SUSTAINABLE DEVELOPMENT COMMITTEE 29 APRIL 2025

OUTER HEBRIDES ENERGY HUB (ISLANDS GROWTH DEAL)

Report by Chief Planning Officer

PURPOSE

1.1 The purpose of the Report is to seek approval of proposed changes to the Outer Hebrides Energy Hub project within the Islands Growth Deal.

EXECUTIVE SUMMARY

2.1 The Outer Hebrides Energy Hub builds on the Comhairle's vision for high value, local Hydrogen production which first found expression in the Creed Park Hydrogen Fuelling Station (2007). Since then, the award-winning Outer Hebrides Local Energy Hub project which created a circular economy from anaerobic digestion of fish waste through electrolysis into Hydrogen for Comhairle fleet and Oxygen for new smolt production and field leading work on Hydrogen at Lews Castle College have kept the Outer Hebrides in the vanguard of Hydrogen development.

2.2 The Outer Hebrides Energy Hub builds on these developments by aiming to deliver a replicable Green Hydrogen production facility at Arnish which will supply local, steam-dependent industries and Comhairle fleet / estate with Hydrogen. The Energy Hub was allocated £11m from the Islands Growth Deal (IGD).

2.3 The original IGD proposal was heavily reliant on SGN's conversion of their 1,700 consumer Stornoway Town Centre gas network from Propane to Hydrogen. However, a key UK Government decision on whether Hydrogen should be permitted for heat in homes has been delayed until late 2026 and this introduces an added element of risk to the original Energy Hub proposal.

2.4 In order to de-risk the Energy Hub project and focus it more tightly with a more manageable match-funding package, the Net Zero Technology Centre (NZTC) has been commissioned to develop a revised Outline Business Case for the project based on local demand, deliverable with or without SGN involvement but with capability to ramp up quickly should the SGN conversion be authorised.

2.5 The project outlines the journey of the Energy Hub project to date, starting small then engaging two of the world's largest Hydrogen developers before returning to a more focused scope with two A-list partners. The key features of the re-framed Energy Hub project are presented in section 10 of the report and Members are invited to agree the new shape of the project for submission, as part of the current set of Islands Growth Deal change proposals being put forward to UK and Scottish Government.

RECOMMENDATION

3.1 It is recommended that the Comhairle approve the revised scope of the Outer Hebrides Energy Hub, as outlined in the report.

Contact Officer: John Cunningham, Chief Planning Officer, *jcunningham@cne-siar.gov.uk*
Appendix: None
Background Papers: None

IMPLICATIONS

4.1 The following implications are applicable in terms of the Report.

Resource Implications	**Implications/None**
Financial	None
Legal	None
Staffing	None
Assets and Property	Significant positive impact on asset decarbonisation if Hydrogen solution is taken forward for the Comhairle / UHI: NW&H estate.
Strategic Implications	**Implications/None**
Risk	Approach seeks to reduce levels of risk.
Equalities	None
Corporate Strategy	The proposal supports delivery of Corporate Strategy commitments: Reduce our carbon footprint and deliver the Climate Change Strategy; Deliver the development projects associated with the Islands Deal; and, Prioritise investment in Comhairle buildings and infrastructure maximising effectiveness of available internal and external funding sources.
Environmental Impact	To be assessed through the Planning process.
Consultation	None

PROJECT ORIGINS

5.1 The Comhairle has a 20-year history of Hydrogen production and, in many respects, led the Scottish Public Sector in this sector with its pioneering Hydrogen Filling Station installed at Creed Enterprise Park in 2006. The presence of the Anaerobic Digester at Creed Enterprise Park later led to delivery of the award-winning Outer Hebrides Local Energy Hub (OHLEH) project. Around 2019, this project demonstrated the processing of Fish Farm waste through anaerobic digestion with product biogas used to generate electricity through a Combined Heat and Power plant. This renewable electricity was then used to electrolyse water into Hydrogen for Comhairle vehicles and Oxygen for return to the Fish Farm partner to be used in smolt growing. A true circular economy critically acclaimed across the public sector and industry.

5.2 With the Outer Hebrides set to become a major centre for renewable electricity generation through Onshore and Offshore Wind, the Comhairle identified the opportunity to develop a local Hydrogen economy of scale which could add considerable value to the renewable electricity otherwise destined for export to Grid. The presence of a leading Hydrogen facility at the then Lews Castle College and the growing cost and challenge of conventional Grid connection gave rise to a vision where locally produced Hydrogen could be used in island industry, transport and heat, attracting island graduates back to work in high value jobs around Hydrogen research, synthetic fuel development and so on.

SGN DRIVER

6.1 As the Islands Growth Deal (IGD) proposal was in development, the Comhairle was seeking the opportunity to take its Hydrogen vision to the next level. Attention was drawn to SGN's 1,700 consumer Stornoway Town Centre Gas Network and the UK Government's latest directives around gas network decarbonisation. Under these directives all gas networks were obliged to decarbonise fully by 2050 with 20% blending of 'low carbon gas' during the 2020's. SGN operate five 'off-Grid' Statutory Independent Undertakings (SIU) supplied by tanker (Wick, Thurso, Stornoway, Oban and Campbeltown) and the four mainland SIU's run on Liquid Natural Gas (LNG) while Stornoway alone runs on Propane, having converted from Butane in the late 1990's. The significance of this is that, while Hydrogen can be blended into LNG at up to 20% with no need for changes to pipework,

appliances etc, Hydrogen and Propane do not mix so a proposal for 20% blending necessarily becomes a 100% conversion.

6.2 A 'low carbon gas' for these purposes can be Biomethane or Hydrogen and the Comhairle quickly made clear to SGN that Biomethane was not favoured as it would be simply another imported gas with no added value in the islands. Locally produced Hydrogen, on the other hand, would drive world leading development and research in next generation fuels, placing the Outer Hebrides at the centre of a new UK Green Hydrogen economy.

6.3 There are sensitivities around the SGN opportunity, not least a delay in a key UK Government decision on whether Hydrogen is to be permitted for heat in homes until late 2026. Notwithstanding these sensitivities, it was agreed to proceed with a bid to the IGD for a Green Hydrogen production facility at Arnish, operational by 2027 with SGN as anchor offtaker. £11m was duly awarded to this project by the IGD and project scoping commenced.

6.4 With only a single gas supply system available in Stornoway, a 100% conversion of the town's gas network would leave gas customers with only one gas option, Hydrogen (or possibly Biomethane). The Propane supply would be deactivated on the day of conversion. Customer acceptance of Hydrogen as a fuel source in the home would, therefore, be critical.

GREEN GROWTH ACCELERATOR

7.1 In view of the need to raise customer awareness and acceptance of Hydrogen, the Comhairle, in consultation with SGN, began to formulate a separate, pre-SGN conversion, project which would see development of a small Green Hydrogen production facility (5MW to 10MW as opposed to the 30MW installation required for SGN). This facility would supply Green Hydrogen to key local industries and Comhairle fleet with by-product Oxygen available for the local Aquaculture and Health sectors. Through this project, prospective SGN Hydrogen customers would see Hydrogen being used safely in local industry and transport, easing the later transition of SGN's Stornoway Town Centre network.

7.2 Application was made to the Scottish Government's Green Growth Accelerator programme and £10m was duly approved for a smaller, local-offtake project which would run ahead of the main IGD SGN network conversion project. With Hydrogen being supplied by tube trailer to steam-dependent industries like seaweed processing, textiles, pharmaceuticals and distillation and to Comhairle buses and refuse collection vehicles, awareness of Hydrogen as a fuel would increase in the community, allowing gas network customers to be better informed when asked to receive Hydrogen as a fuel source in the home.

7.3 Unfortunately, pressing budgetary pressures led to the Scottish Government 'pausing' all six Green Growth Accelerator projects and the smaller, pre-SGN conversion project had to be shelved. Access to Scottish Government funding at Green Growth Accelerator scale remains a possibility with the Government offering to provide bespoke funding for a similar, local offtake project if the case is sufficiently compelling and the Comhairle will soon be revisiting this with Government colleagues.

LARGE SCALE COMMERCIAL INTEREST

8.1 As the Green Growth Accelerator door was closing, another door opened with the arrival of Fortescue Future Industries (FFI) in the Outer Hebrides. FFI is a global metal mining business headquartered in Australia employing 11,000 and with annual revenues of GBP 8.5 billion. FFI had been invited to Scotland by Scottish Development International (SDI), and Comhairle officers presented the Outer Hebrides Hydrogen opportunity to senior company management. This led to FFI selecting the Outer Hebrides as their preferred location for large scale Green Hydrogen production for export. The scale of FFI's ambition was unprecedented; 2GW of Hydrogen production on a 20 Hectare site.

8.2 Given the current state of the Hydrogen market, the Comhairle was sceptical over the deliverability of a project of this size but continued to provide support to FFI. Not unexpectedly, FFI suddenly withdrew from Scotland shortly afterwards, citing immaturity of industrial scale Hydrogen offtake as the reason for withdrawal.

8.3 RWE, the German energy major headquartered in Essen with 20,000 employees and annual revenues of GBP 11 billion already had an interest in the Outer Hebrides as SGN's appointed SIU decarbonisation partner. In its scenario planning around the proposed SGN gas network decarbonisation project, the Comhairle had already dealt with RWE's SGN team but the departure of FFI led to RWE's global team taking an interest in the Outer Hebrides. RWE's ambition was on a similar scale to FFI's and, again, the Comhairle supported RWE while reserving judgement on the deliverability of a project of this scale. Again, not unexpectedly, RWE suddenly withdrew from the Outer Hebrides, deciding to focus their entire Scottish Hydrogen investment on the decarbonising Grangemouth Refinery.

8.4 The sudden withdrawal of these commercial interests was clearly disappointing given the officer time invested. However, it demonstrated that, at a time when Hydrogen production technology at scale is still at the embryonic stage, the Outer Hebrides is catching the attention of the very largest global Hydrogen players. This says much about the quality of resource around these islands and the compelling offer in place through the Comhairle (the enabler), the landowner (The Stornoway Trust), the export vehicle (Stornoway Port Authority), the research partner (UHI North West & Hebrides), the technical partner (Net Zero Technology Centre) and innovating local offtakers.

PROJECT CONSOLIDATION AND IGD CHANGE REQUEST

9.1 Uncertainty around the SGN Stornoway Town Centre gas network conversion, driven primarily by the delayed UK Government decision on the use of Hydrogen for heat in homes and a very high match fund requirement (circa £70 million), presents a considerable risk around an IGD Outer Hebrides Energy Hub project which relies exclusively on SGN network conversion.

9.2 While the SGN gas network conversion project continues as a key feature of the Comhairle's Hydrogen vision, it is proposed to submit a Change Request to Uk and Scottish Government re-framing the IGD Outer Hebrides Energy Hub project around local offtake, deliverable with or without SGN gas network conversion. This removes the elevated risk around sole reliance on SGN's decarbonisation plans.

RE-FRAMED OUTER HEBRIDES ENERGY HUB IGD PROJECT

10.1 The Net Zero Technology Centre (NZTC) in Aberdeen are currently producing a revised Outline Business Case (OBC) for the Energy Hub Project which will focus on 5MW to 10MW Green Hydrogen production for supply to key local industrial offtakers by tube trailer. IGD funding will support site development at Arnish, Hydrogen storage on site at production, Hydrogen storage on site at offtake and tube trailer procurement. Hydrogen production partners will then deploy their own electrolyser solution at the Energy Hub in a 'plug and play' type of model.

10.2 Existing project partners are Malaysia based energy company, Petronas, and Edinburgh based engineering and environmental consultancy, Green Cat Renewables. This consortium will grow with Lewis Wind Power owners EDF Renewables and ESB and Uisenis Wind Farm owners EuroWind showing considerable interest.

10.3 The key features of the re-framed Energy Hub project are:

PROJECT PARTNERS: At this point in time, project partners are Malaysian energy company, Petronas, and Edinburgh based engineering and environmental consultancy, Green Cat Renewables. Lewis Wind Power are likely to supply 'private wire' power to the Energy Hub and owners EDF Renewables and

ESB have expressed an interest in the project. Other partners will join as the re-framed project becomes public.

COMMUNITY INVOLVEMENT: Community involvement has always been a key element of the Energy Hub project. There will be the opportunity for the community to become involved through 'Private Wire' power supply, principally through the planned 20% Shared Ownership of Stornoway Wind Farm and the option for community generators to supply power to the facility providing the economics work.

SITE: Arnish Headland, beyond the existing Arnish Yard, is the preferred location for initial deployment of the Energy Hub. This is a constrained site so, as production gears up for export, a second, larger site may have to be developed. Arnish Headland provides a number of advantages: 'made ground' consisting of excavated conglomerate from development of the existing Arnish Yard so no impact on virgin peat; proximity to a key offtaker (Hebridean Seaweed) so that gaseous Hydrogen can be pipelined directly from production to consumption; and, proximity to the considerable Oxygen market arising from any major aquaculture developments that may take place in the future. However, Arnish Headland is also subject to a number of significant Planning constraints including; impact on Stornoway Conservation Area; impact on the setting of the A-Listed Lews Castle; impact on the setting of the B-Listed Arnish Lighthouse; and, proximity to Arnish Gun Emplacements Scheduled Ancient Monuments. Planning consent is therefore not a given. Project design will be critical and close engagement with Planning colleagues will take place.

LAYOUT: At the scale of production proposed (5MW to 10MW), the site will consist of two plots: a 0.4HA plot housing electrolyser and compressor buildings, two Hydrogen storage banks and a tube trailer loading bay; and, b) a 0.3Ha plot containing administrative buildings and non-hazardous utilities. Precise layout will be determined by the requirements of Hazardous Substances Consent for Hydrogen production in excess of 2MW. Proximity to Hebridean Seaweed will be important to facilitate pipelined output.

POWER SUPPLY: Green Hydrogen production - that is production of Hydrogen from renewable electricity powered electrolysis of water as opposed to steam reforming of LNG (Grey Hydrogen) or steam reforming of LNG with carbon capture (Blue Hydrogen) - has always been, and always will be, the USP of the Outer Hebrides Energy Hub. The most transparent method of producing Green Hydrogen is from 'Private Wire' connection between wind turbine and electrolyser. Unfortunately, 'Private Wire' connection will not be available to the Energy Hub until Stornoway Wind Farm is built and energised in 2030. An acceptable transitionary arrangement is import of power from the Grid through a 'Green Power Purchase Agreement' which is a supply contract between an offtaker (the Energy Hub) and a Renewable Energy generator where the generator certifies that the amount of power being drawn from the Grid by the offtaker is, at least, equivalent to the amount of Renewable Energy exported to the Grid by the generator. This is effectively a virtual Private Wire arrangement.

OFFTAKE: Discussions have taken place with steam-dependent local offtakers in the seaweed processing, textiles, pharmaceuticals and distillation sectors. While all these industries are currently powered by fossil fuels (largely kerosene), all are keen to decarbonise but face a number of systemic challenges at present. For example: Hydrogen currently costs considerably more than kerosene; low density Hydrogen requires much more on-site storage capacity than kerosene and all offtakers are constrained for space; at this stage of commercialisation, conversion of heating plant from kerosene to Hydrogen is expensive; and, a reliable supply of Hydrogen is required for business continuity and resilience. The Energy Hub should be able to address most, if not all, of these concerns through the re-framed project being presented here.

HYDROGEN STORAGE: Hydrogen storage will be required on-site at production and on-site at offtake. The Comhairle is currently in discussions with Technip FMC (Norway) who are pioneering a seabed storage system for Hydrogen. This could be a good solution for the Energy Hub and for coastal-located offtakers. The use of tube trailers for transport and storage will be maximised. In other, early mover

Hydrogen Hub projects, the tube trailers themselves are left on-site with offtakers to boost storage capacity and this solution is under consideration for the Outer Hebrides Energy Hub.

PROJECT COST: The Net Zero Technology Centre indicates the following project costs:
Site Preparation - £5.0m
Grid Connection - £1.8m
Private Wire Connection - £2.2m
System Conversion (Offtake Sites) - £2.0m
Buffer Storage (Offtake Sites) – £3.6m
Tube Trailers - £1.1m
TOTAL - £15.7m

This is against an original IGD award of £11m. These capital costs do not include the revenue costs of closing the price gap between Hydrogen and kerosene for offtakers. The re-framed project will seek this price support through the next round of the UK Government's Hydrogen Allocation Round (HAR) but, should a HAR bid be unsuccessful, discussions are already taking place with GB Energy regarding potential compensatory revenue support for the project.

As envisaged in the original IGD submission, the re-framed project will establish a Green Hydrogen production facility at Arnish. If conversion of the Stornoway Town Centre gas network is green-lighted by UK Government late in 2026, the production facility will be in place and ready to ramp up production to supply the SGN network. Conversely, if the UK does not authorise Hydrogen for heat in homes, the Energy Hub remains viable with a growing range of routes to market available. In this way, the re-framed Energy Hub project significantly de-risks the original proposal which was unduly reliant on SGN network conversion.

FUTURE OPPORTUNITIES: There is a clear and pressing need to decarbonise the Comhairle's estate and the Sandwick Road campus (Comhairle Offices, The Nicolson Institute and Ionad Spors Leodhais), currently fuelled by kerosene and LPG, lends itself well to a single heat source District Heat Network with Hydrogen as its heat source. However, business resilience across these buildings requires a reliable and continuous supply of Hydrogen while Local Authority finances require a competitively priced fuel so now may not be the time to commit to Hydrogen as an only heat source. It is suggested that some thought be given to the development of a District Heat Network, powered initially by an LPG boiler which is 'Hydrogen ready' and can be switched over to Hydrogen once supply is assured.

A similar, Hydrogen fuelled District Heat Network opportunity exists at the Lews Castle campus (Lews Castle, Museum nan Eilean and UHI North West & Hebrides).

Finally, once refined and delivered and taking account of all the associated learning, the Energy Hub model will be easily replicable in other areas. A priority could be replication in Uist and Barra where a strong local Hydrogen market could exist from ferry re-fuelling and distillation.

CONCLUSION

11.1 The Change Request outlined in this report will result in a significantly de-risked project of achievable scale with or without SGN involvement. It removes an earlier over-reliance on SGN and takes advantage of four years of learning as expectations rose and fell. With two committed partners now, and ably guided by the Net Zero Technology Centre, there is a feeling that the Energy Hub is appropriately scaled and eminently deliverable. There is a new confidence around what the Energy Hub can achieve in terms of the decarbonisation of local industry, Comhairle fleet and Comhairle estate and the growth of a new, field leading, research and development sector. Encouraging discussions on funding with the Scottish Government and GB Energy indicate that there is widespread support for this project and that it is recognised as a UK leader in the development of local Hydrogen production and use.