

# The Levenmouth Community Energy Project: Hydrogen production and storage



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*Date of Visit – 1<sup>st</sup> October 2015*

During 2015/16, Bright Green Hydrogen Ltd. is investing a Scottish Government Local Energy Challenge Fund grant of £4.3m into establishing a world-class demonstration facility for the production and use of green hydrogen.

## Background

The Levenmouth Community Energy Project – based at the Hydrogen Office in Methil – is run by Bright Green Hydrogen, part of The Business Partnership. The main aim for the facility being developed is for it to be the world's foremost demonstrator of hydrogen applications derived from renewable energy. Helping to address two of the biggest challenges facing the energy sector; energy storage and low carbon transport.

Hydrogen will be stored at the business park and converted back into electricity at times when the on-site wind and solar generation is low. This will help to offset the intermittency of renewable energy production at the site and improve the facility's ability to be energy self-sufficient.

In addition, to demonstrate how Scotland can decarbonise its transportation sector, excess hydrogen will be used to run one of Europe's largest fleet of hydrogen dual-fuel vehicles. The project will also exhibit how renewable energy can be fed into the national grid evenly. This will help projects in grid constrained areas to connect the grid. There is potential for hydrogen to be used for heating as well, but this project is at this stage concentrating on transport and energy storage.

## Project Objectives

The project aims to:

- Position Levenmouth at the centre of the next generation of the clean energy revolution;
- Establish one of Europe's largest fleets of dual-fuel vehicles (up to 25);
- Contribute towards the security of future energy supplies for generations to come;
- Generate new opportunities for the local economy to help ensure the region's future.

## Hydrogen

Hydrogen is produced by using an electrical current to separate water (H<sub>2</sub>O) into oxygen and hydrogen. For this project the equipment involved in this process would fit in a 20 foot container.

## Progress to Date

The Hydrogen Office already has a 750kW turbine on site and plans to install 200kW of solar PV panels on the building. The project has placed orders for the following hydrogen equipment:

- 1** Overall control system designed by Toshiba, which will manage the entire energy system.
- 2** 60kW electrolyzers, which will electrolyse water to produce 20kg of hydrogen each per day for the transport fleet.
- 5** Ford Transit vans running on a blend of diesel and hydrogen – these will form part of the Fife Council Fleet.
- 9** Buildings on the Business Park with the option of having their electricity supplied by the project.
- 10** Renault Kangoo electric vans are fitted with hydrogen range extenders, which double the vehicle range from 100 miles to 200 miles. These vehicles are to be leased to local organisations and businesses.

## Farming Sector Opportunities

Hydrogen production on farms is of increasing interest. The team proposes that the project will examine renewable energy projects on farms which have constrained grid connections that could be used to produce green hydrogen at a lower cost. This could be energy from wind, solar, hydro or anaerobic digestion where there is limited electricity export opportunity when projects are at peak capacity.

A study with a view to assessing the economic business case for the production of green hydrogen on farms in Fife is currently being undertaken. The report will establish:

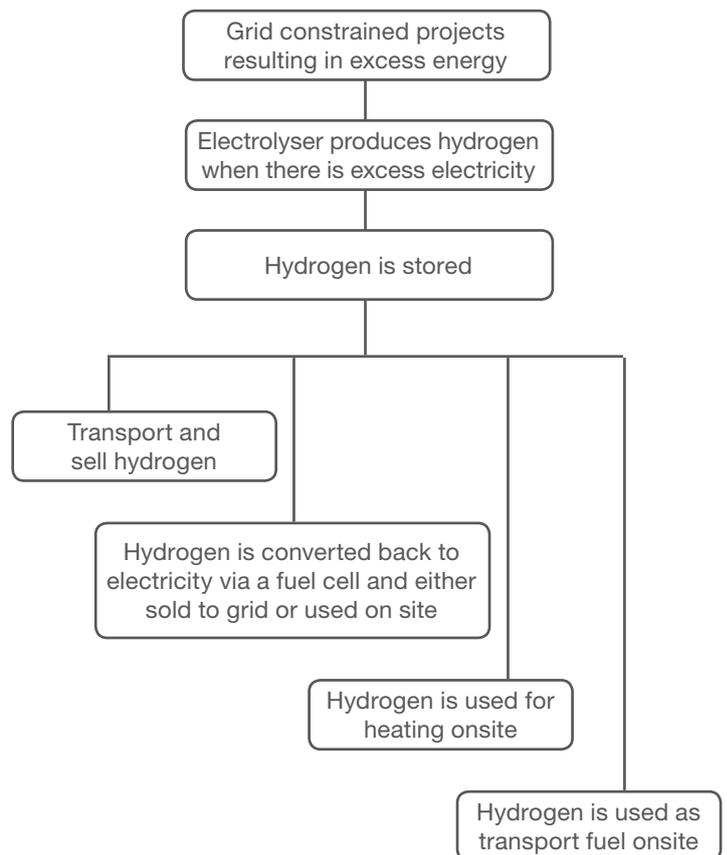
- The cost of equipment for hydrogen production,
- Storage, bottling and off-farm transportation at various scales of hydrogen production.

The image opposite details an example of a hydrogen transportation container that can be placed on the back of a lorry.

The study will go on to identify and evaluate possible deployment routes for green hydrogen, including:

- Transport uses,
- Heating usage and
- Combined heat and power (CHP) uses.

## The potential for hydrogen on farms



The project hopes that an economic model can be agreed with a candidate farm in Fife to install hydrogen production on their premises. The preferred partner will already have a renewable energy project in place with a constrained grid connection.



Many farmers have the potential to develop renewable assets on their land but they may have no way to export that energy through the national grid. Converting the energy into hydrogen provides a workable alternative

*Iain Todd, September 2015*

