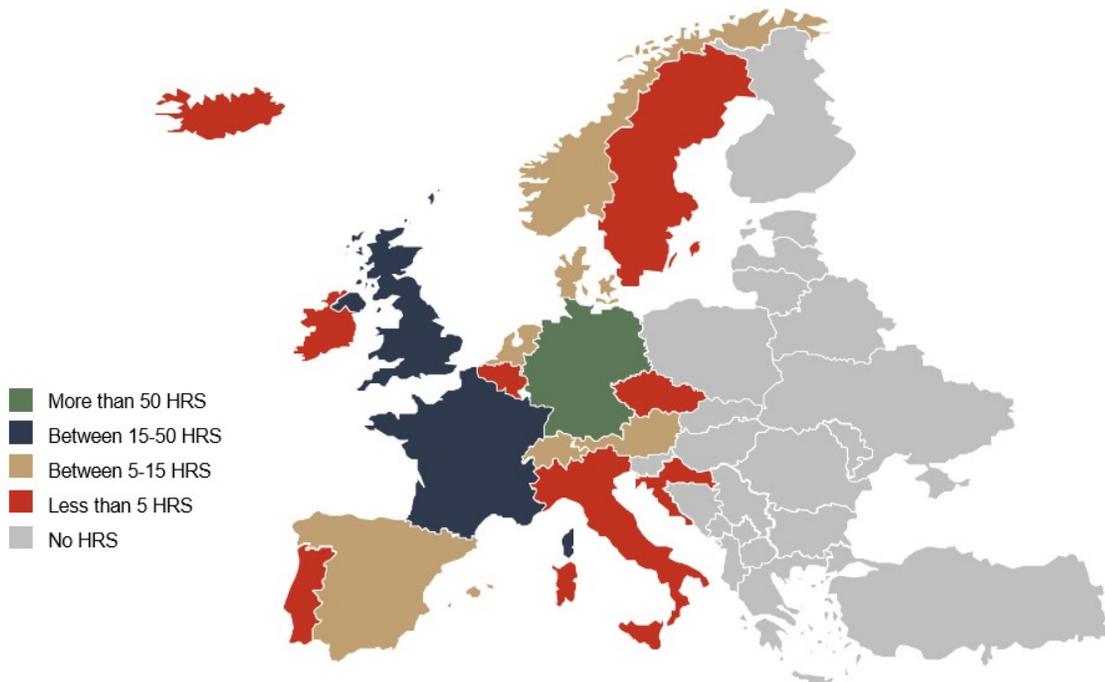
If approved and officially adopted, the hydrogen-related targets proposed under the 'Fit-for-55' package could pose significant challenges for a great part of the EU Member States (MS). Stratas Advisors has identified the main trends and variables that may hinder target realization throughout the Union, including regional disparities leading to heterogeneous outcomes across EU MS in the short-to-medium term. After assessing the feasibility of the proposed targets, we have outlined some key takeaways:

- Major investments need to be diverted towards hydrogen refueling infrastructure, since only two EU MS currently have more than 40 stations across their territory. In order to meet the infrastructure targets under the AFID revision

proposal, it would be necessary to build at least 800 new stations by 2030.

- Apart from certain markets (e.g. Germany) where extensive filling infrastructure and fiscal incentives are allowing for a rapid rollout of FCEVs, the contribution of FCEVs to the new LDV registration target will remain marginal compared to battery-electric vehicles (BEVs), which are expected to play the most significant role.
- Due to the relatively low infrastructure investments required for hydrogen provision in industry, the largest hydrogen demand is likely to remain linked to the industrial sector, particularly in markets with large populations and well-functioning industrial hubs. With new capacity additions, green and blue hydrogen, as well as hydrogen-derived synthetic fuels, have the potential to supply a large part of demand for refining and non-refining processes.

### Hydrogen Filling Infrastructure in Europe



Source: *Stratas Advisors, 2021*

In this respect, targeted policy tools can be the main driver for green and low-carbon hydrogen uptake in the short-to-medium term, as most market barriers are likely to be overcome only if an integrated policy approach covering the entire hydrogen value chain is adopted. In addition to EU funding destined for innovative pilot projects, Stratas Advisors has identified a series of policies which are expected to be adopted and which will have a significant impact on industry once implemented:

- Tax exemptions for electrolyzers and feed-in premiums for variable renewable energy (VRE) assets would draw down costs and lead to improvements in electrolyzer technology;
- More stringent emission reduction targets and renewable energy content mandates will draw investments in clean technologies including zero and low-carbon hydrogen, where producers will have an incentive to comply; and
- To accelerate FCEV penetration, adopting CAPEX subsidies and harmonizing technical guidelines for hydrogen refueling stations can help build a robust filling network, which accompanied by fleet mandates is likely to stimulate supply and demand flows.

### **Stratas Advisors' Views**

Since the cost of green hydrogen is directly proportional to electrolyzer load factors, Stratas Advisors foresees a gradual reduction in prices as load factors increase with growing capacities and improving technologies. The expansion of lower-cost VREs is presumed to become a major enabler in this cost decrease due to a higher generation of excess electricity that would otherwise be curtailed.

In end uses, Stratas Advisors believes that increased carbon prices could serve as a major stimulus for the industrial uptake of green and low-carbon hydrogen, which could be accelerated also through binding renewable content and emission reduction mandates. To avoid asymmetries in the market for FCEVs, recharging and distribution infrastructure investments need to be supported by additional push and pull instruments facilitating FCEV uptake as well.

Major developments are expected to take place in select regions which have either easy access to low-cost renewables or have already achieved some progress in terms of establishing FCEV fleets and infrastructure when compared with other EU MS. In the longer term, large-scale hydrogen projects are likely to be developed also in lower-income MS following the upcoming adoption of hydrogen strategies and roadmaps, along with financial assistance from EU institutions.

The 'Fit-for-55' legislative package has the potential to boost hydrogen investments and production capacity in line with the targets set out in the EU Hydrogen Strategy, but it is unrealistic to believe that the short-term targets will be reached through the deployment of green hydrogen alone. In fact, Stratas Advisors expects that low-carbon hydrogen with CCUS or through nuclear power has the potential to highly contribute to the targets established for 2030, as it can significantly substitute fossil-based hydrogen and reduce CO<sub>2</sub> emissions until green hydrogen becomes an economically viable option.

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