Interreg North-West Europe GenComm

EUROPEAN UNION

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H2go News

June 2018

GenComm's White Paper unveils vision for Smart Renewable Hydrogen

The GenComm project has launched the first of its White Papers on Smart Hydrogen. Officially launched at NUI Galway by the Irish Minister for Climate Action, Communications and the Environment, Denis Naughten TD, the €9.39 million energy sustainability project unveiled its vision for smart hydrogen.

Hydrogen (H2) can be used as a renewable energy storage medium and an energy carrier. This allows the reduction of wind and solar intermittency and transported and enables the energy to be used elsewhere as and when required. In transport, hydrogen can reduce emissions and improve air quality at the same time. In heating hydrogen can be used as a low carbon fuel source replacing fossil fuels. Today however, 95% of all hydrogen is produced from fossil resources. GenComm will produce Smart H2, a renewable and low-emission alternative to fossil fuels, with low impact on natural resources throughout its entire life cycle.

Dr Rory Monaghan, one of the project partners responsible for the 'long term effects' of the project, from the College of Engineering and Informatics and Ryan Institute for Marine, Environmental and Energy Research at National University of Ireland Galway, said: "The White Paper aims to inform stakeholders in the energy industry and community energy sector about the potential for hydrogen to address issues of intermittency, curtailment, profitability and energy security in renewable energy networks. Hydrogen is increasingly viewed as a practical way to store electricity and give it new uses, such as in transportation."

The main output of the project is a hydrogen-based energy model. NUI Galway will adapt this model to a create an online tool to support Smart H2 investment decisions, allowing communities to plan and implement their own hydrogen-based energy systems.

Paul McCormack, GenComm Programme Manager and Innovation Manager at Belfast Met, added: "The use of SMART H2 as an energy carrier can mitigate the sustainability challenges by helping match energy demand with renewables energy supply, while enabling flexibility between the mixed uses of renewable energy."

From left: John Quinn, Photonomi; Dr Rory Monaghan, NUIG; Cormac Walsh, Energy Co-Ops Ireland and Paul McCormack, Belfast Met

Irish Minister test drives hydrogen-fuelled car

Denis Naughten, Minister for Climate Action, Communications and the Environment in Ireland recently took one of Ireland's only hydrogen-fuelled cars, a Toyota Mirai, for a test drive with Photonomi Group's CEO, John Quinn. This was the first time a Government Minister from Ireland was behind the wheel of a hydrogen car, where the fuel source literally falls on our head as rain. The test drive was organised as a result of Minister Naughten's launch of GenComm's first White Paper on Smart H2, which took place at GenComm's recent Open meeting at NUI Galway, where industry and policy-makers were gathered to hear more about the renewable energy project.

The hydrogen electric vehicle has a range of between 400-500km and is already on the Toyota forecourts in California, Germany and the UK. The quietness of the vehicle and how easy it is to drive were all very obvious, but it is the ability to directly replace petrol and diesel cars that makes it the most attractive.

The Irish Minister made a series of videos on social media to mark the event.

SMARTH2 – GenComm's vision for commercialising H2

SMARTH2 aims to resolve grid constrained, renewable energy deployment issues, greening the fuelling infrastructure, creating and demonstrating the appropriate environments and setup required to utilise the excess/curtailed wind energy, transforming and storing it as a Hydrogen Gas and then transporting this gas to central hubs, which is used to fuel Zero emission vehicles including public and goods transport.

SMARTH2 will develop H2 hubs and couple the renewable energy and transport sectors resulting in increased renewable energy generation and productivity and directly reducing GHG gases within the NWE. In order to achieve successful energy transition to a sustainable North West Europe, it is critical to achieve full commercial opportunity for renewable energy. However, it is only by using energy storage technologies at a large scale that this can be attained. The use of SMART H2 (Hydrogen produced from renewable energy sources) is the first stepping stone in order to achieve any meaningful sustainable energy deployment and use of that energy within the transport sector, thereby reducing CO2 emission at a large scale potential. Therefore, the main outputs of the project will deliver four Hydrogen major Hubs; this includes four Hydrogen fuelling stations located in Germany for the distribution of Goods and Belfast, Dublin and Cork Public Transport hubs. In each City, the project will deliver 3 **SMARTH2** fuelled double decker buses.

Our **SmartH2** project will ensure the fuel is delivered on time and in the right quantities; a key deliverable for any customer will be that the fuel is available when and where they need it. This will improve customer confidence and lead to acceptance and growth of this sector.

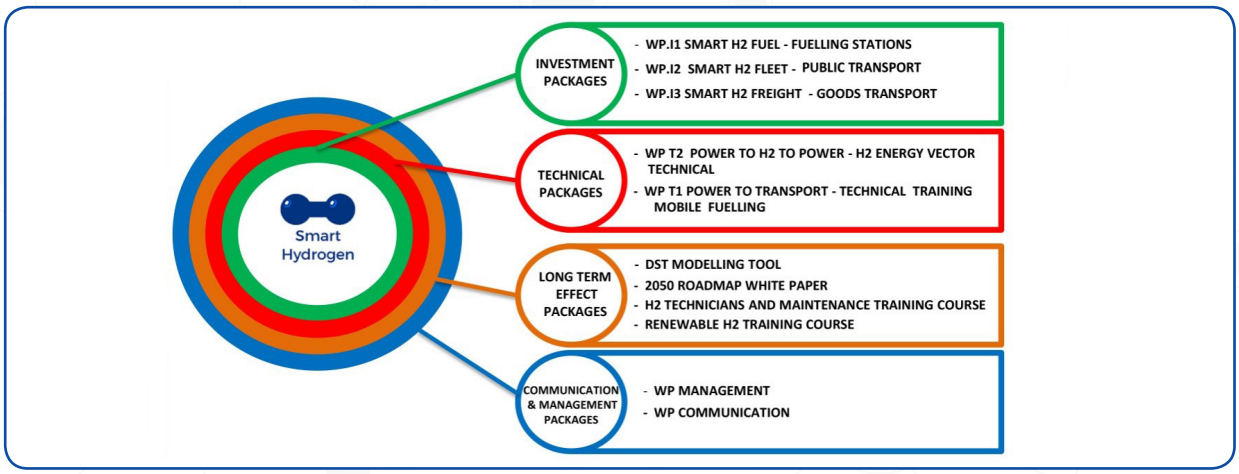

Figure 1. project Smart H2 work package structure

NUI Galway: Development of the project's key deliverable – a Decision Support Tool

Cost-Effective Hydrogen Production from Curtailed Renewable Power

The College of Engineering and Informatics at the National University of Ireland Galway (NUI Galway) is working on the development of a decision support tool, named H2GO. The aim of H2GO is to assist public, energy investors and communities in Northwest Europe in building hydrogen storage at their renewable energy plants. In the construction of H2GO, it is necessary to include technical and economic models of hydrogen energy storage system. This system comprises three main units from electrolyser, compressor and storage tank. According to literatures, electrolyser contributes to almost half of the total capital expenditure (CAPEX) of the system. Therefore, the size of electrolyser has very large impact to the total investment.

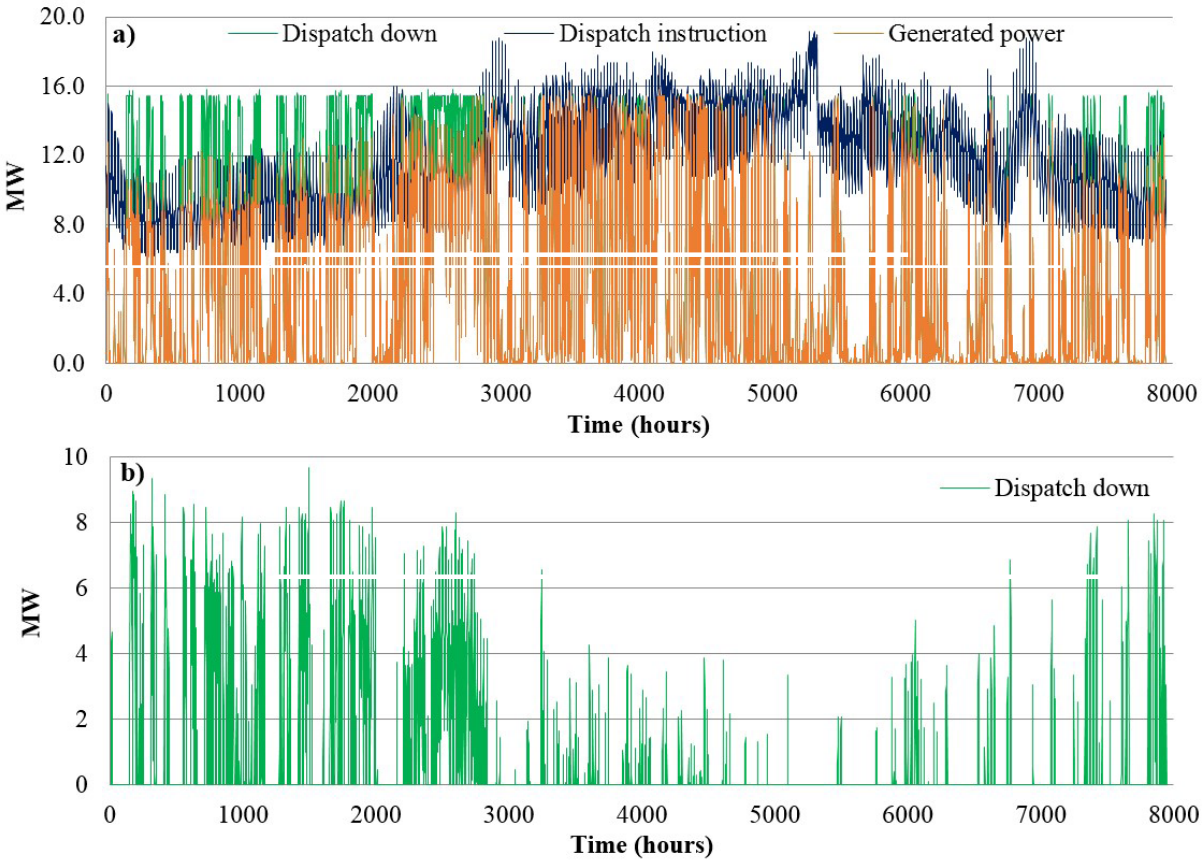

Figure 2. a) Annual power generation and consumption profile, Figure 2. b) Annual wind curtailment or dispatch down (DD) profile

In order to understand the optimum size of electrolyser at one specific location, wind curtailment profile from one year measurement of a 16-wind farm is generated as shown in Figure 2 a). Hereinafter, levelised cost of hydrogen (LCOH) or the minimum selling price to compensate all expenditure over the system's economic lifetime, for each electrolyser capacity can be calculated based on the presence and amount of the annual wind curtailment.

LCOH vs different electrolyser capacity

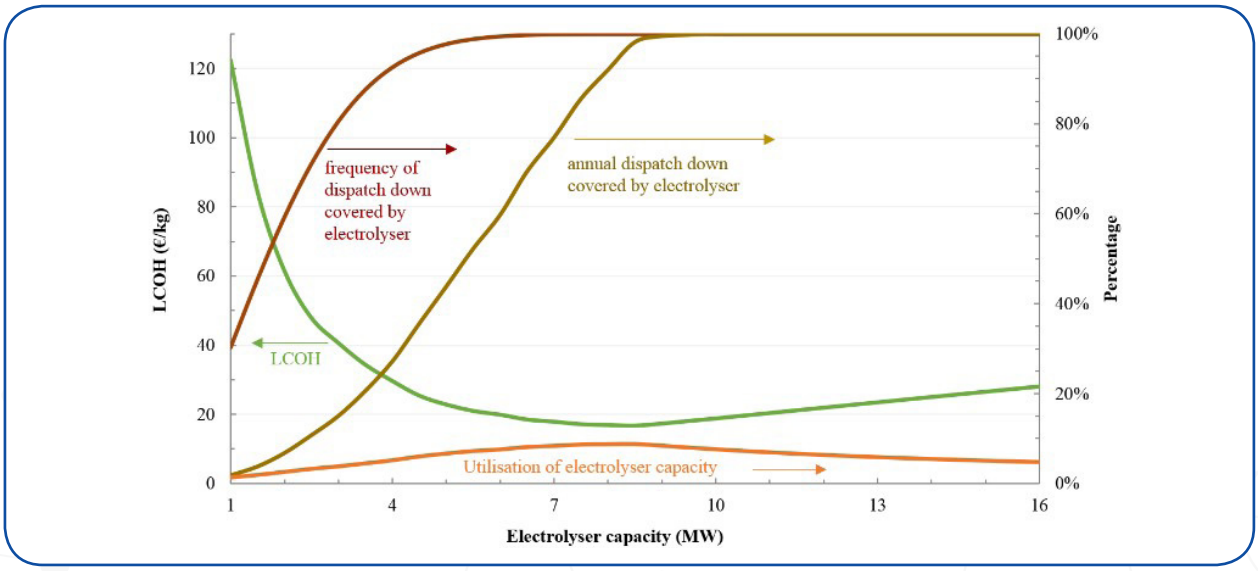

Figure 3.

As depicted in Figure 3, smaller electrolysers tend to have higher LCOH even though the electrolyser capacity factors are also relatively higher. In comparison to the larger electrolysers, LCOH is lower due to economies of scale, however the limited number of large DD imposes to higher cost at the end. The key finding of this work is the optimum LCOH can be found at maximum electrolyser capacity factor.

We invite your feedback at our Open Meetings!

27 June 2018..... Pure Energy Centre (Scotland)
16/17 Oct 2018 ..... INSA Rouen (France)
11/21 Dec 2018..... BURN (Brussels)
Mar 2019..... Energia (Northern Ireland)

June 2019..... Pure Energy Centre (Scotland)
Sep 2019 ..... IZES (Germany)
Dec 2019 ..... ENSI Caen (France)
Mar 2020..... Belfast Met (Northern Ireland)

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The €9.39m Interreg NWE funded GenComm Project will work with remote communities around three pilot facilities in Scotland, Germany and Northern Ireland; extending throughout the NWE region and beyond. GenComm aims to reverse the need for communities to meet their energy needs from non-renewable sources.