



Meeting of the Cross Party Group on Renewable Energy and Energy Efficiency

The Scottish Hydrogen Economy

1245, Thursday 6 June 2019

The Scottish Parliament

Chair: Andy Wightman MSP

1. Attendees

A provisional list of attendees is attached to the end of this note. If you attended and are not shown on the list, please email Peter Speirs (pspeirs@scottishrenewables.com).

2. Introduction by Chair and Previous Minutes

Andy Wightman MSP introduced the meeting by noting that this is a very important topic.

The Minutes of the previous meeting had been sent round group members in advance and the secretariat received no requests for additions or corrections. No requests for additions or corrections were made at the meeting. The group agreed that the minutes provided an accurate account of both meetings.

3. Nigel Holmes, Scottish Hydrogen and Fuel Cell Association

The meeting started with Nigel explaining that Fife, Aberdeen and Orkney are main sites of work for the hydrogen sector in Scotland. Hydrogen can play a key role in supporting the net zero target, and the Committee on Climate Change identifies both the need for increased deployment of renewables and the importance of carbon capture and storage

Around a quarter of demand comes from electricity and transport and half from heat. A central question, therefore, is: how do we take fuels we currently use (natural gas, liquid fuels) to essentially carbon neutral? We will be close to 100% renewable electricity by 2020, and quadruple that output by 2050, with much of this progress from onshore wind

There is a challenge associated with this: there is a constraint (an imbalance between supply and demand) from this. It is possible to convert excess electricity from onshore or offshore wind to hydrogen and more of general electricity to hydrogen: this would be green hydrogen. The Levenmouth project has shown that you can use wind and solar power to turn some of this electricity into hydrogen using a private wire network. In Aberdeen. Hydrogen buses have travelled 1 million miles and carried 1 million passengers. The buses are almost as reliable as conventional buses mechanically and in refuelling and can be made in Scotland: Larbert's Alexander Dennis has worked on a hydrogen version of their bus giving a full day's range and the fuel cell that can provide heat, Orkney is ahead of the curve in terms of renewables. The Big Hit project is creating a real pipeline of hydrogen work in Scotland and the Chapensea-Kirkwall HiSeas 3 Ferry is expected to be operation in 2021.

The big opportunity is linking hydrogen to offshore wind. This is now starting to happen internationally, likely to be ORSTED who do it first in the Netherlands, but we need to ensure that this happens in Scotland as we can make a huge contribution to achieving net zero and using the skills in the oil and gas industry to transition to heat, power and heavy duty transport.

4. Nigel Holmes, Scottish Hydrogen and Fuel Cell Association (On behalf of Scottish Gas Networks)

Nigel apologised on behalf of SGN, whose speaker was unable to make it. The big challenge with heat is that it is seasonal. Gas networks have been very reliable in responding to this, and SGN has to prepare for a 1 in 20 winter situation (see e.g. the Beast from the East).

How do we decarbonise this gas network? SGN are going through a process

- Replacing gas with biogas
- Looking at billing and GSNR regulation
- Then introducing 2% hydrogen to the network (at St Fergus)
- SGN working in partnership with all the gas redistribution networks across the UK

Transition to a hydrogen network will involve not just what goes on in the network but how you produce the gas. SGN and others have various projects looking at converting the network to hydrogen, but it is central to work with consumers. There is the Acorn project, which produces hydrogen from methane, and creates CO₂ which can be stored offshore.

The industry can look at Aberdeen sites to see how to decarbonise gas networks in relation to heat, transport and manufacturing, The same approach is being considered in London and the South East of England. In Scotland, Grangemouth already produces a lot hydrogen, so that can be useful in demonstrating the scale of the potential.

With seasonal demand, we must have seasonal supply. This can be achieved through large-scale storage underground, perhaps using existing gas storage areas. At the same time, there is a lot of consideration going into the practicality of hydrogen at a household level: what will the acceptance be from the consumer? Will someone who has a combi boiler be open to changing? There remains need for education on social change.

5. Gavin Catto, Green Cat Renewables

GCR is not an R&D company. It is focused on project development and development support. GCR is a group of companies started in Scotland in 2005; historically, it focused on small-scale renewables funded by FiT and RO, but, in 2015, it had to reconsider the future due to changes in UK Government policy.

It was clear that there was a move to subsidy-free renewables with larger turbines and projects; it was also that the old approach of building non-smart projects was over: there was a need to move to smart projects (not just what works for the generators but what is required for the system) with a focus on storage and co-location.

GCR has also looked to go beyond Scotland, setting up an office in Canada and potentially opening one in California. Hydrogen is the obvious solution to fill a large gap in how to tackle the decarbonisation of heat and transport. GCR had an opportunity to invest in a company, Eneus, which was founded 3 years ago with a purpose to develop low cost, green hydrogen from renewable sources. The gamechanger for hydrogen businesses is the incredible drop in renewable electricity cost, particularly in the USA where the cost of renewables is less than half the wholesale cost of electricity in the UK.

If we are going to be serious in hitting our net zero target there is likely to be a nearly exponential growth in the demand for hydrogen across the economy.

There is a problem, however: how do you transport hydrogen? It can be very energy intensive to compress hydrogen (15% embedded energy). Liquification can be done, but taking up 40% of embedded energy. If you convert hydrogen to ammonia, however, you use significantly less embedded energy with many other benefits. Ammonia store also provides significantly higher levels of storage than the alternatives.

With greater penetration of renewables on the grid, these processes can function at a wide range of scales and can balance the network.

6. Questions and Answers

A range of questions were directed at the panel; please note that the intention of this meeting note is not to record a verbatim account of the meeting. Questions posed to the panel and answers received included:

- Shouldn't the focus be on green rather than blue hydrogen?

- Nigel said that the CCC is a clear call to action that goes beyond renewables and blue hydrogen is an important part of that
- If we're talking about decarbonising the gas grid at the same time we've maximised our energy efficiency, with 17% from district heating, is there a minimum level of gas demand to maintain the gas grid?
 - Gavin said that the gas pipeline issue is a good one to raise, and there are comparable issues in elements of the electricity grid; Nigel said that when we look at decarbonising the power networks it is quite attractive to look at things in isolation, but this cannot be done; around 60% of electricity used during peak in the east came from gas networks. Scottish Government's energy networks vision sets out that if we're going to achieve decarbonisation you must look at interfaces of gas and power networks
- What is the sweet spot for hydrogen for the economy?
 - Nigel said that this is an important question. The timescales for decarbonising are very ambitious, and the SGN work is so important because they look at the technical aspects *and* the consumer acceptance aspect. An Oban project involved checking 1100 consumers' gas appliances to see if they were suitable. SGN wants to give consumers the choice of using hydrogen to decarbonise at low cost and make Scotland a magnet for those interested in hydrogen
- 7. Gavin said that what has taken him by surprise is that renewables is now the cheapest energy source. He is confident that we can produce hydrogen more cheaply, but this must be done at scale. What he is aiming at is fairly large production that can be used in whatever way in order to achieve that scale and cut costs; economics will then dictate that this transition takes place.

8. Conclusion and Next Meeting

Andy thanked the presenters and those in attendance. The next meeting scheduled to take place will be the AGM.

9. AOB

Attendees

Andy Wightman MSP
 Alex Burnett MSP
 Liam McArthur MSP
 Keith Baker
 Nigel Holmes
 Rebecca Bell
 Mark Cassidy
 Pete Roche
 Martin SurrIDGE
 John Birchmore
 Laura Russell
 Caroline Hickling
 Paul Gill

Rob Forrest
Gavin Catto
Peter Speirs
Barbara Whiting
Agnes Holmes
Robin Parker
Fiona Lamdy
John Maclean
Nick Stapley
Ewan Swaffield
Richard Leslie
Paul Moseley
Steven Ashurst
Enrique Troncoso
Daniel Schofield
Karen Fox
Alan Beal
Jon Clipsham