

Hydrogen for Grid Support

Tyler Ruggles, LIFTE H2

Hydrogen is an energy carrier that could in the future link together multiple energy sectors and facilitate the high penetration of variable wind and solar generation into low-carbon emissions power systems. Among other processes, hydrogen can be produced from water electrolysis that produces hydrogen gas. Certain electrolyzers can act as controllable, flexible loads in electricity systems, which allows these electrolyzers to ramp their power consumption up and down in step with available wind and solar power or when the grid is otherwise constrained. Research has shown that adding flexible hydrogen production to models of electricity systems dominated by wind and solar power could decrease the levelized cost of energy substantially by allowing more full utilization of wind and solar assets.

Depending on how hydrogen is incorporated into future energy systems, there could be a variety of benefits and challenges. Hydrogen could be used as a long-duration energy storage technology to store energy when the sun is shining and the wind is blowing for use later in the week, month, or even year and possibly reduce the needed generation capacity in future electricity systems. A robust network of hydrogen pipelines may be able to abate increases in electricity transmission capacity as Europe continues to build out its offshore wind generation in the North Sea. These benefits may be enabled or stifled by our global ability to improve relevant technologies, reduce the capital costs of electrolyzers, and improve hydrogen storage and transportation technologies. Non-technical roadblocks are also present. For example, in many power systems, grid-tied electrolyzers are not allowed access to real-time electricity prices which would enable them to best act as flexible loads that provide grid services. Additionally, installing on-site electrolyzers can force businesses to upgrade their grid interconnection, which can take years in certain regions. Hydrogen may have a very large role to play in supporting decarbonized grids and realizing the future low-carbon energy transition if technological progress continues and technical and non-technical hurdles can be overcome.

Bio: <https://thruggles.com/>