Roadmap for the development of electrofuels for the decarbonisation of heat and transport

SEAI National Energy Research, Development & Demonstration Funding Programme

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Keywords
Decarbonisation, electrofuels, hydrogen, energy security

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This report was prepared by University of Galway and is based on research carried out from March 2020 to June 2023.

This project has been co-funded by the Sustainable Energy Authority of Ireland and Gas Networks Ireland under the SEAI Research, Development & Demonstration Funding Programme 2019, Grant number 19/RDD/445.

Abstract

The Irish Government's Hydrogen Strategy, published in July 2023, set out the government perspective on the role for renewable hydrogen in Ireland's energy system. However, uncertainty persists around future scales and timelines of what is a novel industry in Ireland. The aim of this research, therefore, is to examine the role of hydrogen and electrofuels (fuels derived from electricity) in the decarbonisation of Ireland's energy system and provide useful insights to guide policymakers in the area.

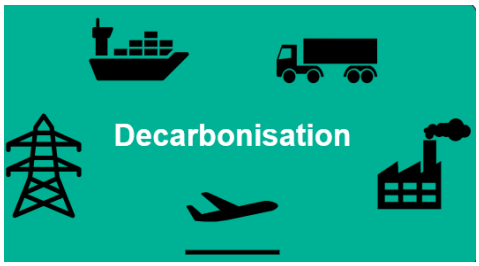
Research Outcomes

The role of hydrogen in a decarbonised energy system is secondary to renewables, energy efficiency, and electrification, due to its' low efficiency, and higher cost. However, hydrogen and other electrofuels are crucial in decarbonising harder-to-abate sectors such as heavy transport (trucking, shipping, and aviation), industry, and backup power generation for when wind is low. By 2050, hydrogen consumption in these sectors could account for 20% of Ireland's energy demand.

Key to hydrogen's role is that it can act as large-scale energy storage, contributing to energy security and reducing reliance on fossil fuel imports. Hydrogen produced at times of high wind output can be stored for months or even years. One underground hydrogen storage cavern could store over 100 GWh of energy, enough to meet 40% of Ireland's electricity demand for 24 hours.

Due to its vast wind resource, Ireland has the potential to produce more energy than it needs in the long-term and could export hydrogen to the UK and Europe.

The first Irish hydrogen projects developed in the coming years are likely to be expensive and logistically challenging. Government ambition and support akin to Ardnacrusha power station in the 1920's and wind power in the 2000's is required to develop the renewable hydrogen industry and lower costs for consumers.



Recommendations

The hydrogen industry can enable deep decarbonisation of the energy system in addition to renewables, energy efficiency and electrification. It also represents an opportunity for high value job creation and regional development in line with the Just Transition. Work must begin now to support early projects to help lower costs, whilst also planning for a rapid scale-up of the significant infrastructure required for this industry in the coming decades.