

How, Where And When Can Green Electrolytic Hydrogen Become Cost-competitive ?

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In the short term, quite some expectations are put worldwide on the contribution of green hydrogen, i.e. hydrogen produced with renewable electricity from water electrolysis, to reach the decarbonisation objectives. Although there is not a lack of ideas and initiatives on different power and volume scales, an often cited side-comment (or excuse) is that green hydrogen is still too expensive. In this contribution, we will demonstrate that this is not necessarily the case if we take as a fair point of comparison the principle of fossil parity. The latter means that the cost of green hydrogen is either equal to the cost (or price) of fossil SMR-based hydrogen (typically for industrial use), or that its cost as a fuel is similar to the cost of fossil-based fuels (e.g. in €/km for mobility applications).

The most straightforward way to arrive at such fossil parity is to encourage H₂ consumers also to become their own H₂ producers. In that way, they can use the in-house produced hydrogen directly at its intrinsic production cost, rather than at a (volatile) market price. Indeed, one of the major advantages of green electrolytic hydrogen is that it can in many cases be produced in-house, at a scale which corresponds to the consumer's own needs. The only additional requirement is that the green hydrogen consumer also becomes owner of its own renewable electricity production capacity. This then allows to guarantee a stable electricity cost (and hence also green H₂ cost), directly related to the one-shot investment cost of the renewable electricity device, independent of any market fluctuations. If these 2 conditions are met, it can be easily demonstrated that for specific market segments with an upfront guaranteed hydrogen demand, fossil parity is already reached today at the scale of a few MW.