

# Overview of Efforts to Overcome the Challenges of Renewable Energy Storage in the United Kingdom

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The United Kingdom (UK) like all other developed economies aims to achieve net zero carbon emissions by 2050 [1]. The key to achieving this target will be a large-scale electrification of the energy system. Thus, a steady growth of renewable energy generation by sources such as wind and solar power is necessary to satisfy the anticipated demand for electricity, while reducing greenhouse emissions. Reliable and low-cost energy storage technologies are then essential to secure supply during periods of low wind and solar irradiation. The UK government has funded several demonstration projects for long duration energy storage that range from flow batteries, pumped storage (thermal and mechanical), ammonia production and cracking, metal (alloy) halides to novel liquid carriers of hydrogen [2]. Additionally, the UK government has prioritised hydrogen and other net negative emissions technologies (e.g. ammonia and carbon capture usage and storage) to reduce CO<sub>2</sub> emissions by decarbonising “hard to electrify” sectors such agriculture, high temperature processing as well as marine and air transport [1]. To overcome that challenge, current research is focused on discovering metal (alloy) hydride materials for hydrogen storage, as well as catalysts for electrochemical production of green hydrogen as well as for the synthesis and cracking of green ammonia. This talk thus will cover selected recent highlights of the afore-mentioned research efforts.

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[1] UK Government, Net Zero Strategy: Build Back Greener, October 2021. Available at: <https://www.gov.uk/government/publications/net-zero-strategy#full-publication-update-history>.

[2] UK Department for Business, Energy & Industrial Strategy, 2022. Available at: <https://iuk.ktn-uk.org/wp-content/uploads/2022/07/Longer-Duration-Energy-Storage-and-Storage-at-Scale-Showcase-.pdf>.