Agenda Item	17
Report No	HC/5/21

THE HIGHLAND COUNCIL

Committee: **Highland Council**

Date: 25 March 2021

Report Title: **Highland's Hydrogen Economy & Update on Opportunity Cromarty Firth's Greenport Bid**

Report By: Executive Chief Officer - Infrastructure and Environment

1. Purpose/Executive Summary

1.1 This report outlines the current position and opportunities in respect of hydrogen in Highland. It highlights a major proposition for Highland to capitalise on hydrogen as a driving force in achieving its net zero ambitions, and in evolving the region's unique role as Scotland's engine for renewables, whilst also safeguarding our most valuable natural and environmental assets. This would align well with the vision contained within Highland's Indicative Regional Spatial Strategy, including Highland being an exemplar carbon action region and transitioning to a green, circular economy.

1.2 In recognition of the rapidly emerging position for hydrogen at the national and international level, as well as commercially, the report outlines how Highland can benefit from and support this transition, and how embracing such change can act as a catalyst for transformation and regeneration and directly support our economic recovery from the COVID-19 pandemic.

2. Recommendations

2.1 Members are asked to:

i. Support development of a vision for hydrogen in Highland to be presented to a future Member workshop which will outline in more detail the significant role for hydrogen in Highland's green energy proposition / commitment;

ii. Agree the Highland Council's in-principle support for the Opportunity Cromarty Firth project and Green Port bid, noting its potential contribution to the hydrogen economy in Highland and to national and local outcomes; and

iii. Agree the actions being undertaken in collaboration with Aberdeen City Council in respect of hydrogen fuelled fleet.

3. Implications

3.1 Resource - Officers will be expected to continue to advise and contribute to the Opportunity Cromarty Firth project and ensure the bid for Freeport status is aligned with Council ambitions. Funding will continue to be sought for the likely increased short terms costs of delivering a fleet fuelled by hydrogen.

3.2 Legal and Risk - There are no legal implications arising from this report, but further consideration of the implications will be required at key stages moving forward.

3.3 Community (Equality, Poverty and Rural) - One of the UK Government's key measures of determining Freeport bids is the contribution towards regeneration. Opportunity Cromarty Firth is looking at maximising the socio-economic benefits for not only the Easter Ross area, which suffers from areas of multiple deprivation, but also for the wider Highland region.

3.4 Climate Change / Carbon Clever - The Opportunity Cromarty Firth project is centred around supporting offshore wind energy projects planned for the Moray Firth, North, North East and East identified in the Scottish Government's Marine Plan and maximising the benefits for the north of Scotland. Taken together with the potential creation of a green hydrogen hub in Highland, it would help to deliver the Council's decarbonisation targets whilst supporting a just transition to a net zero economy.

3.5 Gaelic - None arising from this report.

4. Background & Progress to Date

4.1 The Scottish Government has pledged to end Scotland's contribution to climate change no later than 2045. All public bodies have a duty to support and work towards this target under the Climate Change (Scotland) Act 2009, as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

4.2 At a meeting of The Highland Council on 9 May 2019, it was agreed that the Council declare a climate and ecological emergency, whilst recommitting to achieving a carbon neutral Highland by 2025.

4.3 Highland has taken a proactive approach in embracing the decarbonisation agenda in its strategy for the future. The Indicative Regional Spatial Strategy ("IRSS") approved by the Economy and Infrastructure Committee on 2 September 2020 and submitted later that month to Scottish Government reflects the contribution that Highland can make to key national outcomes that are sought to address the challenges ahead, and the development and assets that can help make it a reality.

4.4 It is the case that Highland can continue to play a disproportionately large role in helping both Scotland and the UK achieve their respective net zero targets, due in large part to the renewable energy resource available as well as the carbon sequestration potential of our forests, peatlands and water bodies. As part of the energy transition required to achieve net zero, the Scottish Government recently released a Hydrogen Policy Statement, which acknowledges that "it is becoming increasingly clear that hydrogen will play a major role globally in the transition to net zero, and Scotland's assets, natural, human and physical mean we can be a major player in this emerging global hydrogen market."

4.5 The Statement sets out a vision: “for Scotland to become a leading Hydrogen nation in the production of reliable, competitive, sustainable hydrogen and secure Scotland’s future as a centre of international excellence as we establish the innovation, skills and supply chain that will underpin our energy transition”.

4.6 The Highland Council has itself recognised the significant role hydrogen will play in its regional decarbonisation efforts, and at a meeting of the Highland Council on 4 March 2021, Members agreed funding to support the development of corporately-agreed hydrogen and low carbon heat strategies, to ensure that the Council benefits from the energy-systems transformation that these technologies will bring to the region.

4.7 In addition, work is underway across the wider region, most notably through Opportunity Cromarty Firth, to help expedite the region’s transition to a hydrogen economy, whilst there are opportunities for collaboration and learning through the work of other Councils such as Aberdeen City, who are at the forefront of public sector involvement in hydrogen production and utilisation.

4.8 In early March, a Member Workshop was held which provided a briefing on the potential of both hydrogen and the OCF Greenport bid. This report was required to be submitted ahead of this workshop, and therefore, verbal feedback will be provided when the item is considered at the meeting of the Highland Council on 25 March.

5. Hydrogen & Decarbonisation Ambition

5.1 Considering progress from both a policy and project perspective both by the Council and partners, this report seeks to provide some additional clarity to Members and to seek Council support to further embrace and lead on the transition in respect of the emerging hydrogen economy in Highland.

5.2 From a decarbonisation perspective, hydrogen is a clean-burning gas that contains more energy per unit of weight than fossil fuels. When combusted, the only by products are water and oxygen. In a hydrogen economy, hydrogen would be used in place of the fossil fuels which currently provide four fifths of the world’s energy supply and emit the bulk of global greenhouse gas emissions, as part of a wider mix of power produced from wind, solar, hydro etc. Hydrogen can be made by splitting water with electricity through a process called electrolysis, and once produced, can be stored, liquefied and transported via pipelines, trucks, ships or trains. In addition, it can be used to make fertiliser, fuel vehicles, heat homes and businesses, generate electricity or drive heavy industry. Hydrogen is likely to provide enhanced flexibility to energy systems, increase energy security whilst also increasing the efficiency of the renewable assets from which it is produced. It is important to note that hydrogen can be a net zero carbon source of fuel, if it uses 100% renewable electricity in its production (as planned in the Cromarty Firth green hydrogen hub).

5.3 The vision contained within the IRSS includes, amongst other things, Highland being an exemplar carbon action region and transitioning to a green, circular economy which maximises the value of existing core industries, helps attract new and emerging sectors and diversifies jobs and skills – maintaining and enhancing Highland’s role as a global centre of excellence for renewable energy innovation and generation. The IRSS vision is also for the safeguarding, enhancement and international celebration of Highland’s unmatched land, coast and water environment and natural, built and cultural heritage. Development will therefore be expected to align with this. It is considered that hydrogen has the potential to directly address and reconcile these two very challenging commitments.

5.4 Through the next stages – refining the IRSS – Highland has the opportunity to make delivery elements of the vision more explicit; subsequently there will be opportunity to reflect firmer proposals when the IRSS is translated into a statutory Regional Spatial Strategy under new duties expected to be gained next year by the Council as Planning Authority under the Planning (Scotland) Act 2019. The review of the Inner Moray Firth Local Development Plan, currently at Main Issues Report consultation stage, is presenting options for making decarbonisation a reality and paves the way for a robust position identifying land use implications and investments required. Whilst that Plan covers just part of Highland, in several key policy areas it is a signal of the direction of travel for the evolution of the Development Plan for the Highland area going forward. It is also noted that the area contains a number of key locations, assets and developments which can unlock opportunities for the rest of the Highland region.

5.5 The Committee on Climate Change (the "CCC"), as part of its 6th carbon budget setting out the UK's path to net zero, details multiple scenarios which explore the actions required across various sectors in order for the UK to achieve net zero emissions by 2050. Under the "balanced pathway" scenario, the CCC sets out actions across 3 key areas in respect of energy:

- Reducing demand for carbon-intensive activities – around 10% of the emissions saving required comes from changes which reduce demand for carbon-intensive activity, whilst a further 5% comes from improving efficiency in our use of energy and resources.
- Take up of low-carbon solutions – over half the required emissions saving comes from people and businesses adopting low-carbon solutions as high-carbon options are phased out. By the early 2030s, all new cars and vans and all boiler replacements in homes and other buildings must be low-carbon, and by 2040, all new heavy goods vehicles should be low-carbon. The CCC suggests that industry must either adopt technologies which use electricity or hydrogen instead of fossil fuels or install carbon capture, utilisation & storage (CCUS).
- Expansion of low-carbon energy supplies – low carbon electricity can now be produced more cheaply than high carbon electricity, and under the balanced pathway, the low carbon share increases from 50% now to 100% by 2035, cutting the UK's emissions by 18%. In addition, low carbon hydrogen production scales up to 90TWh by 2035 (around one third of the size of the current power sector). The CCC envisages that low carbon hydrogen will be used in areas less suited to electrification (e.g. shipping, HGVs and some industrial processes) and will be vital in providing flexibility to deal with intermittency in the power system.

5.6 Whilst the CCC recognise that a variety of interventions are going to be required to get to net zero (see fig.1 below), and that electrification of heat and transport is likely to play the biggest role, they **do not** recognise a credible pathway to net zero without hydrogen. There is therefore a significant opportunity for the Highland region to benefit from this energy transition, given that offshore wind is one of the cheapest ways to produce green (zero carbon) hydrogen and almost one quarter of Europe's offshore wind resource sits within our region.

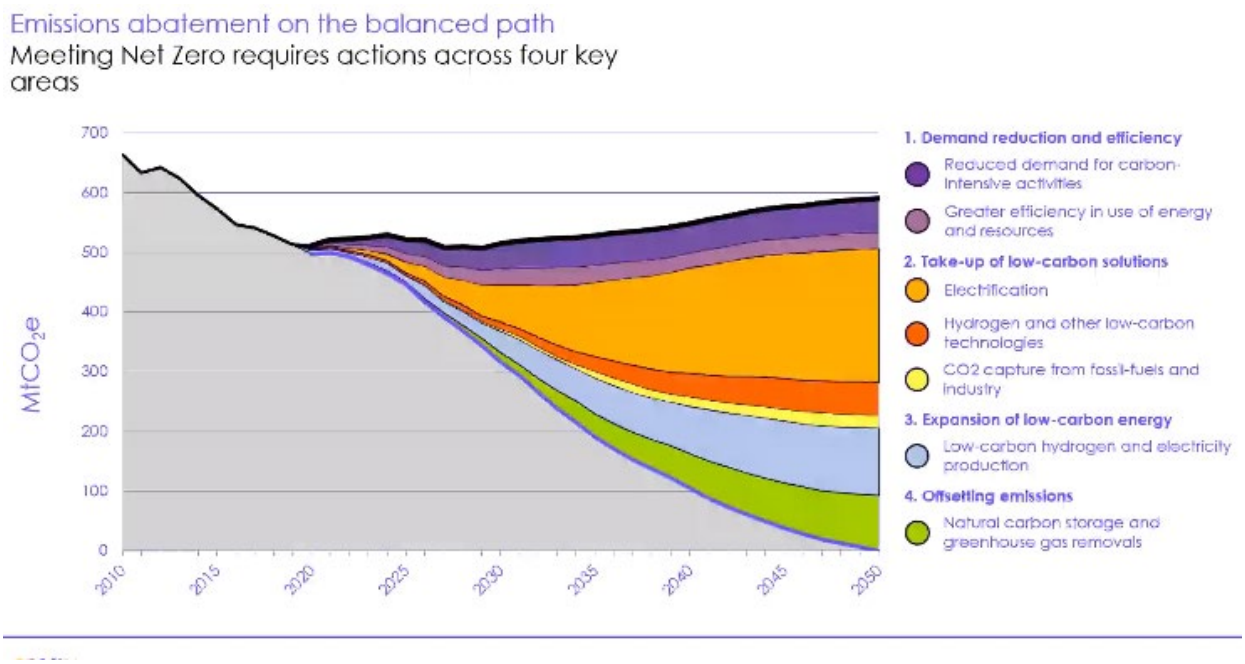

Fig. 1 – Emissions abatement to 2050 on the balanced pathway – Committee on Climate Change, 2020.

6. Opportunity Cromarty Firth

6.1 In January 2021, the Scottish Government announced proposals for a new model of Green Ports, which will be focussed on inclusive growth, fair work practices and delivering a net zero economy. The plans seek to adapt the UK Government's freeport proposals, offering streamlined planning processes, and a package of tax and customs reliefs whilst seeking to ensure that operators and businesses benefiting from Green Port status pay the living wage, commit to supporting sustainable and inclusive growth in local communities and contribute to Scotland's just transition to net zero.

6.2 As referenced above, Highland's natural and environmental assets make it uniquely well placed to drive Scotland's renewable energy transition and to deliver against both the local and national climate & ecological emergencies, whilst also supporting a just transition to net zero and a green economic recovery from the COVID-19 pandemic. A particularly significant opportunity in that regard is the generation of much more offshore wind electricity, which can usefully contribute to Scotland's decarbonisation commitments as well as the production of green hydrogen.

6.3 The Cromarty Firth is an area with significant geographical advantages, including close-proximity to a 50-year pipeline of £multi-billion offshore wind projects. The Cromarty Firth plans to build on its expertise and proven track record with this industry to construct and service these new offshore wind projects. In addition, the Firth has identified an opportunity to create Scotland's strategic national Renewable Energy Hub and will shortly be submitting a Green Port bid to the Scottish Government under the banner of Opportunity Cromarty Firth (OCF). The OCF project comprises various specific opportunities, with the two most pertinent to this paper detailed below:

- The Power House – Future Technology Centre – a new applied research centre, dedicated to developing floating offshore wind and green hydrogen technologies. The aim is to create a global centre of excellence and innovation, reinforcing Scotland's position as world leaders in floating offshore wind and green hydrogen opportunities at commercial scale. This centre is being hosted by the University of the Highlands & Islands in Alness.

- Electrolysis Facility & Hydrogen Storage – Green Hydrogen Hub – this opportunity would seek to produce hydrogen within the Cromarty Firth area from wind energy, particularly that generated by offshore windfarms in the Outer Moray Firth. Such a hub will be key to both regional and national decarbonisation plans and will provide valuable export opportunities for both expertise and technologies.

6.4 The recent Crown Estate Scotland ports study called for a strategic approach to national infrastructure investments, to ensure that taxpayers' money is spent wisely on the infrastructure that will be needed to support the planned expansion of renewable energy for our national power needs. The Cromarty Firth has been identified as one of the primary locations which is already well-positioned to become a renewable energy hub, serving projects across Scotland and creating export opportunities for Scottish technology and expertise.

6.5 The North of Scotland Hydrogen Programme was officially announced by the Port of Cromarty Firth on 5 March 2021, and is a multi-partner initiative to establish the hydrogen hub referenced at para 6.3 above which will seek to produce, store and distribute hydrogen to the region, Scotland, other parts of the UK and Europe. One of its projects will provide distilleries in the region with hydrogen, and this is being privately funded by partners including ScottishPower, Glenmorangie, Whyte & Mackay, Diageo, Port of Cromarty Firth and Pale Blue Dot Energy.

6.6 There are multiple benefits which are likely to flow from the successful development of a Hydrogen Hub within the Cromarty Firth, including:

- Economics - wind energy is now the cheapest way to produce electricity at scale, which means the resulting green hydrogen can be produced cost-effectively.
- Hydrogen production could resolve many of the grid constraint issues in the Highlands, thereby anchoring jobs here instead of bypassing the Highlands through shore connections landing outwith the area e.g. Moray West Offshore Windfarm.
- Various large, credible, non-seasonal off-takers of hydrogen in the region have been identified, who are likely to require the hydrogen from as early as 2022/2023.
- As a result, the OCF project is at a larger scale than other Scottish hydrogen projects. This is likely to prove much more attractive to investors and developers alike, as it costs almost as much to develop a small project as a large one.
- The offtakers identified by OCF are large, multi-national companies who can afford commercially attractive, long term contracts. Their main driver for wanting hydrogen is not price.
- Invergordon is located at the end of the gas grid, which means the grid could be decarbonised from one end. It is very much easier to decarbonise this way rather than trying to start somewhere in the middle.
- Low carbon heat – approximately 25% of energy is lost in the production of hydrogen and is released in the form of heat. However, if collected and used as power for a heat network, this loss of efficiency can become a source of energy for other applications.
- There is a large potential export market – Germany, the Netherlands and Belgium do not have sufficient wind resource to produce the hydrogen they need to decarbonise their industry. They are actively planning to import green hydrogen from wind and solar projects in other parts of Europe, including Scotland.

6.7 It is important to note that The Scottish Government's plans for Green Ports are to prioritise innovation and regeneration, fair work and decarbonisation. In addition, there will be no relaxation on marine environmental protections and there will be a significant focus on new jobs and innovation. In developing proposals under the initial Free Port guidelines, the Opportunity Cromarty Firth consortium had already recognised the need to demonstrate these particular aspects as part of their bid and have taken a strong position in respect of the potential for Green Port status. The associated developments can disproportionately contribute to Scotland's net zero agenda, and it is also expected by the Scottish Government that Green Port bids will align with the relevant Local Authority Development Plan, in this case, the Inner Moray Firth Local Development Plan.

6.8 As the Review of the Inner Moray Firth Local Development Plan (IMFLDP2) progresses, there will be opportunity to consider how best to reflect OCF, taking account of the progress of the project. For example, the IMFLDP2 might set the framework for a master planning approach to the development and regeneration. Furthermore, under the Planning (Scotland) Act 2019 the Council as Planning Authority is gaining new duties to consider making Masterplan Consent Area (MCA) schemes and this is an approach worth considering for OCF. MCAs would essentially grant up-front consents for planned development. MCAs would be a useful, proactive tool to promote and incentivise investment in development by providing consent in advance for specified types of development, in carefully defined circumstances, in a particular area. It can also set out up-front costs and help coordinate the delivery of necessary infrastructure. A key aspect is that within the MCA, the development management process is streamlined provided an application complies with the principles of the MCA Scheme for that area, which should be well informed in its preparation by community and stakeholder engagement and necessary assessments. A master planning approach to OCF (whether using the particular 'tool' of MCAs or not) could be key to a proactive place-making approach and ensure that benefits from the investment in the area are maximised and secured for all, as part of a just transition. Furthermore, development can not only add value to the area, it can also provide a catalyst for regional transformation, for example, by allowing Highland to be more responsive to opportunities from large sectors such as offshore renewables.

7. Aberdeen City Council – Opportunities for Collaboration

7.1 Subject to the agreement of the Scottish Government in May 2021, Aberdeen City Council has been nominally awarded funding from the Scottish Government's Energy Transition Fund for developing Aberdeen as a "Hydrogen Hub". This funding is intended to facilitate the production, storage and distribution of renewable hydrogen at scale, in a similar vein to Cromarty Firth proposals. Aberdeen City Council has an eight-year history of hydrogen refuelling and transport applications and they are intending to approach the market in early summer for an industry partner to help develop their Hub ambitions.

7.2 The Highland Council has been working with Aberdeen City Council, and another 10 other organisations, over the past 6 months (as part of the Interreg Smart HyAware project) to explore potential hydrogen uptake from amongst the Council vehicle fleet. The review concluded that 92% of our collective fleets could potentially use hydrogen if vehicles were available. Unfortunately, the review also concluded that full Fuel Cell Electric Vehicles are not likely to become available until 2025. In order to address this the Study recommended that the organisations involved continued to collaborate to share best practice, training, learning, funding opportunities and progress hydrogen vehicle procurement and hydrogen infrastructure roll out.

By working together, we could establish economies of scale and efficiencies. Given the Commercial and Procurement Shared Service between Highland, Aberdeenshire and Aberdeen City Council this is ideal opportunity to utilise Aberdeen City Council's hydrogen network and benefit from their experience.

7.3 Aberdeen is now engaging with the organisations involved in the fleet review and has offered to facilitate a number of actions, partially funded through the Energy Transition Fund. ACC intends to pursue an H2ICEd (Hydrogen injection into diesel combustion engine policy which equates to around 30% carbon emissions reductions) in the interim and intends to set up Aberdeen as a hydrogen retrofitting, maintenance and training centre for NE Scotland. If their Business Case to the Scottish Government is approved in May 2021, they have offered funding towards the retrofit of Highland Council vehicles from their Aberdeen base once established.

7.4 Aberdeen City Council has also been awarded feasibility funding for infrastructure. They are currently exploring the ideal "footprint" of a satellite hydrogen refuelling station (fuelled from a central production site). While work will initially focus on Aberdeen's needs, as they have a requirement for hydrogen in the short term, they have also offered to share the specifications of this and facilitate review of a site in Inverness if this is of interest. There may also be collaboration opportunities for supplies of green hydrogen if required in the short term as well, or as a reciprocal back up supply in the case of any shortages in the medium-long term.

7.5 If funding is secured, it is anticipated that the retrofit of the selected vehicles would be undertaken in Q2/Q3 2022/23, which would provide the Council with time to address some of the issues below:

- Staff training – there will be a need to ensure that fleet officers, mechanics etc are adequately trained in respect of the refuelling of vehicles. It is anticipated that Aberdeen City Council would undertake routine maintenance and servicing of the converted fleet, although there will be a longer-term need to upskill our staff to do this themselves, as the size of our hydrogen fleet grows.
- Refuelling – at present, there is no hydrogen refuelling station within Highland. Opportunities will be explored over the next 12-18 months to identify potential solutions, including mobile refuelling units which could cater for both Council and partner hydrogen fleet requirements.
- Alignment with wider fleet decarbonisation agenda i.e. electrification – the Council's new Fleet Decarbonisation Officer will be working closely with the Transport & Logistics Manager and other colleagues to identify the best short-term opportunities for both electrification and conversion to dual fuel of appropriate vehicles and the siting of charging and refuelling infrastructure, whilst also identifying and applying for external funding which can expedite this transition.
- The Council will need to consider how to subsidise the running costs of hydrogen fuelled vehicles in the short to medium term, until the supply of hydrogen is mainstreamed. Indicative trials in Aberdeen City Council show an increase in running costs when compared to equivalent diesel vehicles; however, discussions between officers across Councils suggest that an approach should be made to the Scottish Government with a view to identifying mechanisms to better enable this transition and reduce pressure on otherwise stretched budgets.

7.6 Trialling hydrogen fuelled vehicles will allow the Council to assess the whole life cost of this type of vehicle and will contribute to the wider strategy of decarbonising the fleet. Looking slightly further ahead, the fleet workshops will require investment, both in terms of the asset and the equipment, to make them suitable to service and maintain hydrogen fuelled vehicles.

8 Next Steps

8.1 The recommendations at paragraph 2.1 of this paper outline the key next steps for the Council in formalising support for the emerging hydrogen economy in Highland. In addition, Council support for the Opportunity Cromarty Firth Bid would demonstrate both an understanding and recognition by the Council of the potentially transformational role this development could have in respect of Highland's economic recovery from COVID-19 and to maximise the region's ongoing contribution to local, national and international decarbonisation efforts.

Designation:	Executive Chief Officer - Infrastructure and Environment
Date:	8 March 2021
Authors:	Scott Dalgarno, Development Plans Manager Keith Masson, Climate Change & Energy Team Manager David Cowie, Principal Planner
Background Papers:	Council's indicative Regional Spatial Strategy Opportunity Cromarty Firth webpage Scottish Government consultation response UK Government consultation response Crown Estate Scotland report - "Ports for offshore wind: A review of the net-zero opportunity for ports in Scotland", 2 Sept 2020