IMPACT OF REDII POLICIES ON THE OPERATION OF ELECTROLYSERS FOR PRODUCTION OF SUBSIDIZED RFNBO HYDROGEN

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ABSTRACT

The REFHYNE project is currently operating a 10 MW polymer electrolyte membrane (PEM) electrolyser for the supply of "green" hydrogen to Shell Energy and Chemicals Park Rheinland. There, hydrogen is used in the production of fuels to reduce emissions from the fossil-based transportation sector.

The RED II (Renewable Energy Directive) Delegated Acts[1] serve as essential components of the regulatory framework for implementing hydrogen as part of the European climate and environmental goals towards 2030, 2040 and 2050. They aim e.g. to achieve increased use of energy from renewable sources, fostering better energy system integration, Specifically, they outline detailed rules for the production of renewable fuels of non-biological origin (RFNBOs). One of the relevant production routes includes hydrogen from electrolysis, where there are temporal and geographical correlation criteria. The temporal correlation means that renewable electricity generation and hydrogen production coincide temporally. Until December 31, 2029, this means the same month. After that date, it must be within the same hour.

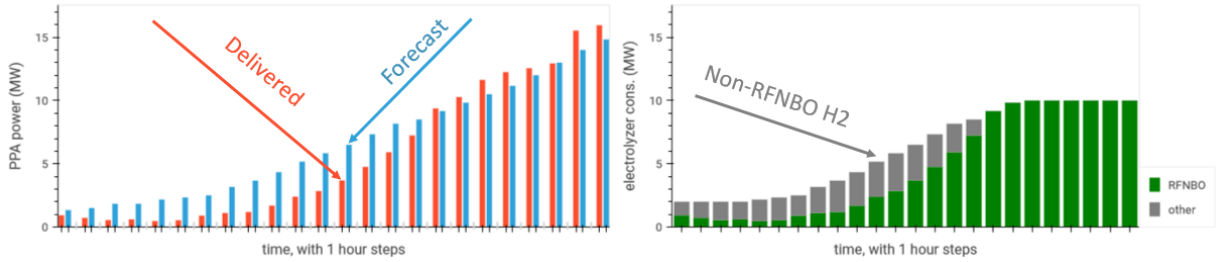

Figure 1: Difference in forecasted and delivered power from a renewable PPA (left), and a corresponding production profile of an electrolyser, producing both subsidized and un-subsidized hydrogen for RFNBO (right).

This paper analyses the impact of the different temporal correlation (hourly/monthly) on the operating strategies of electrolysers, and how this also affects the sourcing strategies for renewable energy. Going from monthly to hourly correlation leads to an increased production of non-subsidized hydrogen, due to the more difficult timing and matching of hydrogen production and

renewable electricity. Different PPA and their impact is also analyzed. Large PPAs leads to higher share of subsidized hydrogen, they may however suffer from surplus renewable electricity. In each site and business case will require tailored design and renewable electricity sourcing.

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