A Hydrogen Strategy for Northern Ireland

Policy Paper

The Consultation Process

This policy paper is based on extensive research and engagement with key stakeholders in the energy sector in Northern Ireland. The DUP Policy Unit has consulted with a wide range of organisations and individuals externally, as well as with elected representatives at all levels within the party.

This final policy paper will be adopted and will inform future DUP manifestos.

Introduction

Northern Ireland is fast emerging as an innovator in hydrogen technology. Many recognise that Northern Ireland is leading the world in terms of hydrogen usage in the transport sector. Companies such as Wrightbus are developing cutting-edge technologies which are revolutionising whole sectors, and based on this, the DUP has consulted key stakeholders to develop a Hydrogen Growth Strategy. It is intended that this policy should enable Northern Ireland to seize, fully exploit and develop its potential with respect to the opportunities associated with Hydrogen.

The region is long recognised as a perfect destination for on and off-shore wind technology, given its location and open coastlines. The renewables sector has grown for many years and the development of the hydrogen sector is regarded as a natural next stage. Already many international companies have a presence in the Northern Ireland market, and the growing involvement of local academia and entrepreneurs has further boosted this potential. Another element in the development of the sector is the innovative use of the local gas infrastructure to distribute hydrogen.

Background

Currently, energy generation is dominated by fossil fuels, the use of which creates carbon dioxide. There is now a global commitment to shift energy dependence from fossil fuels, producing carbon dioxide to green energy sources, that is energy sources that can be used without producing carbon dioxide. There is a global commitment to ‘net zero’ by 2050, which means a global economy the functioning of which does not increase the level of carbon dioxide

in the atmosphere. This global political commitment is creating an imperative for the rapid development of green energy technology so that the world economy can continue to function fully without using fossil fuels.

Structure

In this paper we will first set out the basis for Northern Ireland's Comparative Advantage in relation to the production of green hydrogen and the implications of this for the use of hydrogen as a form of green energy (Section 1). The paper will then reflect on the geo-strategic significance of Northern Ireland's hydrogen contribution in terms of UK security in a changing world which must inform any assessment of what hydrogen has to offer Northern Ireland (Section 2). We then turn to DUP policy commitments in relation to hydrogen and the challenge of putting in place a public policy framework to enable Northern Ireland to fully exploit the benefits of our Comparative Advantage in green hydrogen production and its implications for the development of the application of hydrogen (Section 3).

Section 1: Hydrogen: Northern Ireland's Comparative Advantage

Section 1 will set out the basis for Northern Ireland's Comparative Advantage in green hydrogen production which we want to see fully exploit to the benefit of the people of Northern Ireland both in terms of (1) hydrogen production and (2) the application of hydrogen as a form of energy both in terms of heating and transport.

(1) Green Hydrogen Production

One green energy technology in relation to which Northern Ireland enjoys a natural Comparative Advantage is Green Hydrogen. To think clearly about green hydrogen production in policy terms, we must understand the basis for this Comparative Advantage, which depends on having a clear understanding of the process of green hydrogen production.

Hydrogen is a highly reactive element and only occurs naturally in combination with other elements. Water, the molecular structure of which involves one oxygen atom to two hydrogen atoms, provides a good source of hydrogen. Green hydrogen is produced through a process of electrolysis which breaks down water into its atomic components, producing oxygen and

hydrogen. Electrolysis has to be powered by electricity and hydrogen resulting from electrolysis is categorised as 'green hydrogen' if the electrolysis process is itself powered by a green energy source, wind or solar.

In this context, the first basis for Northern Ireland's Comparative Advantage in Hydrogen is our leading position in wind energy generation, which means we have a natural capacity to power the production of green hydrogen. As the DUP Economy Minister, Diane Dodds observed in 2020:

"Northern Ireland has a valuable indigenous source of energy – wind. We are a market leader in renewable electricity generation – 48% of the electricity we generated over the past year was from renewable sources. We lead the way in engineering solutions to get as much of this wind generation as possible onto our electricity network. In both cases we are doing better than anywhere else in the world."[1]

The significance of this is thrown into sharper relief with respect to green hydrogen production by an early consultee to the process that has resulted in the development of this paper:

"The challenge has been identified as to what to do at night-time when the requirement for electricity is lower. Already 15% of wind generating capacity at night is curtailed as wind turbines are turned off. Electrolysis capacity at night-time could use this surplus electricity to produce hydrogen more affordably. Rather than paying for the curtailment of wind turbines, electrolysers could be key in building wind farm investor confidence as hydrogen becomes more important." Daniel McLaughlin, Belmont Strategy

The second basis for Northern Ireland's Comparative Advantage in green hydrogen production arises from the combination of world leading universities and engineering technology that is applying itself to the opportunities presented by green hydrogen production, mindful of the edge Northern Ireland enjoys in this sector because of the advanced nature of our wind energy sector and access to water.

[1] https://www.economy-ni.gov.uk/news/dodds-northern-ireland-can-lead-way-hydrogen-energy

In this context DUP Economy Minister Diane Dodds noted:

"With the global demand for electrolysers set to soar, my vision is that we will create the world's largest manufacturing base for electrolysers. This will leverage Northern Ireland's expertise in advanced materials handling and engineering and create hundreds of direct sustainable jobs, with thousands in the supply chain. It will provide a lasting legacy from the challenge of taming climate change."[2]

NI Water is owned by the Government - accountable to the Department for Infrastructure - and is playing a leading role in hydrogen generation in Northern Ireland. It is already using electrolysers to extract hydrogen from water and developing hydrogen storage and hydrogen fuelling.

(2) Green Hydrogen Applications

In addition to having the capacity to play a key role in the generation of Green Hydrogen, Northern Ireland is also well placed to play a key role in the application of hydrogen in relation to both a) heating and b) transport.

Heating

Northern Ireland is too reliant on oil as a source of home heating. This is not only costly for consumers but is one of the least environmentally friendly forms of heating. In terms of our short to medium energy future, the DUP believes that gas remains crucial, first because it is immediately available and the most environmentally friendly of traditional options and, second, because gas boilers can be converted over to hydrogen and bio-methane, when supplies become available, which are even more environmentally friendly than gas.

The DUP has long supported the continued expansion of the domestic gas network and a corresponding reduction of domestic dependence on oil systems and incentivising the adoption of gas heating within energy efficiency programmes.

[2] https://www.economy-ni.gov.uk/news/dodds-northern-ireland-can-lead-way-hydrogen-energy

As we stated in Towards Net Zero: 'To ensure we can maximise the potential use of hydrogen in the gas network, we will review existing legislative provision by 2025. The route to fully decarbonised gas is uncertain and we are working with the gas sector to understand viable pathways.'[3]

Transport

Hydrogen vehicles replace petrol and diesel as a means of powering cars, lorries and buses with electrical power. A hydrogen fuel cell directs hydrogen to a catalyst with which it reacts, stripping the hydrogen of its electrons, forcing them down a circuit, creating electricity with which to power the vehicle and creating water vapour as a by-product. To the extent that actual power for driving the car is electricity, some might say, why not just have an electric car? There are four significant advantages to hydrogen:

First, the process of refuelling a hydrogen vehicle is much faster than charging an electric vehicle battery. Second, hydrogen vehicles have a longer range than battery vehicles. Third, the production of a battery and disposal of a battery generates significant amounts of carbon dioxide and finally, hydrogen takes up far less space than batteries, leaving much more room in the car for other things. This is a particularly important consideration for lorries and buses.

Wrightbus based in Ballymena has been playing a key role in the application of hydrogen in the context of powering vehicles. As DAERA reported on the occasion of a visit by the Agriculture Minister Edwin Poots MLA in 2021.

'Wrightbus is leading the way in zero emission transport with its world-first hydrogen double-decker bus, the Hydroliner, which it first launched in Aberdeen in January this year. The buses emit only water vapour, with no harmful pollutants. Three zero-emission Hydroliners have been in service in Belfast since last December – which were the first of their kind in Northern Ireland - after the firm won a contract to supply Translink with 20 Hydroliners and 80 of its recently-launched battery-electric Electroliner double decker buses.

In addition to Aberdeen and Belfast, Hydroliners are currently also in operation in London and Dublin, with a fleet expected to launch in Birmingham later this year. So far, its hydrogen

[3] The Path to Net Zero Energy. Safe. Affordable. Clean. (economy-ni.gov.uk)

buses have prevented an incredible 500,000 kg of CO2 from entering the atmosphere after clocking up more than 300,000 miles."[4]

The Future: *A Paradigm Shift on Energy?*

More and more commercial organisations in NI are recognising the potential of hydrogen technology. This was underpinned by the recent formation of a trade body, Hydrogen NI, which states:

"Northern Ireland has the resources, ambition, and expertise to develop a world-leading clean hydrogen economy. With several successful projects and initiatives already underway, the coming years present major opportunities that will lead to increased levels of investment, job creation and decarbonisation. Hydrogen NI brings together stakeholders from across the sector and provides a voice for the industry as we work to deliver a thriving clean hydrogen economy in NI"[5].

Section 2: Hydrogen and the Geostrategic Perspective

One of the key points that the DUP is keen to highlight in making the case for Northern Ireland's Comparative Advantage in relation to hydrogen is the geostrategic consideration. Although it does not directly enhance Northern Ireland's Comparative Advantage in hydrogen production, it makes our Comparative Advantage more important.

In the context of the war in Ukraine we have become acutely aware of the problems of being energy dependent on countries that have different moral values from our own. While, in an economically and technologically interdependent world striving for complete independence is neither possible nor desirable, it is imperative that we do not place ourselves at the mercy of countries whose values and aims and objectives are very different from our own.

[4] https://www.daera-ni.gov.uk/news/minister-poots-visits-wrightbus-discuss-their-plans-green-hydrogen-economy-northern-ireland https://wrightbus.com/en-gb/hydrogen-bus-streetdeck-hydrolinerFCEV https://wrightbus.com/en-gb/gb-kite-hydroliner-fcev

[5] Home - Hydrogen NI (hydrogen-ni.com)

In the aftermath of the end of the Cold War, Western governments understandably relaxed their guard, looked for a peace dividend and in some cases became dependent on Russian gas to a degree that they have come to regret since the advent of the war in Ukraine.

Although the UK avoided the geostrategic problems of depending on Russian gas, we have arguably been on the edge of creating a new and equally undesirable dependency. Until very recently the Government had committed to ban the sale of all petrol and diesel ICE cars from 2030, creating a huge potential dependence on China which has cornered the market in car battery production.

'Chinese companies control half of global lithium production and over 70% of Li-ion battery manufacturing (Benchmark Mineral Intelligence 2020). Until recently, the United States (US) and Europe have not taken significant steps to stop such dominance (Kumagai 2021). No direct conflict has emerged between China and other big powers, or between China and the key producer states over access to lithium resources despite the trade war (Tu et al. 2020)'[6]

The geo-strategic implications of this are far-reaching.[7]

The ban on the sale of petrol and diesel ICE cars has now been put back until 2035.[8] While this was announced as part of a package of measures conceived for the purpose of reducing the burden of Net Zero on the public rather than for geo-political considerations, provision for Lithium mining - without which there can be no battery construction - has been made in Cornwall and Tata has agreed to build a £4bn electric car battery factory in Somerset. [9] Although this will make a contribution, it is not clear that it will deal with the presenting

[6] Suleyman Orhun Altiparmak China and Lithium Geopolitics in a Changing Global Market https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9403979/

[7] https://www.telegraph.co.uk/business/2023/07/30/Chinese-electric-car-invasion-paralyse-britain-jim-saker/ https://www.kallanish.com/en/news/power-materials/market-reports/article-details/experts-warn-of-china-weaponising-threat-to-uk-ev-industry-0523/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9403979/ https://www.ft.com/content/9ce55666-91d6-4bb0-9fdf-4de7a8bedc43 https://www.reuters.com/business/energy/eu-may-become-hooked-china-batteries-it-was-russian-energy-paper-2023-09-17/ https://www.wired.co.uk/article/china-cars-surveillance-national-security

[8] https://www.theguardian.com/environment/2023/sep/21/drivers-rishi-sunak-electric-car-u-turn

[9] https://www.theguardian.com/uk-news/2023/aug/08/cornish-lithium-secures-536m-to-open-first-mine-for-the-metal-in-britain

challenge unless we want to become beholden to a Tata monopoly and it is not clear, in any event, where it will get its Lithium from??

(Moreover, if one's primary concern is Net Zero, big questions exist about a future based on electric car batteries which while reducing carbon emissions if we focus on the tail pipe, greatly increase them if we look at mining Lithium, battery construction and disposal. And then there is a question about how the energy that is conveyed to the battery at charging points?[10] If it is from solar power then the power that actually moves the power is green, but it equally might be generated using fossil fuels. None of these difficulties obtain with green hydrogen.)

In this context two things follow. First, to the extent that Northern Ireland's hydrogen sector can make the UK less dependent on Chinese batteries, Northern Ireland will be well placed to make a contribution to the security of the United Kingdom. Second to the extent that Northern Ireland, because of its Comparative Advantage in Hydrogen production, can make a disproportionately significant contribution to hydrogen production, it is well placed to make a disproportionately significant contribution to the security of the United Kingdom. In a context where the world feels like an increasingly dangerous place, this consideration bestows additional benefits on the development of the hydrogen sector in Northern Ireland, highlighting the important contribution that Northern Ireland has to make to the security of the United Kingdom. Of great importance, it also provides a basis upon which to argue that it is in the interests of the UK Government to invest in Northern Ireland to help us exploit our Comparative Advantage to the full, and thereby make the greatest possible contribution to a critical aspect of UK security.

Section 3: DUP Hydrogen Policy

The DUP is deeply committed to Northern Ireland fulfilling its potential which means having a focused strategy to access the benefits of Northern Ireland's Comparative Advantage in Green Hydrogen production and for it also to take a lead in the application of this important new source of green energy. Comparative Advantages are precious, especially when their importance is underlined by additional geostrategic considerations, and it is the determination of the DUP to pioneer the best possible policy and legal framework to enable Northern Ireland

[10] https://youmatter.world/en/are-electric-cars-eco-friendly-and-zero-emission-vehicles-26440/

to seize this opportunity. It is generally accepted that there is significant potential for hydrogen development in Northern Ireland. Both the private and public sectors have expressed their commitment, and it is estimated that it could in time meet approximately one-third of local energy needs. We are seeking to make green energy generation (whether renewables or hydrogen) part of our long-term economic strategy, enabling Northern Ireland to become an energy exporter rather than the importer it is today. We want NI green hydrogen generation and application to contribute to the greatest possible extent to Northern Ireland's own energy needs and then to be sold in the wider UK and exported to the Republic of Ireland.

Structure

In Section 3, we will: (1) consider existing DUP policy hydrogen commitments; and (2) the need for a Hydrogen Strategy and then (3) a series of specific goals that have helpfully been set before us by consultees which we are minded to pursue.

(1) Existing Policy Commitments

The 'Path to Net Zero'[11] Strategy was published in December 2021 by DUP Economy Minister, Gordon Lyons. It is Northern Ireland's future energy strategy, a comprehensive plan to improve energy storage and broaden our range of energy sources. Hydrogen is referenced throughout. In his introduction, Minister Lyons picks out hydrogen and writes:

'We can continue to be world leaders in integrating renewable electricity generation and we can become world leaders in the new hydrogen economy'

Detailed policy commitments are then set out on page 34/35:

'Key Policies
Create a hydrogen centre of excellence in research and innovation Hydrogen is a substantial opportunity for Northern Ireland. We can attract investment into the local economy and

[11] The Path to Net Zero Energy. Safe. Affordable. Clean. (economy-ni.gov.uk) https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf

position our companies to take advantage of the energy and economic opportunities available on a global scale.'

The document then sets out diagrammatically our hydrogen commitment through 'Figure 11: Hydrogen Proposition for Northern Ireland.'

On Page 35 we then set out our three 'Priorities for Research and Innovation Activities, the first of which is hydrogen:

'In order to take advantage of the unique hydrogen opportunities available to Northern Ireland we will implement a Hydrogen Catapult in partnership with academia. This centre of excellence in research and innovation will bring together key players across the hydrogen economy.'

The document contains other commitments, including:

'The Department for Business, Energy & Industrial Strategy (BEIS) in the emerging fields of hydrogen, Carbon Capture, Utilisation and Storage and industrial decarbonisation and innovation. We have launched a green funding opportunities e-zine that will provide regular updates on available funding in the low carbon sector.'[12]

'For the harder-to electrify sectors including HGVs, we will work on an all-island basis to develop the infrastructure for alternative fuels such as hydrogen and biomethane. Building on our existing capabilities in this area, we will work with partners to support vehicle and refuelling technology trials. We will identify and prioritise measures that:
• Inform technology choice and incentivise transport operators to move towards a zero emissions fleet; and
• Support demand management and behavioural change to incentivise optimisation of resources used to move people and goods.
We will also review how we measure carbon emissions from transport to assist with decarbonisation plans and monitor progress.'[13]

[12] Ibid., p. 35.
[13] Ibid., p. 47.

The importance of the above commitments were underlined in our 2022 Assembly manifesto:

'Launched 'Path to Net Zero' Energy Strategy and 22 point Action Plan for implementing it. This strategy will help reduce our reliance on importing fossil fuels and create hundreds of new jobs as Northern Ireland establishes itself as a global leader in hydrogen technology and clean energy.[14]

(2) Towards an NI Hydrogen Strategy

The Path to Net Zero is Northern Ireland's Energy Strategy. The sector, however, has expressed a desire for the development of a dedicated Hydrogen Strategy to provide the necessary focus in order to draw stakeholders together so the sector can grow and develop as efficiently and effectively as possible. The strategy will provide an opportunity for the public and private sectors to work together to help Northern Ireland become a world leader both in the production and application of green hydrogen and to showcase our success. The Energy Networks Association recently highlighted the importance of taking this kind of action when it commented "there is no realistic scenario whereby the UK is able to achieve net zero carbon emissions by 2050 without hydrogen playing a key role in the decarbonisation of large emitting sectors such as industry, transport, power and heat."

(3) Policy Recommendations from Consultees

We are minded to pursue the following additional proposals from consultees:

- The formation of a new Hydrogen Unit within the Department for the Economy, to focus on growing the sector, in co-ordination with private sector and academia

- A dedicated Hydrogen Innovation Strategy, upon which the future strategic direction of building the Northern Ireland hydrogen sector will be developed

[14] https://s3.eu-west-1.amazonaws.com/my-dup/029311-DUP-Manifesto.pdf p. 10.

- Investing in the skills needed including a new dedicated green hydrogen apprenticeship programme and access to international best practice.

- Targets to embed hydrogen use by the public sector to be embedded into the next Programme for Government.

- Open discussions with UKG to consider funding streams and incentives for SME innovation in the hydrogen sector.

- Undertake an assessment of what additional gas network infrastructure is required to facilitate hydrogen blending, the process whereby hydrogen is injected into the gas network.

- Facilitating the delivery of large-scale hydrogen storage to ensure all year-round supply is guaranteed.

- Consider how best to ensure closer policy coordination between United Kingdom and Republic of Ireland around gas interconnection, including the management of hydrogen blends.

- All new gas fuelled boiler, hybrid systems and appliance installations to be Hydrogen-Ready as soon as is feasible.

- The Utility Regulator must take a lead role in supporting hydrogen blending research, demonstration projects and the development of a regulatory framework to allow the blending of hydrogen into the network 100% Hydrogen network

- Progressing the Energy Strategy commitment to review existing legislative provision to ensure NI can maximise the potential use of hydrogen in the gas network

- Creating a funding framework to support research into the safe conversion of existing network infrastructure to 100% hydrogen and trial 100% hydrogen networks 26 Internal NI GNO Calculation – Methodology can be shared upon request 27 BEIS, Hydrogen

transport and storage infrastructure, A consultation on business model designs, regulatory arrangements, strategic planning and the role of blending.

Conclusion

Northern Ireland has a Comparative Advantage in Green Hydrogen production and is also leading the way in the application of Green Hydrogen as a new energy source. The DUP is determined to ensure that the potential benefits arising from both are fully realised to the advantage of all the people of Northern Ireland. This paper has provided both an appreciation and an understanding of the presenting opportunities and proposals to help achieve this ambition which it is now our purpose to advance.