Bright Green Hydrogen
Levenmouth Community Energy Project

APSE Scotland Advisory Group

12 October 2016

Lorna Archer, Bright Green Hydrogen

Fife means business.

Introducing Hydrogen

- Hydrogen as an element
- Together with fuel cell technology, hydrogen can contribute to energy storage, leading to a low carbon energy solution
- Fuel cells are an electrochemical device which can combine hydrogen as a fuel with oxygen from the atmosphere
- This generates electricity, which can be used to power an electric motor


Map from Google Maps
Thurso
Stornoway
Elgin
Fraserburgh
Nairn
Inverness
Peterhead
Inverurie
Ellon
Aberdeen
Scotland
Stonehaven
Fort William
Montrose
Forfar
Arbroath
Oban
Perth
Dundee
A
Glenrothes
M9
Kirkcaldy
Dunfermline
Greenock
M8
Edinburgh
Glasgow
Livingston
East Kilbride
Kilmarnock
M74
Ayr
A74(M)
Londonderry / Derry
Dumfries
United Kingdom
Blyth
Ballymena
Larne

Local Ambition for Levenmouth

"We want the towns, villages and communities that make up Levenmouth to flourish into the future. Levenmouth will be ***a place of opportunity*** *and will* ***rid itself of disadvantage and poverty****. It will be* ***a leading centre for Renewable Energy****, and where* ***educational and economic opportunities exist for young people and adults alike****. Levenmouth will* ***look after its environment*** *and will become an attractive place where people are healthy, feel safe and aspire to live, work and visit."*

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The Hydrogen Office

- The Hydrogen Office, operated by Bright Green Hydrogen, demonstrates how excess renewable energy can be stored as hydrogen, encouraging the de-carbonisation of our energy supplies
- It acts as both a demonstration centre and an educational centre for this new technology
- We produce our hydrogen renewably through the process of electrolysis using our innovative Energy Centre

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LES Challenge Fund 2015

- Seeking a major expansion of its activities, BGH set up a consortium of organisations in 2014, involving principally Fife Council and Toshiba
- The group successfully passed both stages of the LES Challenge Fund during 2014 and 2015, resulting in a grant of £4.4m to the project

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The Levenmouth Community Energy Project

- Increase in generation – 750kW to 910kW
- Increase in buildings on microgrid network
- Hydrogen energy storage system – Logan Energy
- Two hydrogen refuelling stations – Logan Energy
- Energy flow managed by Toshiba H2EMS
- Fleet of 17 vehicles
- Investigation into Rural hydrogen

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Our Wind Turbine

- GWP 47 turbine, designed by Norwin
- 750kW rated power
- Provides electricity for our innovative micro-grid
- Excess wind energy sent to the hydrogen storage system and national grid

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Our Solar PV

- Solar PV designed by Forster Energy
- 160 kW rated power
- Provides top-up electricity on days when there is little or no wind
- Can be exported to the National Grid when the hydrogen system is full

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Energy Storage System (1)

- 250 kW PEM electrolyser, made in Canada by Hydrogenics
- Produces circa 100kg of hydrogen per day at full power

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Energy Storage System (2)

- First tank stores ~ 25kg of hydrogen at 30 bar
- A second tank stores ~ 20kg of hydrogen at 30 bar

Energy Storage System (3)

- A 100kW PEM fuel cell
- Recombining hydrogen from storage, and oxygen from the air
- Can be used to supply the whole business park if there is no renewable energy available

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Hydrogen Refuellers

- Two further electrolysers for refuelling – both 60 kW
- Each produces circa 24kg of hydrogen per day at full power
- Hydrogen is stored at 450 bar on refueller roof
- Produces hydrogen for vehicles

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Management of Refuelling Hydrogen

- Vehicle refuelling with green hydrogen will take place at the Methil site
- Refuelling will also take place at the Council vehicle depot at Bankhead in Glenrothes, but without hydrogen production;
- Transport Scotland have provided funding
- The contract for the refuelling station there has recently been awarded to BOC

Our Vehicle Fleet

- 10 Renault Kangoo electric vans, fitted with hydrogen fuel cell range-extender
- 5 Ford Transits owned by Fife Council, to run on a mix of hydrogen and diesel
- 2 Refuse collection vehicles also owned by Fife Council, also running on a mix of hydrogen and diesel – these are a world-first
- All vehicles are dual-fuel, and so can operate even if hydrogen supply interrupted

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Community Benefits of Vehicle Fleet

- Offering local businesses access to cutting edge and innovative technologies
- Providing a refuelling hub to the local area to support the hydrogen vehicle fleet
- Vehicle branding will generate recognition in the local area through visibility of the Project

A Bright Green Future

- Demonstration of world leading technologies
- Educational outreach programmes
- Expand training opportunities through Fife College
- Community benefit fund for the local area
- One of several sites specialising in energy storage across Scotland which is leading the way on energy decarbonisation

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