

Electricity Procurement Strategy and Levelized Cost of Hydrogen: Evidence from Austria's >90 % Renewable Grid

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Extended Abstract

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Abstract Summary

Austria provides a distinct test case for renewable hydrogen economics in the EU. According to official Eurostat results, Austria reached a 90.07 % share of renewable energy in gross electricity consumption in 2024, the highest among EU member states and the first value above 90 % recorded. Under Delegated Regulation (EU) 2023/1184, this enables grid-drawn electricity to count as renewable for production of renewable fuel of non-biological origin (RFNBO) in bidding zones whose average renewable share exceeded 90 % in the preceding calendar year, within a defined annual operating-hour limit.

Within the EU Hydrogen Strategy, renewable and low-carbon fuels, including hydrogen, are identified as essentials on the path to climate neutrality by 2050, especially for decarbonising hard-to-abate industrial sectors, as well as the transport sector. The Renewable Energy Directive (RED III) mandates that 42 % of industrial hydrogen consumption must qualify as an RFNBO by 2030, rising to 60 % by 2035, creating binding demand for compliant production at scale. Yet low-emissions hydrogen accounted for less than 1 % of the ~ 100 Mt produced globally in 2024. Electricity supply strategy governs procurement cost and electrolyser utilisation, and through utilisation, the balance between capital and operating costs in the levelized cost of hydrogen (LCOH).

For most EU producers, RFNBO compliance requires a dedicated power purchase agreement (PPA) covering additionality, temporal, and geographical correlation requirements under Arts. 5-7 of Delegated Regulation (EU) 2023/1184. Austria's 2024 electricity data remove that constraint, enabling market-based grid procurement as a legitimate alternative. This creates a comparison that has not been quantitatively resolved: whether market-based grid procurement reduces the LCOH relative to PPA-based supply — as a combination of a fixed baseload contract combined with a PV overlay — or primarily restructures the trade-off between electricity price, electrolyser utilisation and RFNBO compliance.