

Large scale offshore hydrogen storage to enable Ireland's Energy Transition

Introduction

There is growing global momentum in the transition from fossil fuels to renewable sources of energy. The need to lessen the adverse effects of climate change has generated strong political resolve combined with increasing investor and public pressure for action to be taken.

Achieving Ireland's Energy Transition will require fit for purpose energy infrastructure and the development and adoption of innovative new technology and solutions. Fortunately, Ireland's vast offshore wind energy resource can be harnessed to produce green hydrogen that will satisfy and stabilise domestic energy needs and provide a unique export opportunity for green hydrogen to the continent.

The wonder of hydrogen is its simplicity. It is 'simple to make & simple to use'. Converting renewable offshore wind energy to hydrogen allows Ireland to bring 'clean, green, and unseen' energy from Ireland to every corner of the globe. The only by-product is water! And this is not new, we had a 50% blend of hydrogen in our 'Town Gas' before the production of gas from offshore fields such as Kinsale Head & Corrib.

The Need for Energy Storage

There is a natural lack of consistency and resilience in wholly renewable energy systems. On stormy days, natural surges of wind power must be curtailed due to lack of grid capacity whilst on calm days with little to no wind, a heavy dependence is put on alternative back-up fossil fuel generation. Fundamentally, intermittent wind destabilises power grids without appropriate energy management. Due to infrastructure limitations around grid flexibility and existing forms of energy storage such as pumped hydro and/or short-life battery storage, energy systems struggle to balance the grid.

Furthermore, these challenges are exacerbated by the exponential growth in renewable energy investment. Large scale rapid expansion of offshore wind power is happening - however, a lack of matching energy storage capacity to manage and smooth out intermittency will limit the ability to economically add further wind capacity and thus deliver the Energy Transition.

There is a need for sustainable energy system resilience - today and tomorrow.

dCarbonX has the solution

dCarbonX is an asset-focused GeoEnergy company established to solve these problems through baseload subsurface solutions. In strategic partnerships, our business is to develop offshore subsurface assets for the storage of green hydrogen and the sequestration of CO₂. In effect, dCarbonX enables the Energy Transition by providing offshore subsurface energy storage which can help bring resilience and reliability to investments in renewables and hydrogen.

Offshore Green Hydrogen Storage

dCarbonX recently formed a partnership with Irish state-owned national power utility ESB to develop large scale hydrogen storage at three project areas connected to the country's strategic electrical hub infrastructure. These project areas are:

- Green Atlantic @Moneypoint - Shannon Cluster
- Green Hydrogen Valley @Poolbeg - Dublin Cluster
- Green Hydrogen @Kinsale - Cork Cluster

Exploring the Energy Transition

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Large scale offshore energy storage is not new to Ireland as demonstrated by the successful development and operation of the 2.3 TWh SW Kinsale seasonal natural gas storage system from 2001-2016. This provided resilient and reliable peak network support for the Irish natural gas market and transmission system for many years.

dCarbonX has identified various offshore subsurface geological features based on its experience and current analysis which could host up to 11 TWh of green hydrogen/hydrogen carrier storage. These geological features include:

- Salt deposits
- Depleted gas fields

Salt Deposits

Salt (halite) deposits occur offshore Ireland most notably in the Irish Sea but also off the west coast. Salt caverns are excavated in thick salt layers by using water to leach the salt, a process known as solution mining, and the resulting cavern is then used for storing both gases and liquids. Salt caverns have been used to store hydrogen for many years in the US and UK and so this technology is well understood. This approach is the focus of our storage development plans for Green Hydrogen Valley @Poolbeg.

Depleted Gas Fields

Depleted gas fields are obvious places to store gas as they are proven to be sealed over geological timescales. Data collected during the production of gas from the field can be reused in the hydrogen storage feasibility assessment. Whilst the chemistry of hydrogen and hydrogen carriers, such as ammonia, is distinct from natural gas (methane), various common technical solutions can be deployed according to subsurface reservoir conditions. This approach is the focus of our storage development plans for the Green Hydrogen @Kinsale project – which aims to repurpose the depleted Kinsale Head gas field.

Summary

dCarbonX is focused on green hydrogen energy storage offshore Ireland with our partner ESB in three project areas off the south, east, and west coasts which are close to key national electrical grid infrastructure. The development of these planned large scale offshore subsurface storage projects will help eliminate wind energy curtailment, promote deep decarbonisation through green hydrogen and facilitate new energy export opportunities to markets such as mainland Europe. Without the deployment of large scale underground hydrogen storage capacity, the full potential of Ireland's vast offshore wind resources cannot be fully exploited for the benefit of Irish consumers, industry and the environment.

For further information about dCarbonX Limited, our latest project news, corporate updates and the biographies of co-founders Tony O'Reilly (CEO), Dr John O'Sullivan (COO) and Dr Angus McCoss (CTO) please refer to our website www.dcarbonx.com

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